SECTION EC
ENGINE CONTROL SYSTEM

CONTENTS

QR25DE

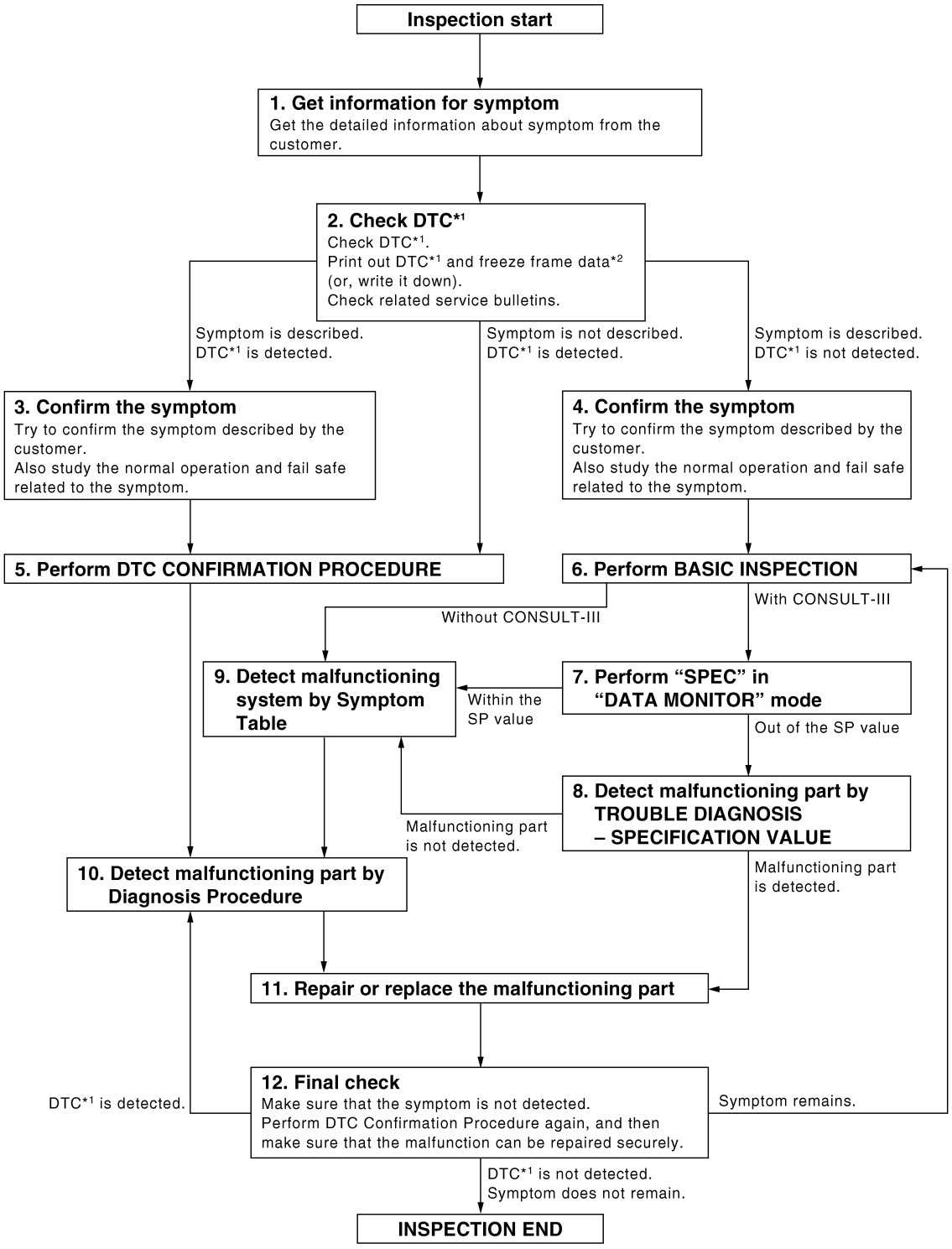
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000006391585

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-13, "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-95, "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-311, "Symptom Table".)

3. Check related service bulletins for information.

Is any symptom described and is any DTC detected?

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

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).
Also study the normal operation and fail safe related to the symptom. Refer to EC-315, "Description" and EC-284, "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-315, "Description" and EC-284, "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-286, "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 GI-42, "Intermittent Incident".

6.PERFORM BASIC INSPECTION

Perform EC-15, "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-107, "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-108, "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-311, "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-45, "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-274, "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-95, "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-95, "Diagnosis Description".)

Diagnostic Work Sheet

INFOID:0000000006391586

DESCRIPTION

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about an incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one on the WORKSHEET SAMPLE 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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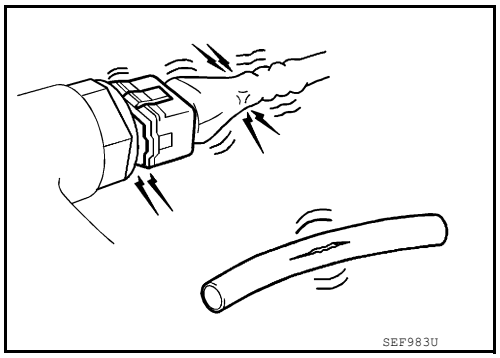
INSPECTION AND ADJUSTMENT
BASIC INSPECTION

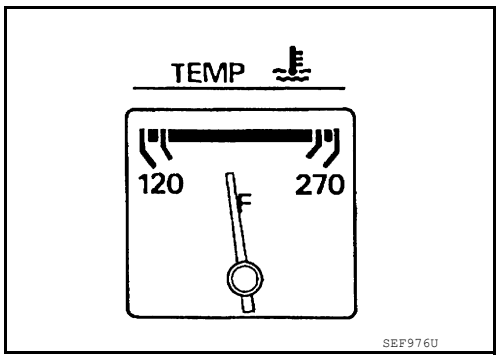
BASIC INSPECTION : Special Repair Requirement

INFOID:0000000006391587

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.

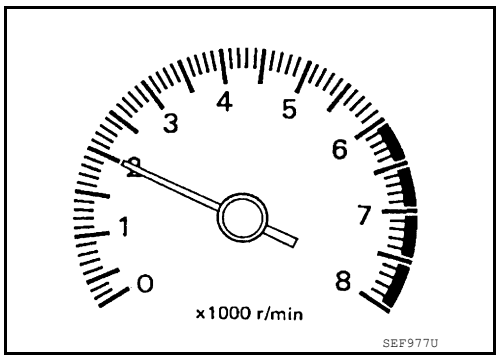




5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT-III or ECM [Diagnostic Test Mode II (self-diagnostic results)].

Is any DTC detected?

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



2.REPAIR OR REPLACE

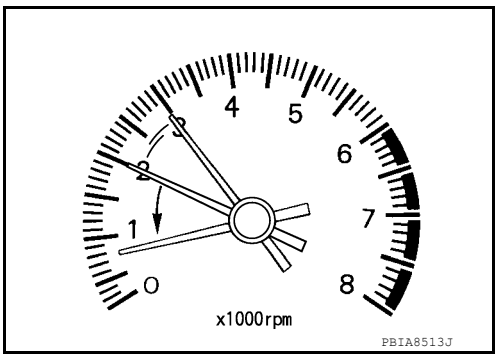
Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> 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-19, "IDLE SPEED : Special Repair Requirement". For specification, refer to EC-326, "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-19, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-20, "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-19, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to EC-326, "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-148, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-144, "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-227, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement".

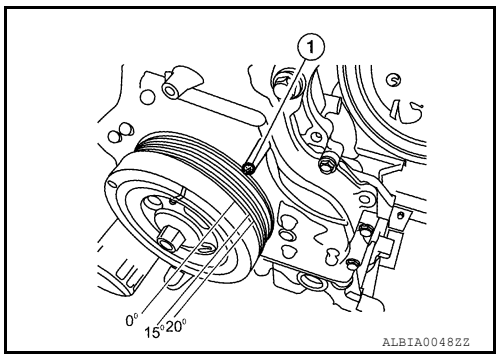
>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.

2. Check ignition timing with a timing light.
For procedure, refer to EC-19, "IGNITION TIMING : Special Repair Requirement". For specification, refer to EC-326, "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-19, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-20, "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-19, "IDLE SPEED : Special Repair Requirement".
For specification, refer to EC-326, "Idle Speed".

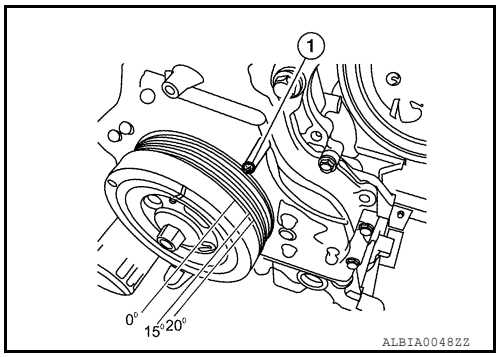
Is the inspection result normal?

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-19, "IGNITION TIMING : Special Repair Requirement". For specification, refer to EC-326, "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-53, "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-148, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-144, "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-227, "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-18, "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:0000000006391588

When replacing ECM, this procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement

INFOID:0000000006391589

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

Refer to SEC-227, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement".

>> GO TO 2.

2.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

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

>> GO TO 3.

3.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 4.

4.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

IDLE SPEED

IDLE SPEED : Description

INFOID:0000000006391590

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

IDLE SPEED : Special Repair Requirement

INFOID:0000000006391591

1.CHECK IDLE SPEED

With CONSULT-III
Check engine speed in “DATA MONITOR” mode with CONSULT-III.
Without CONSULT-III
Check engine speed by installing the pulse type tachometer clamp on the loop wire.

>> INSPECTION END

IGNITION TIMING

IGNITION TIMING : Description

INFOID:0000000006391592

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

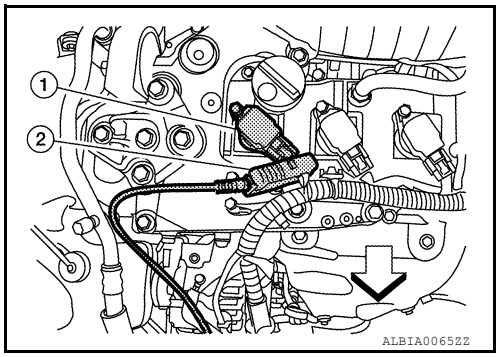
IGNITION TIMING : Special Repair Requirement

INFOID:0000000006391593

1.CHECK IGNITION TIMING

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

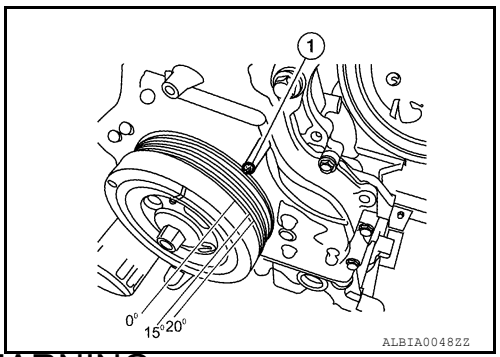
2 : Timing light
⇦ : Vehicle front



2. Check ignition timing.

1 : Timing indicator

>> INSPECTION END



ACCELERATOR PEDAL RELEASED POSITION LEARNING

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description

INFOID:0000000006391594

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:0000000006391595

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:0000000006391596

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:0000000006391597

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:0000000006391598

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:0000000006391599

1.PRECONDITIONING

Make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.
- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 100°C (158 - 212°F)
- Selector lever: P or N (CVT), Neutral (M/T)
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up

- CVT models
- With CONSULT-III: Drive vehicle until “ATF TENP SEN” in “DATA MONITOR” mode of “CVT” system indicates less than 0.9V.
- Without CONSULT-III: Drive vehicle for 10 minutes.

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

2. Perform Throttle Valve Closed Position Learning. Refer to EC-20, "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

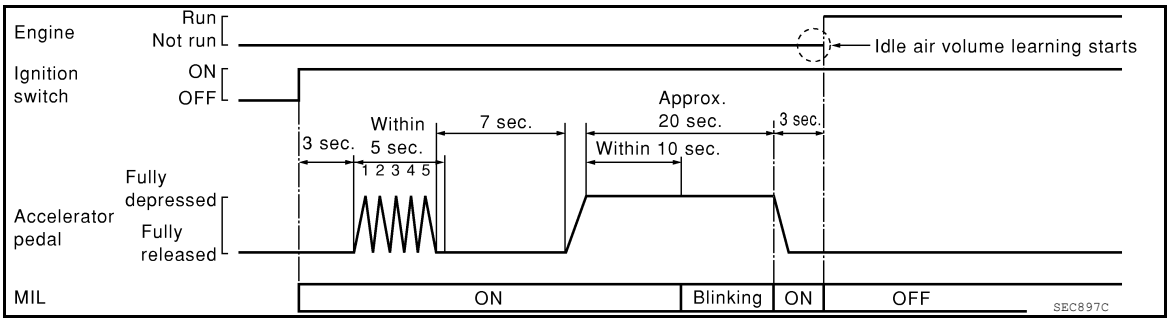
NOTE:

- **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-19, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
3. Start engine and warm it up to normal operating temperature.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
6. Repeat the following procedure quickly five times within 5 seconds.

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

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



>> GO TO 4.

4. CHECK IDLE SPEED AND IGNITION TIMING

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

ITEM	SPECIFICATION
Idle speed	CVT: 650 ± 50 rpm (in P or N position) M/T: 650 ± 50 rpm (in Neutral position)
Ignition timing	CVT: 15 ± 5° (in P or N position) M/T: 15 ± 5° (in Neutral position)

Is the inspection result normal?

YES >> INSPECTION END

5. DETECT MALFUNCTIONING PART

Check the following

- Check that throttle valve is fully closed.

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

Is the inspection result normal?

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

6. DETECT MALFUNCTIONING PART

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.
It is useful to perform “TROUBLE DIAGNOSIS - SPECIFICATION VALUE”. Refer to EC-107, "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:0000000006391600

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:0000000006391601

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.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Turn ignition switch ON.
7. Check DTC and confirm that DTC P0102 is detected.
8. Erase the DTC P0102.

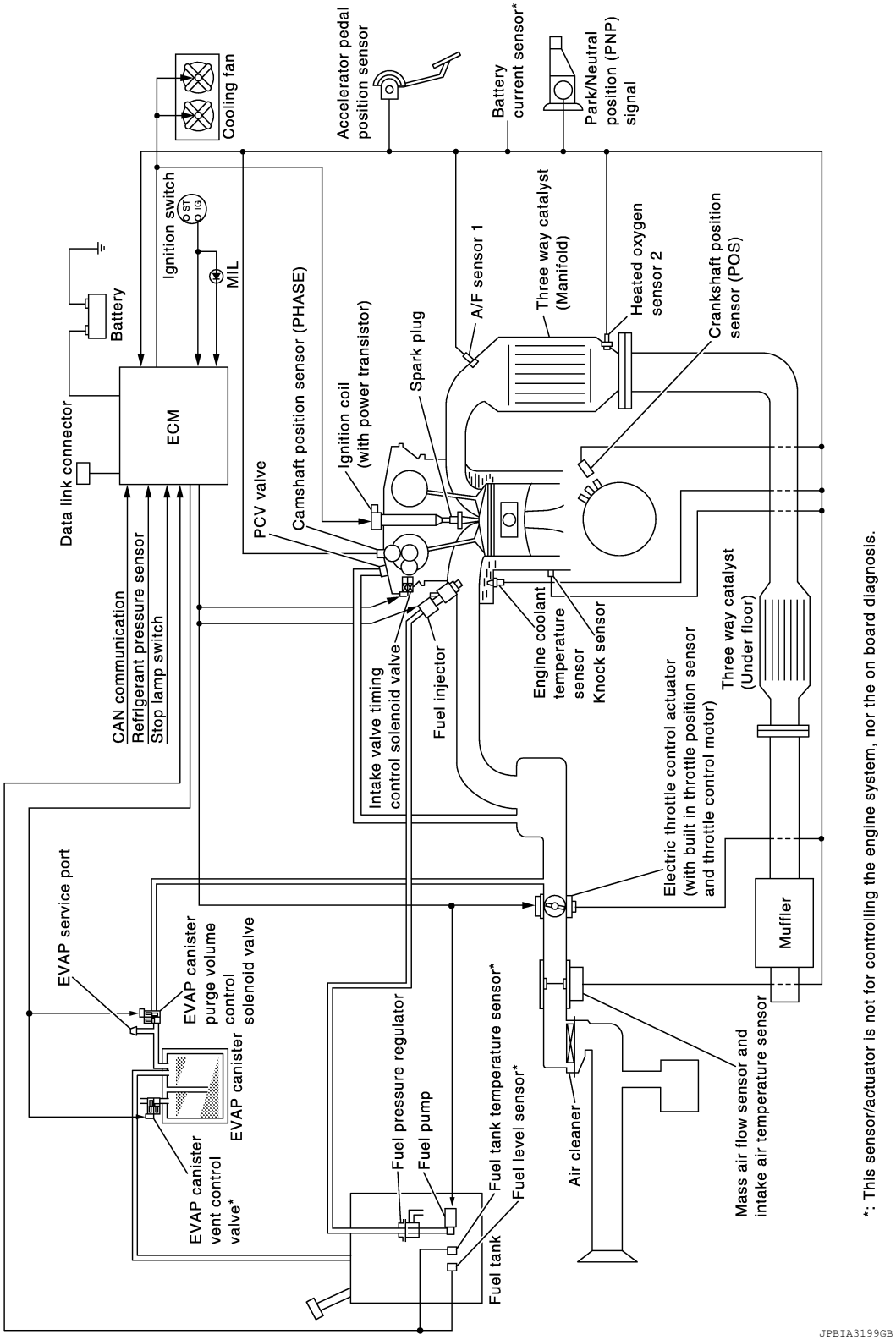
>> END

SYSTEM DESCRIPTION

ENGINE CONTROL SYSTEM

System Diagram

INFOID:0000000006391602



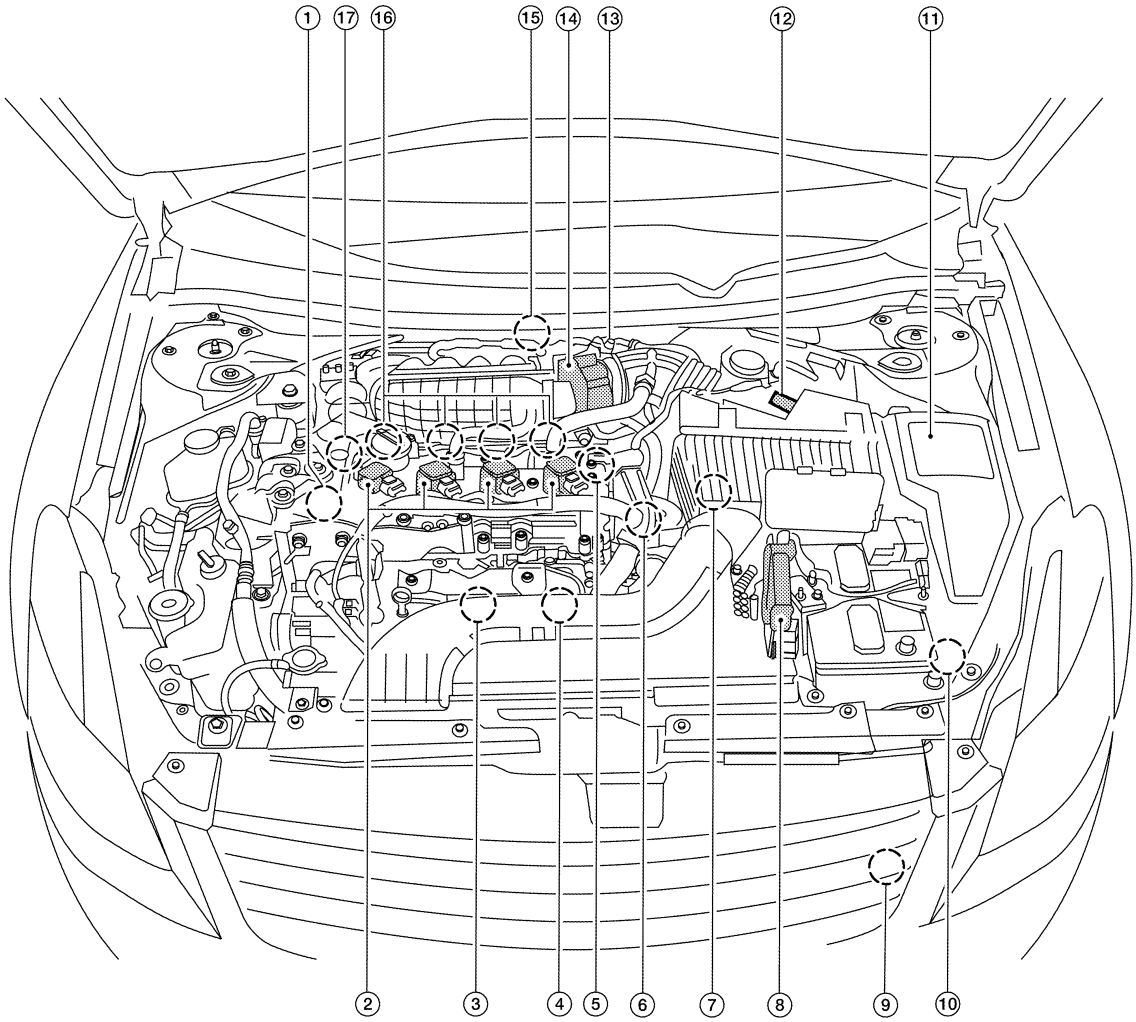
System Description

INFOID:0000000006391603

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

Component Parts Location

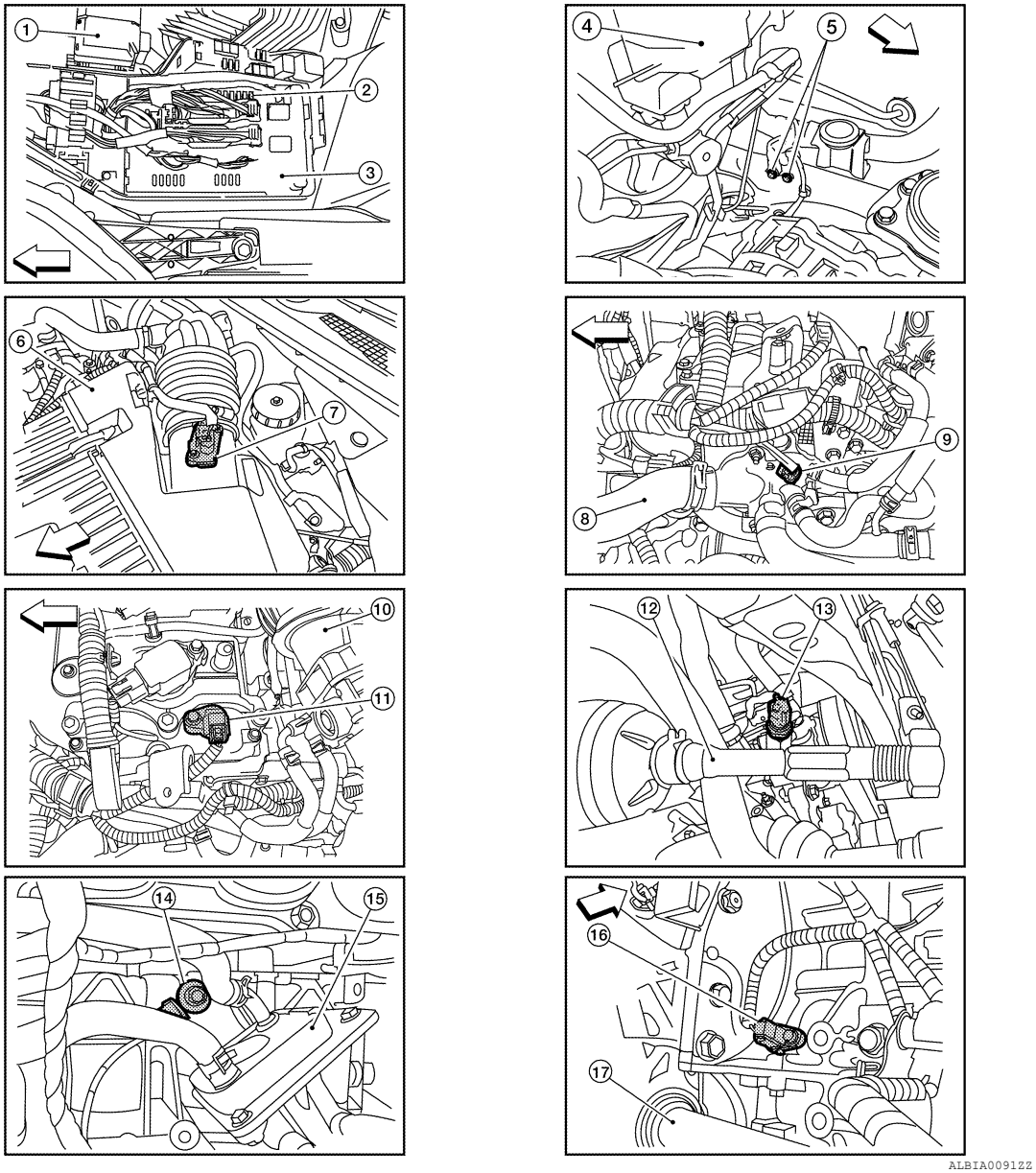
INFOID:0000000006391604



ALBIA0094ZZ

1. Intake valve timing control solenoid valve
2. Ignition coil (with power transistor) and spark plug
3. Knock sensor, Crankshaft position sensor (POS)
4. Air fuel ratio (A/F) sensor 1
5. Camshaft position sensor (PHASE)
6. Engine coolant temperature sensor
7. Transmission range switch (CVT models) Park/neutral position (PNP) switch (M/T models)
8. ECM
9. Refrigerant pressure sensor
10. Battery current sensor
11. IPDM E/R
12. Mass air flow sensor (with intake temperature sensor)

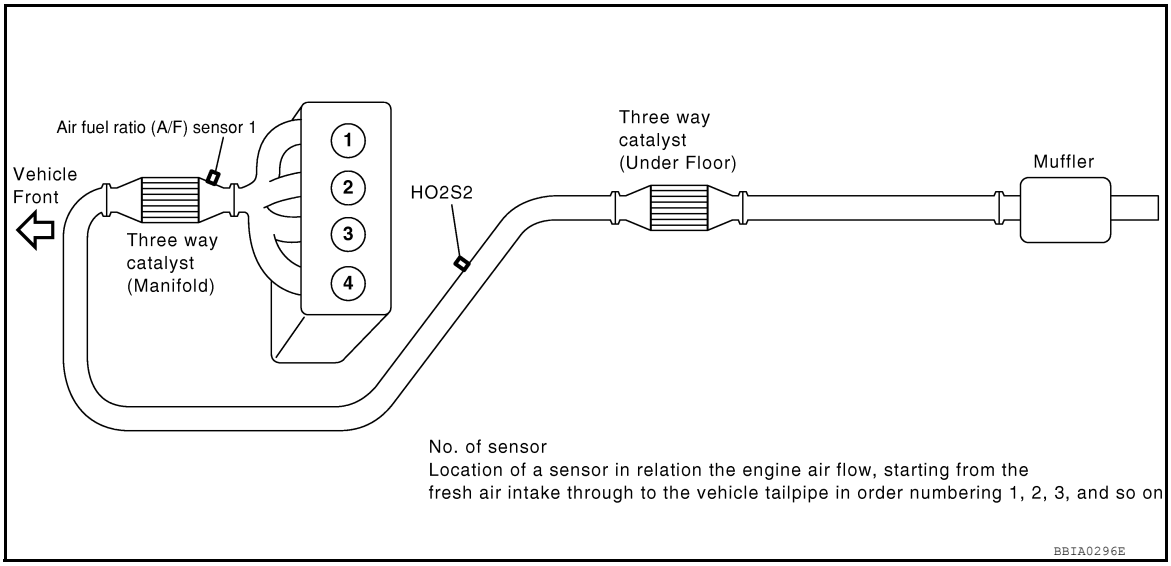
13. EVAP service port
14. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
15. EVAP canister purge volume control solenoid valve
16. Fuel injector
17. Power steering pressure sensor

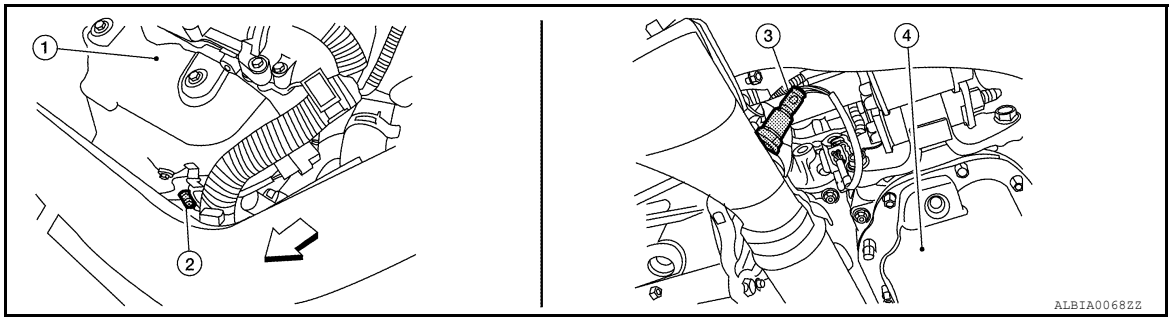


ALBIA0091ZZ

1. Battery
2. Fuel pump fuse (15A)
3. IPDM E/R
4. Brake master cylinder
5. Engine ground
6. Air cleaner assembly
7. Mass air flow sensor (with intake air temperature sensor)
8. Radiator hose (upper)
9. Engine coolant temperature sensor
10. Intake air duct
11. Camshaft position sensor (PHASE)
12. Tie rod (RH)
13. Power steering pressure sensor
14. Knock sensor
15. Engine oil cooler
16. Crankshaft position sensor (POS)
17. Drive shaft (RH)

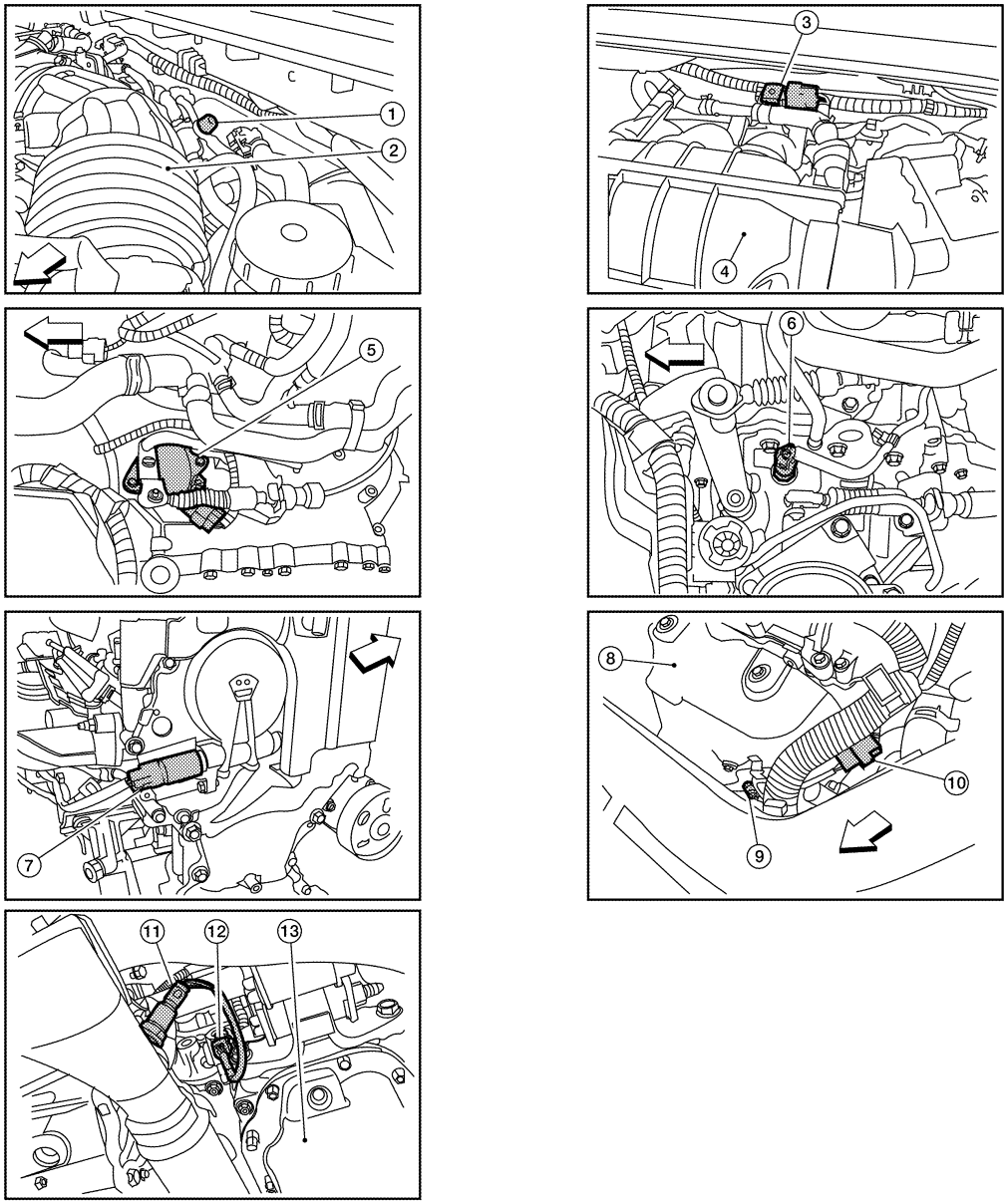
⇦: Vehicle front





1. Exhaust manifold cover
2. Air fuel ratio (A/F) sensor 1
3. Heated oxygen sensor 2 (This illustration is a view from under vehicle.)
4. Engine oil pan

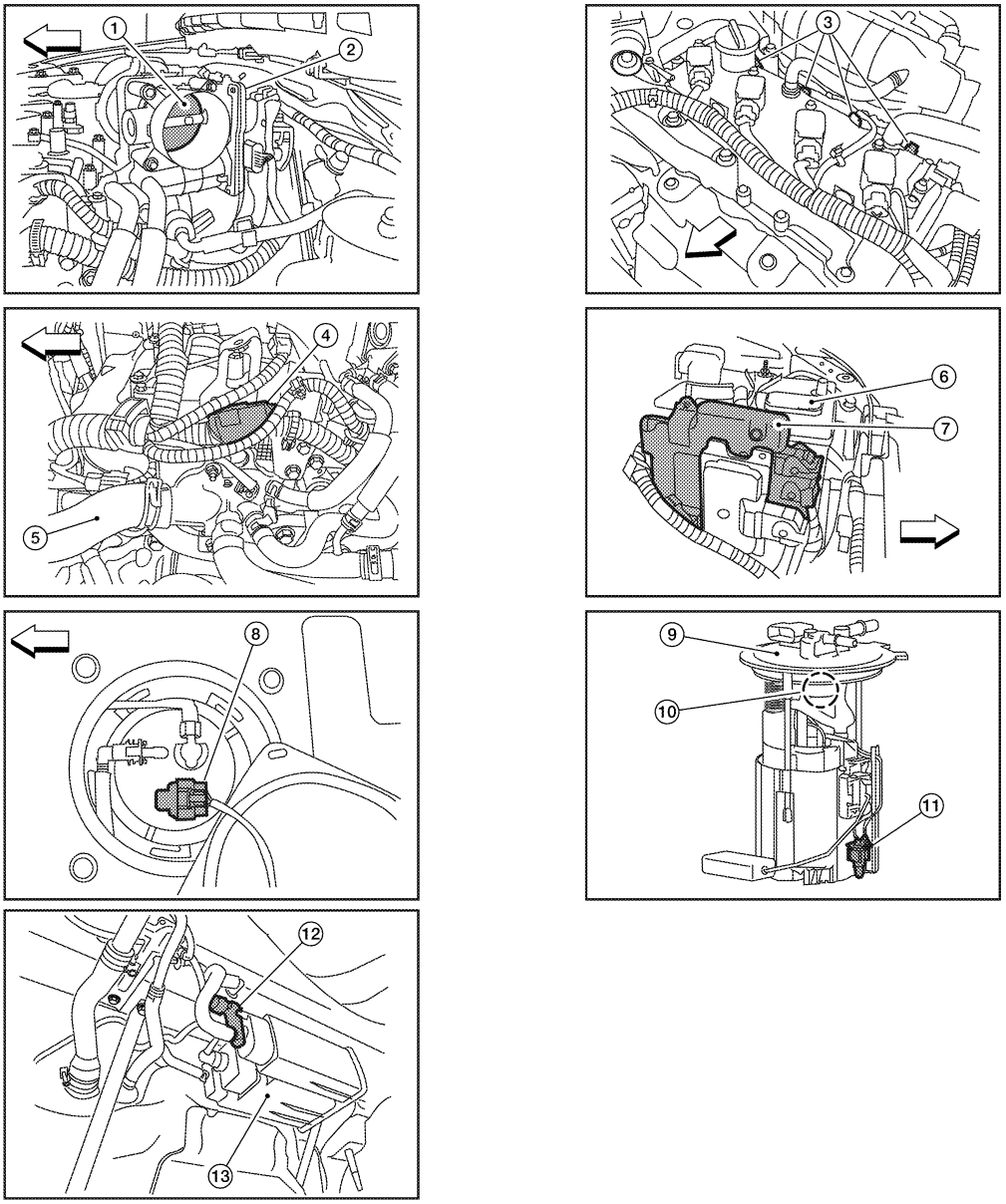
⇦: Vehicle front



ALBIA0095ZZ

1. EVAP service port
2. Intake air duct
3. EVAP canister purge volume control solenoid valve
4. Intake manifold collector
5. Transmission range switch (CVT models) (This illustration is view with air cleaner assembly removed.)
6. Park/neutral position (PNP) switch (M/T models) (This illustration is view with air cleaner assembly removed.)
7. Intake valve timing control solenoid valve (This illustration is view with engine removed.)
8. Exhaust manifold cover
9. Air fuel ratio (A/F) sensor 1
10. Air fuel ratio (A/F) sensor 1 harness connector
11. Heated oxygen sensor 2 (This illustration is view from under vehicle.)
12. Heated oxygen sensor 2 harness connector (This illustration is view from under vehicle.)
13. Engine oil pan

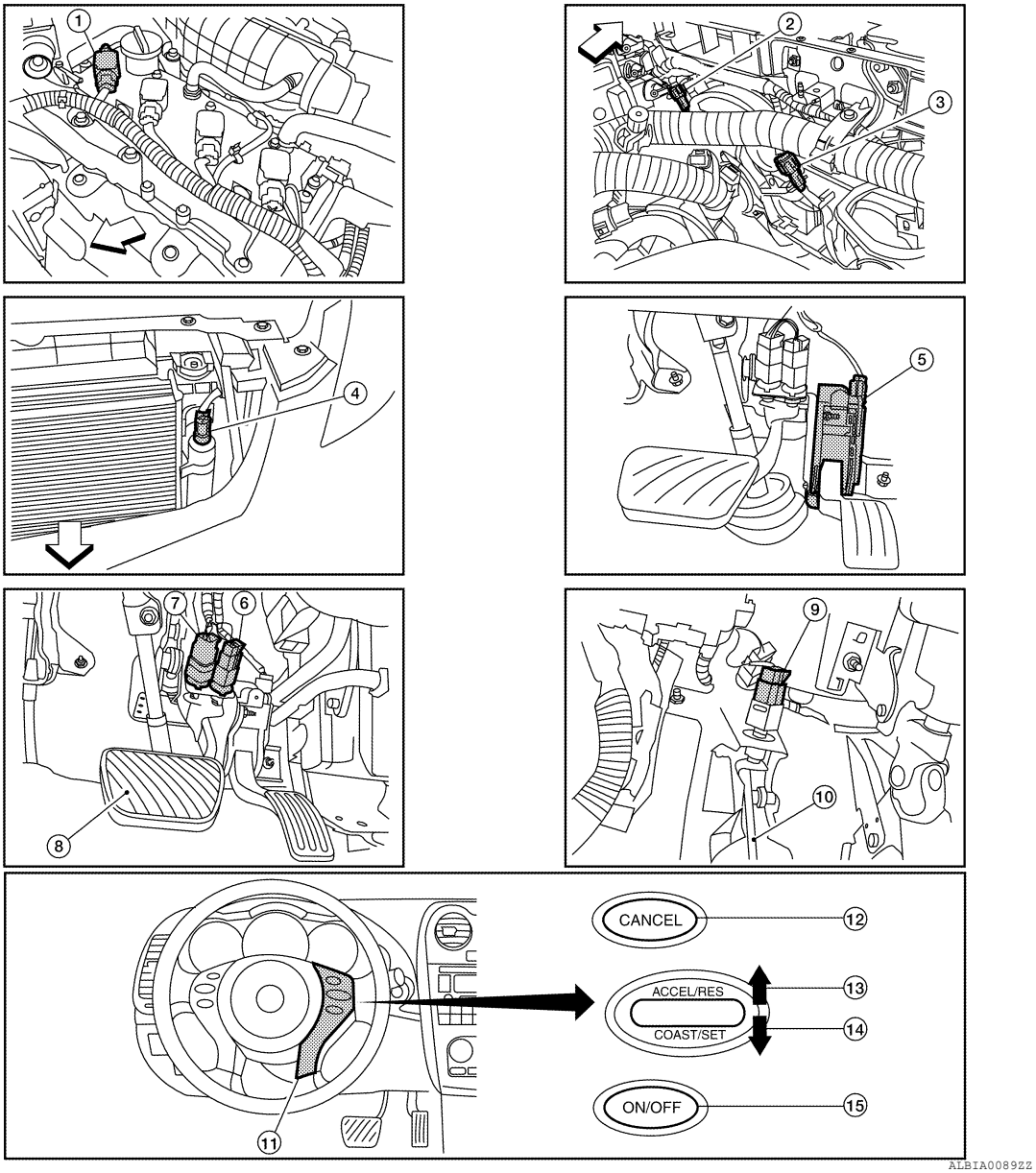
⇦: Vehicle front



ALBIA0518ZZ

1. Throttle valve (This illustration is view with intake air duct removed.)
2. Electric throttle control actuator
3. Fuel injector harness connector
4. Condenser-2
5. Radiator hose (upper)
6. Battery
7. ECM
8. Fuel level sensor unit and fuel pump harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
9. Fuel level sensor unit and fuel pump assembly
10. Fuel pressure regulator
11. Fuel tank temperature sensor
12. EVAP canister vent control valve (This illustration is view with rear suspension member removed.)
13. EVAP canister (This illustration is view with rear suspension member removed.)

⇦ : Vehicle front



1. No.1 ignition coil
2. Cooling fan motor-1 harness connector
3. Cooling fan motor-2 harness connector
4. Refrigerant pressure sensor
5. Accelerator pedal position sensor
6. ASCD brake switch
7. Stop lamp switch
8. Brake pedal
9. ASCD clutch switch
10. Clutch pedal
11. ASCD steering switch
12. CANCEL switch
13. RESUME/ACCELERATE switch
14. SET/COAST switch
15. MAIN switch

⇦: Vehicle front

Component Description

INFOID:0000000006391605

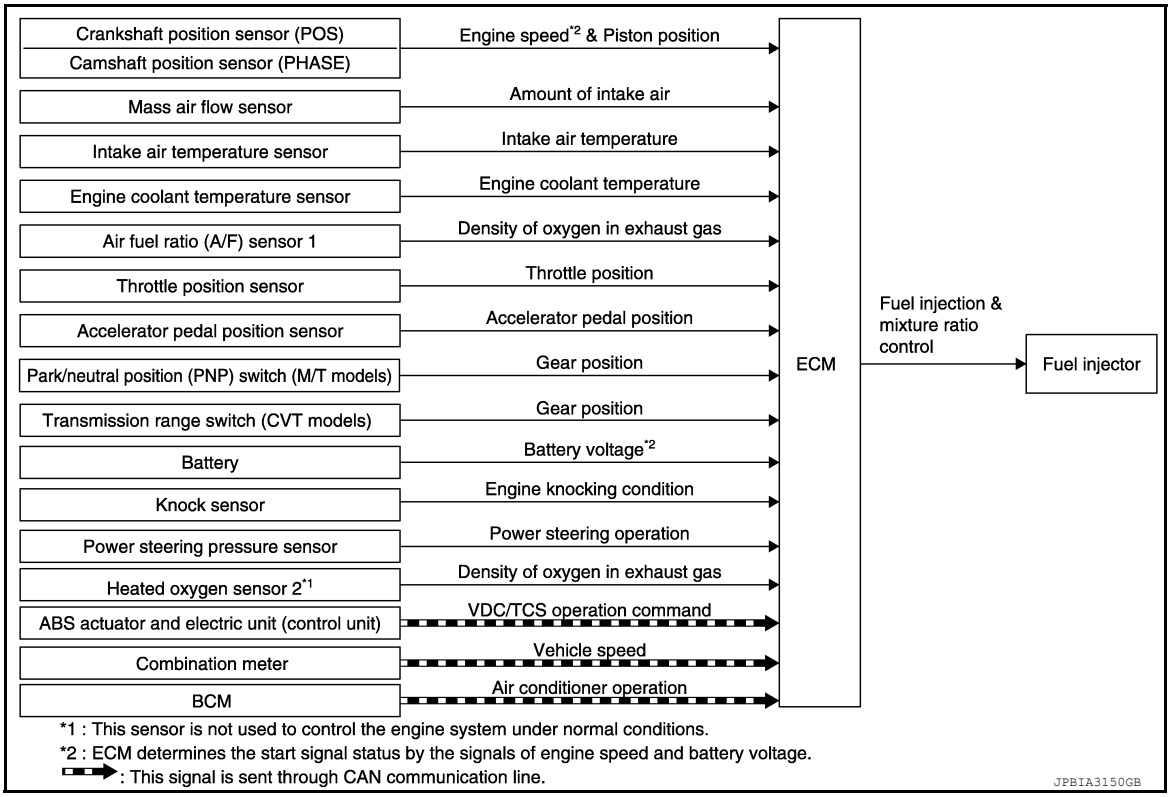
Component	Reference
A/F sensor 1	EC-228, "Description"
A/F sensor 1 heater	EC-231, "Description"
Accelerator pedal position sensor	EC-208, "Description"
ASCD brake switch	EC-179, "Description"

Component	Reference
ASCD steering switch	EC-176, "Description"
Camshaft position sensor (PHASE)	EC-148, "Description"
Crankshaft position sensor (POS)	EC-144, "Description"
Cooling fan motor	EC-67, "System Description"
Electric throttle control actuator	EC-206, "Description"
Engine coolant temperature sensor	EC-133, "Description"
EVAP canister purge volume control solenoid valve	EC-241, "Description"
Fuel injector	EC-247, "Description"
Fuel pump	EC-250, "Description"
Heated oxygen sensor 2	EC-254, "Description"
Heated oxygen sensor 2 heater	EC-259, "Description"
Ignition signal	EC-264, "Description"
Intake air temperature sensor	EC-262, "Description"
Intake valve timing control solenoid valve	EC-87, "System Description"
Knock sensor	EC-142, "Description"
Mass air flow sensor	EC-128, "Description"
PCV valve	EC-270, "Description"
Power steering pressure sensor	EC-154, "Description"
Refrigerant pressure sensor	EC-271, "Description"
Stop lamp switch	EC-193, "Description"
Throttle control motor	EC-204, "Description"
Throttle control motor relay	EC-198, "Description"
Throttle position sensor	EC-136, "Description"

MULTIPORT FUEL INJECTION SYSTEM

System Diagram

INFOID:0000000006391606



System Description

INFOID:0000000006391607

INPUT/OUTPUT SIGNAL CHART

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

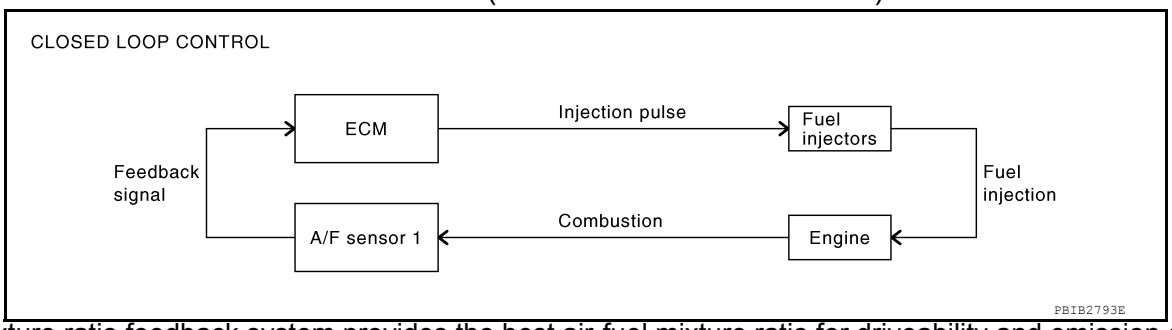
VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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 (CVT models)
- High-load, high-speed operation

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

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses A/F sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about A/F sensor 1, refer to EC-228, "Description". This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).

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

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

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

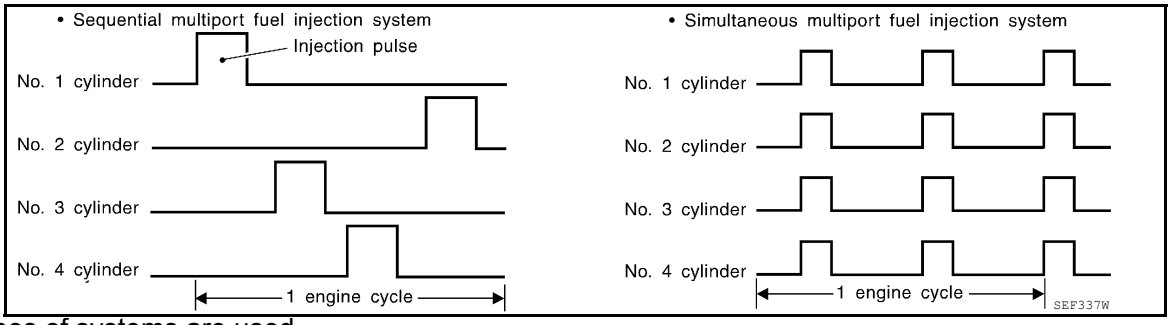
- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of A/F sensor 1 or its circuit
- Insufficient activation of A/F sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (CVT models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

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

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

FUEL INJECTION TIMING



Two types of systems are used.

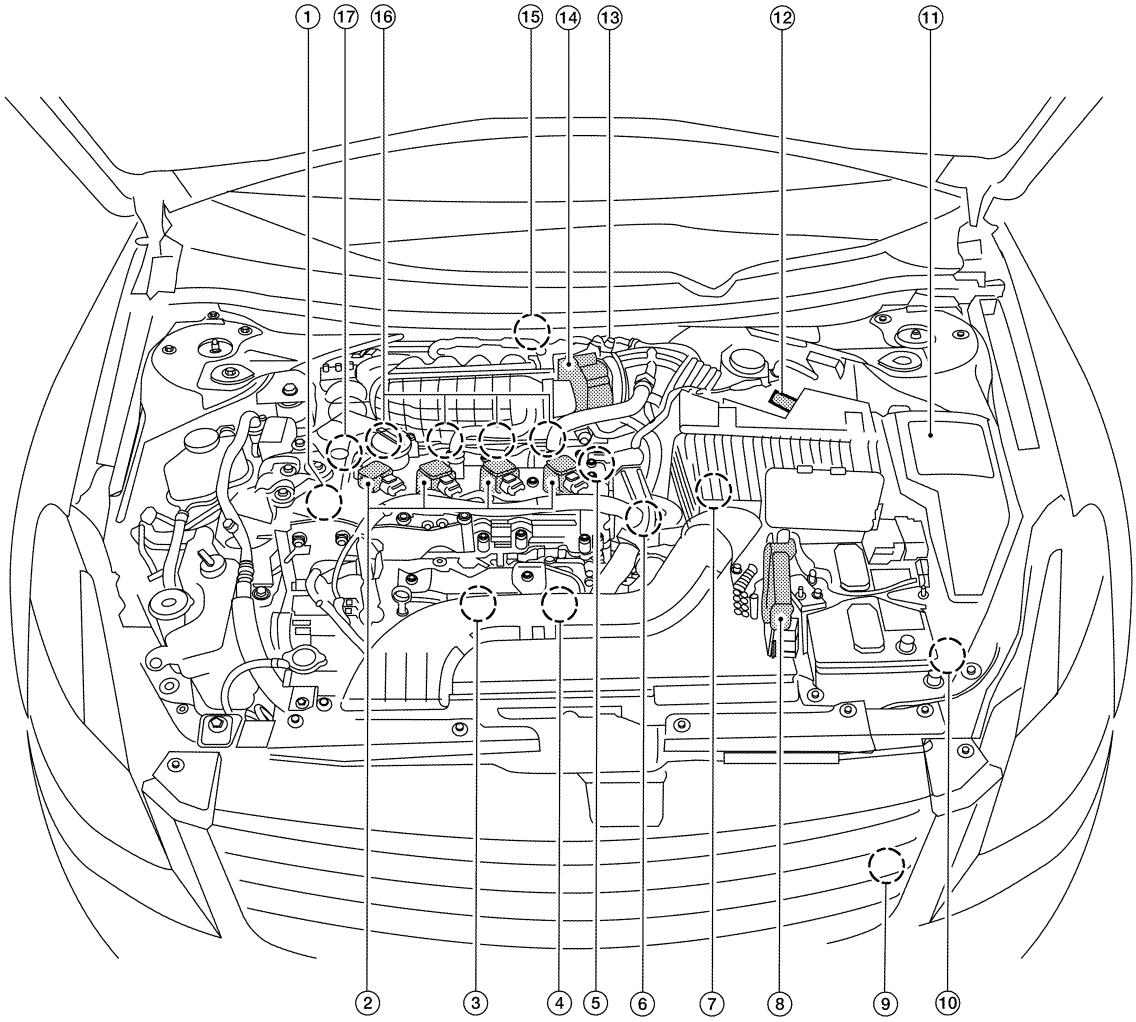
- Sequential Multiport Fuel Injection System
  Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.
- Simultaneous Multiport Fuel Injection System
  Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
  The four injectors will then receive the signals two times for each engine cycle.
  This system is used 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:0000000006391608



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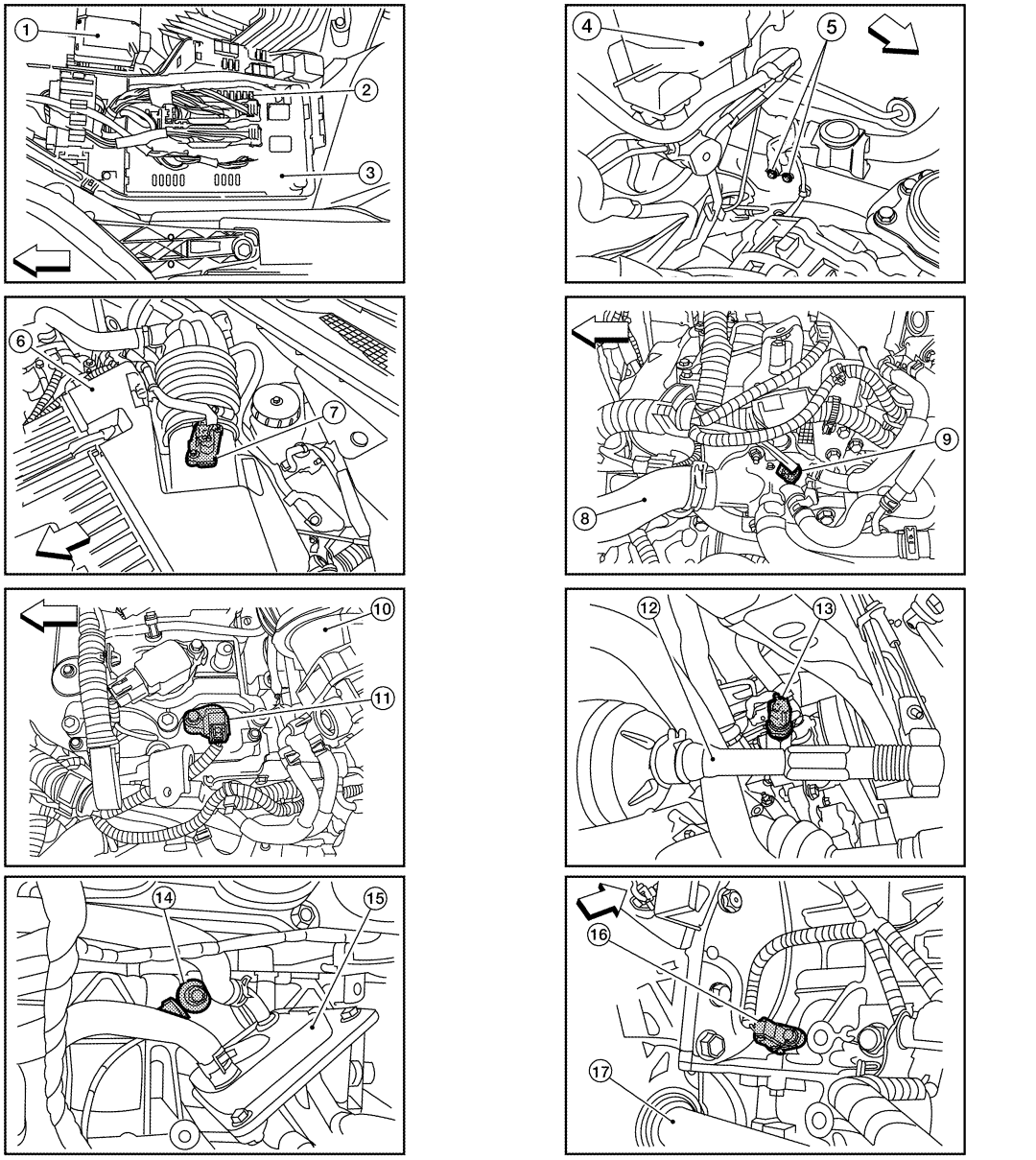
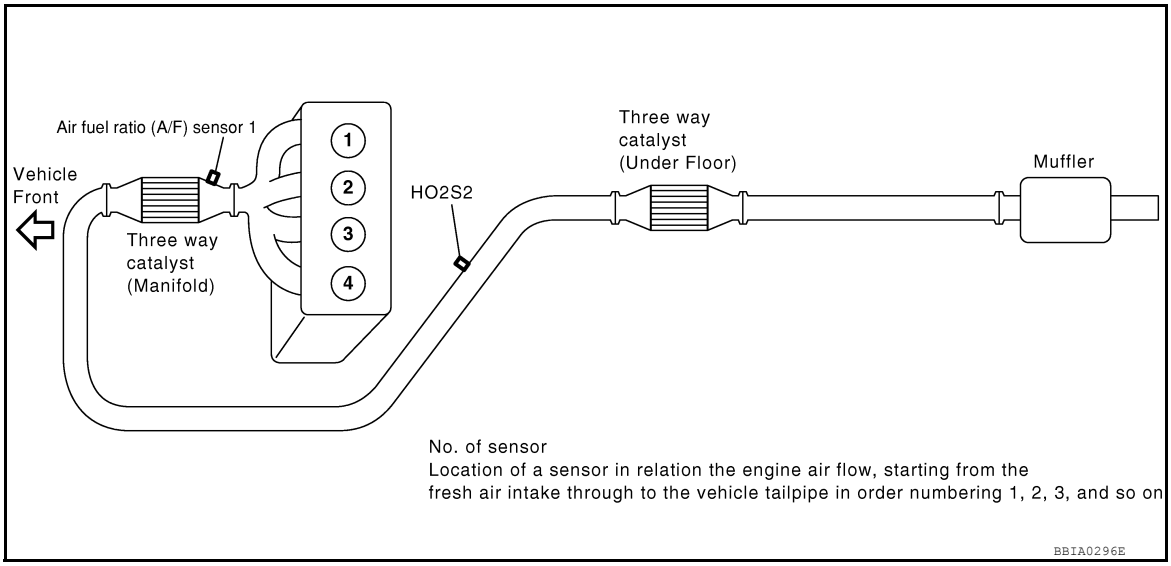
1. Intake valve timing control solenoid valve
2. Ignition coil (with power transistor) and spark plug
3. Knock sensor, Crankshaft position sensor (POS)
4. Air fuel ratio (A/F) sensor 1
5. Camshaft position sensor (PHASE)
6. Engine coolant temperature sensor
7. Transmission range switch (CVT models) Park/neutral position (PNP) switch (M/T models)
8. ECM
9. Refrigerant pressure sensor
10. Battery current sensor
11. IPDM E/R
12. Mass air flow sensor (with intake temperature sensor)
13. EVAP service port
14. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
15. EVAP canister purge volume control solenoid valve
16. Fuel injector
17. Power steering pressure sensor

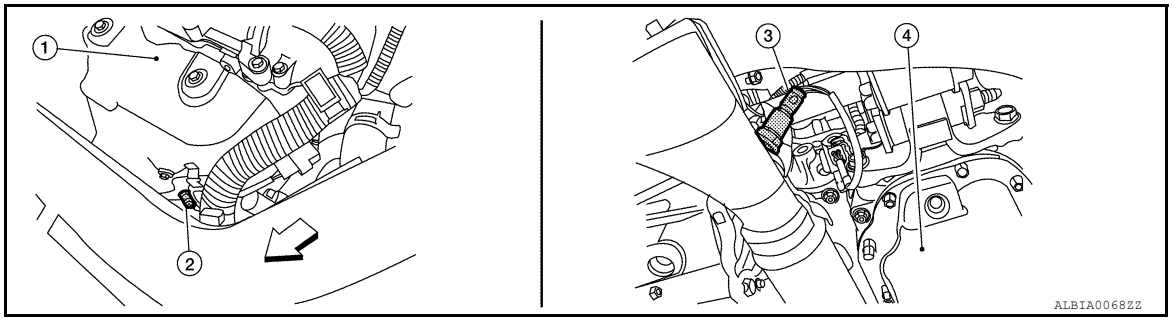


ALBIA0091ZZ

1. Battery
2. Fuel pump fuse (15A)
3. IPDM E/R
4. Brake master cylinder
5. Engine ground
6. Air cleaner assembly
7. Mass air flow sensor (with intake air temperature sensor)
8. Radiator hose (upper)
9. Engine coolant temperature sensor
10. Intake air duct
11. Camshaft position sensor (PHASE)
12. Tie rod (RH)
13. Power steering pressure sensor
14. Knock sensor
15. Engine oil cooler
16. Crankshaft position sensor (POS)
17. Drive shaft (RH)

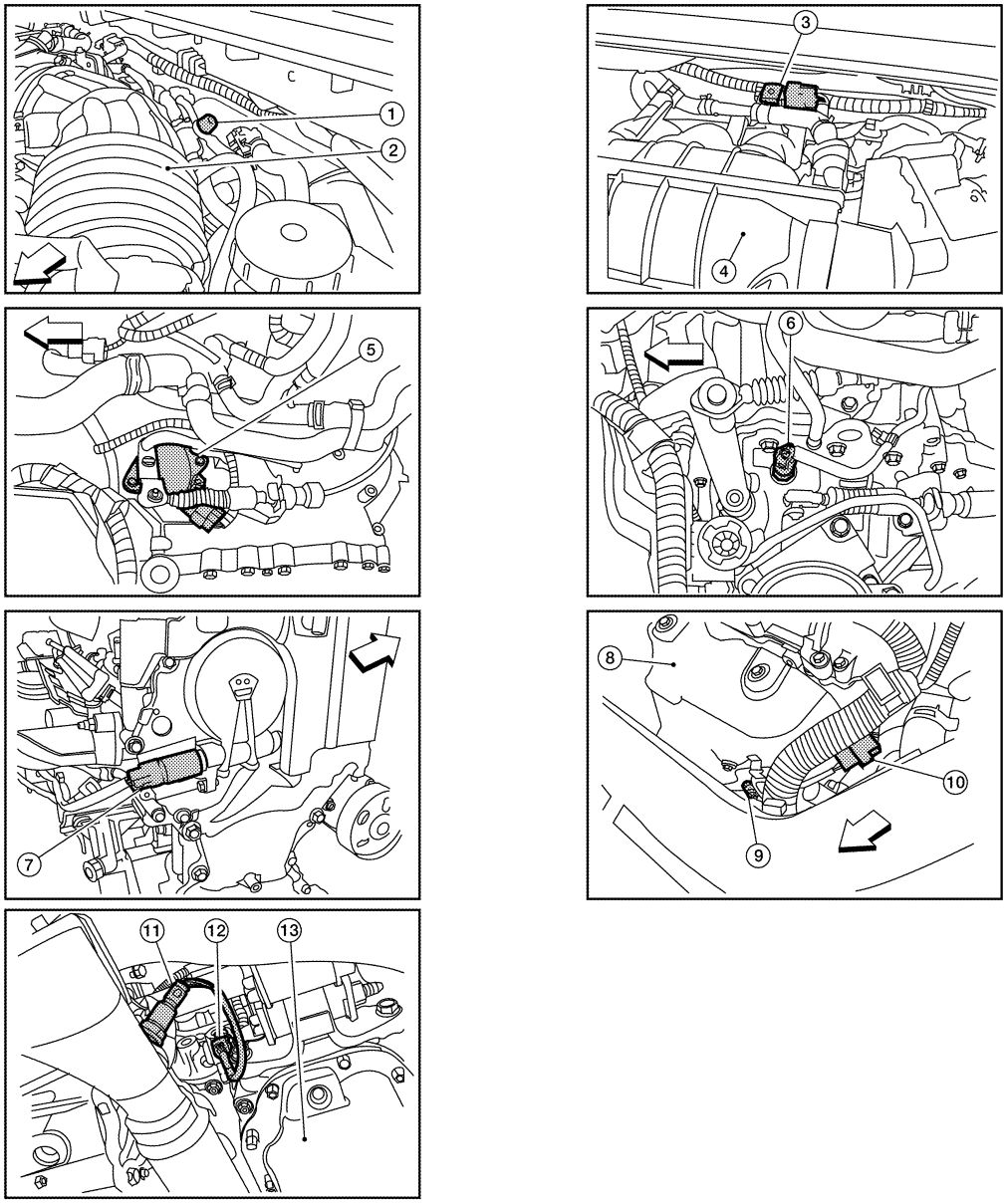
⇦: Vehicle front





1. Exhaust manifold cover
2. Air fuel ratio (A/F) sensor 1
3. Heated oxygen sensor 2 (This illustration is a view from under vehicle.)
4. Engine oil pan

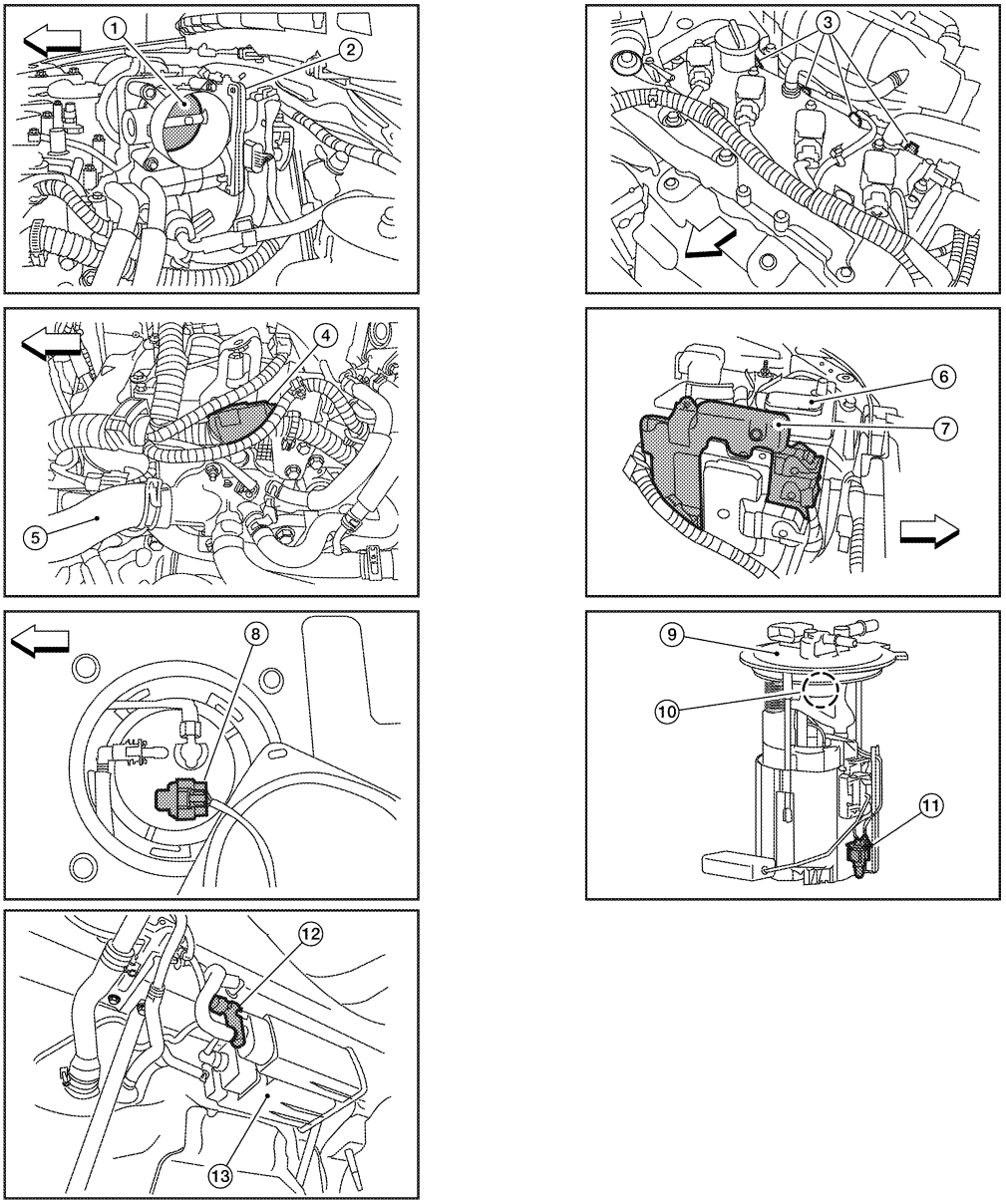
⇦: Vehicle front



ALBIA0095ZZ

1. EVAP service port
2. Intake air duct
3. EVAP canister purge volume control solenoid valve
4. Intake manifold collector
5. Transmission range switch (CVT models) (This illustration is view with air cleaner assembly removed.)
6. Park/neutral position (PNP) switch (M/T models) (This illustration is view with air cleaner assembly removed.)
7. Intake valve timing control solenoid valve (This illustration is view with engine removed.)
8. Exhaust manifold cover
9. Air fuel ratio (A/F) sensor 1
10. Air fuel ratio (A/F) sensor 1 harness connector
11. Heated oxygen sensor 2 (This illustration is view from under vehicle.)
12. Heated oxygen sensor 2 harness connector (This illustration is view from under vehicle.)
13. Engine oil pan

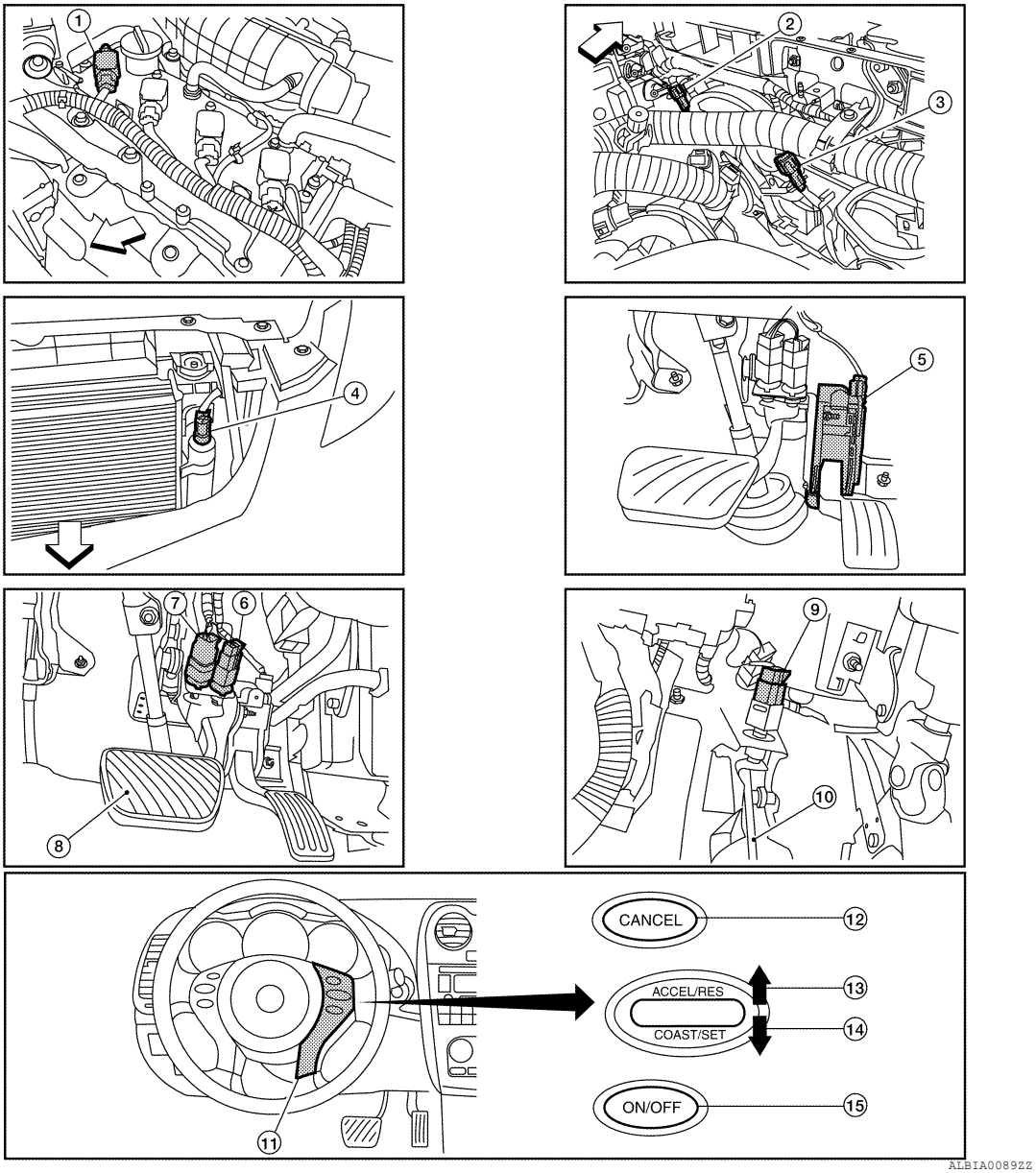
⇦: Vehicle front



ALBIA0518ZZ

1. Throttle valve (This illustration is view with intake air duct removed.)
2. Electric throttle control actuator
3. Fuel injector harness connector
4. Condenser-2
5. Radiator hose (upper)
6. Battery
7. ECM
8. Fuel level sensor unit and fuel pump harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
9. Fuel level sensor unit and fuel pump assembly
10. Fuel pressure regulator
11. Fuel tank temperature sensor
12. EVAP canister vent control valve (This illustration is view with rear suspension member removed.)
13. EVAP canister (This illustration is view with rear suspension member removed.)

⇦ : Vehicle front



1. No.1 ignition coil
2. Cooling fan motor-1 harness connector
3. Cooling fan motor-2 harness connector
4. Refrigerant pressure sensor
5. Accelerator pedal position sensor
6. ASCD brake switch
7. Stop lamp switch
8. Brake pedal
9. ASCD clutch switch
10. Clutch pedal
11. ASCD steering switch
12. CANCEL switch
13. RESUME/ACCELERATE switch
14. SET/COAST switch
15. MAIN switch

⇦: Vehicle front

Component Description

INFOID:0000000006391609

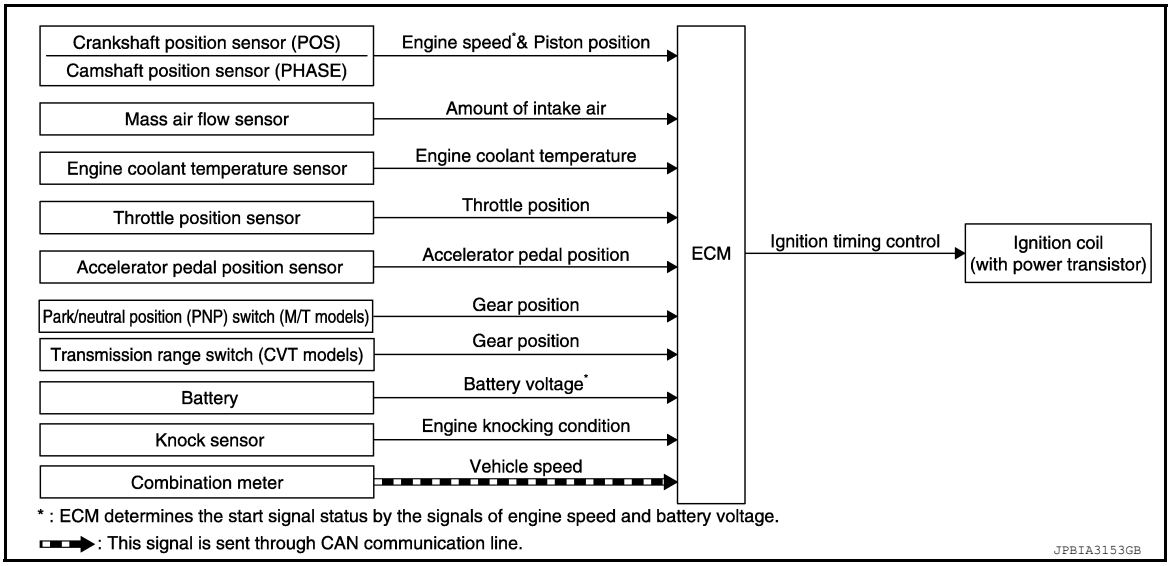
Component	Reference
A/F sensor 1	EC-228, "Description"
Accelerator pedal position sensor	EC-208, "Description"
Camshaft position sensor (PHASE)	EC-148, "Description"
Crankshaft position sensor (POS)	EC-144, "Description"

Component	Reference
Engine coolant temperature sensor	EC-133, "Description"
Fuel injector	EC-247, "Description"
Heated oxygen sensor 2	EC-254, "Description"
Intake air temperature sensor	EC-262, "Description"
Knock sensor	EC-142, "Description"
Mass air flow sensor	EC-128, "Description"
Power steering pressure sensor	EC-154, "Description"
Throttle position sensor	EC-136, "Description"
Vehicle speed sensor	EC-152, "Description"

ELECTRIC IGNITION SYSTEM

System Diagram

INFOID:0000000006391610



System Description

INFOID:0000000006391611

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		
Transmission range switch (CVT models) Park/neutral position (PNP) switch (M/T models)	Gear position		
Combination meter	Vehicle speed*1		

*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.

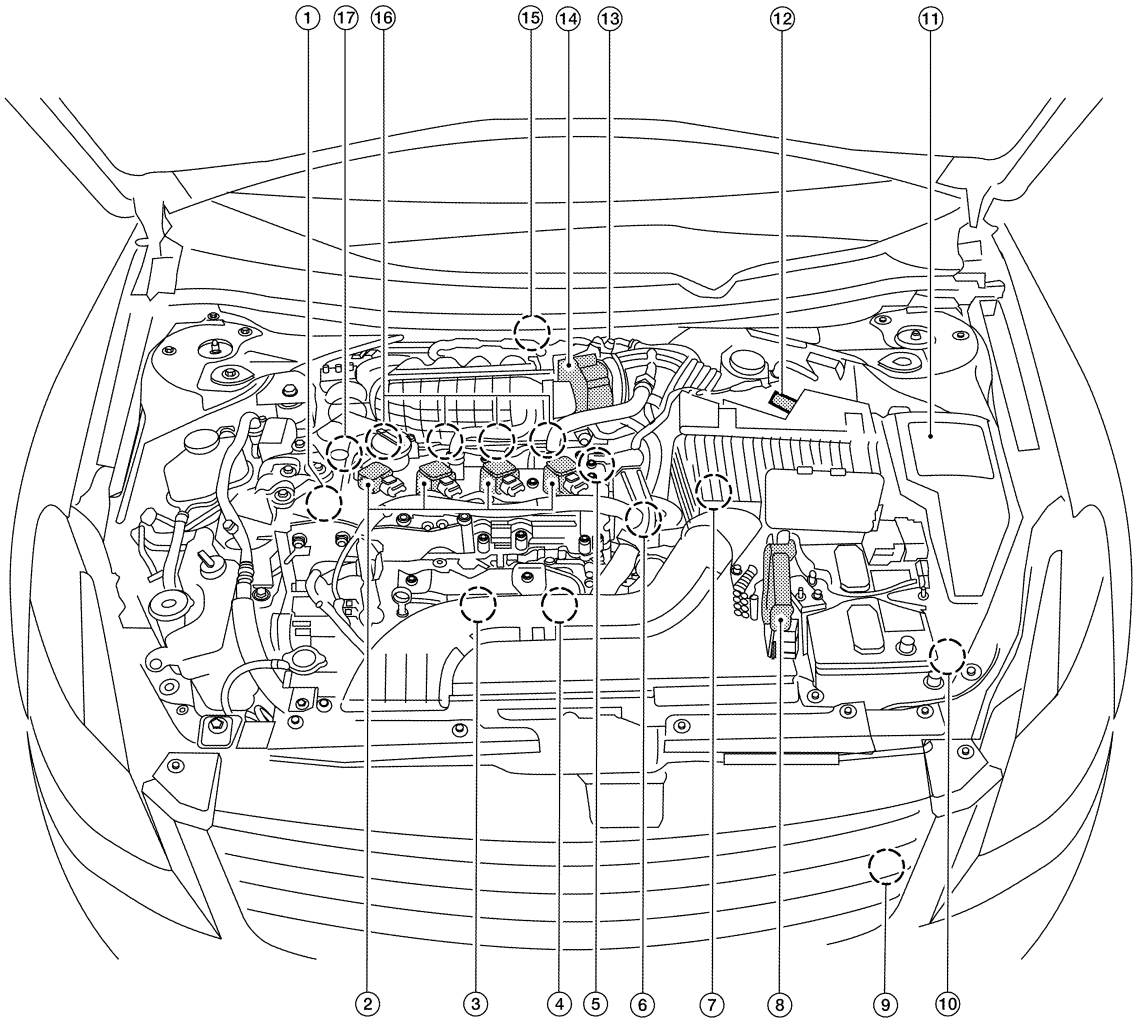
- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

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:0000000006391612



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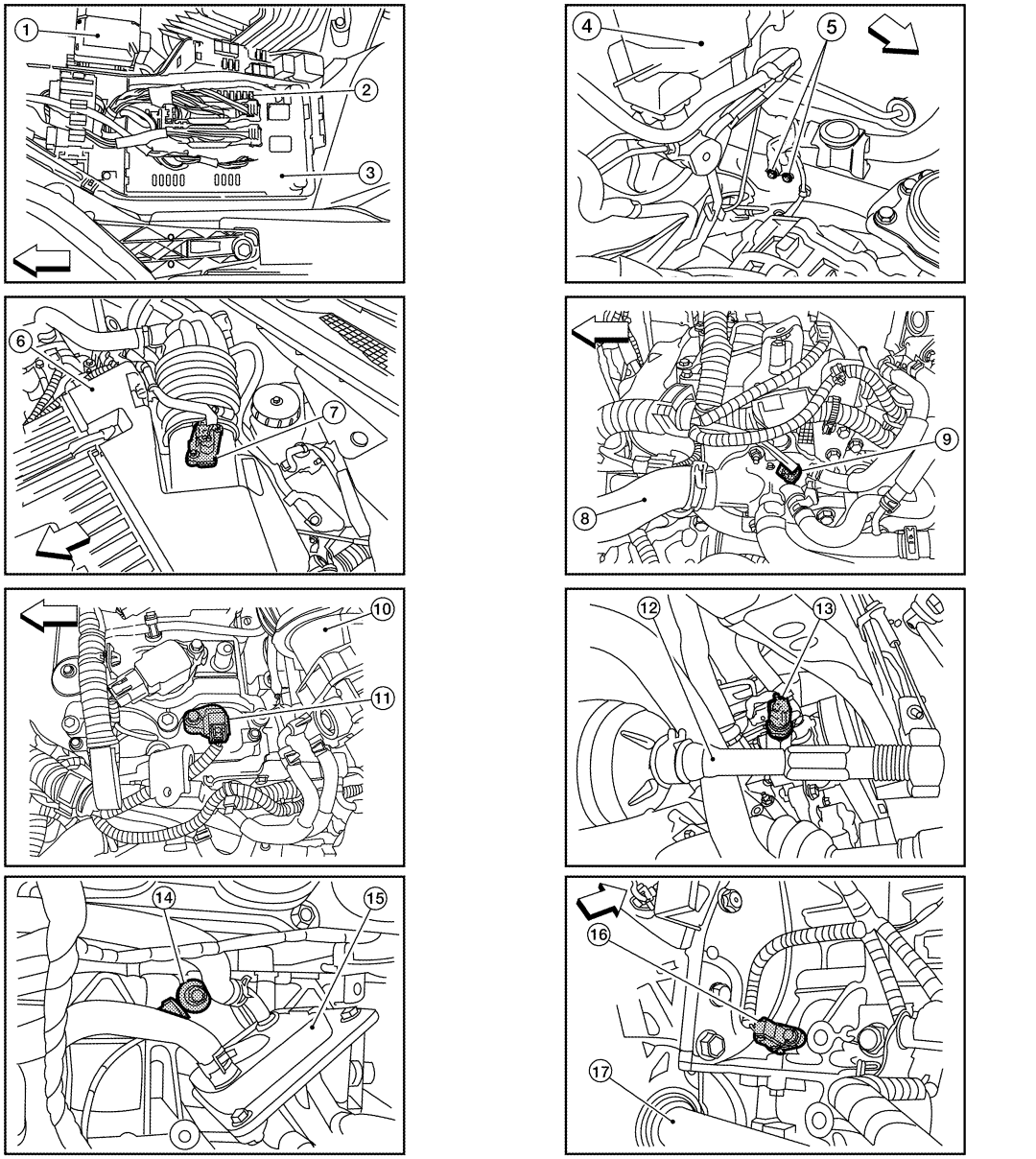
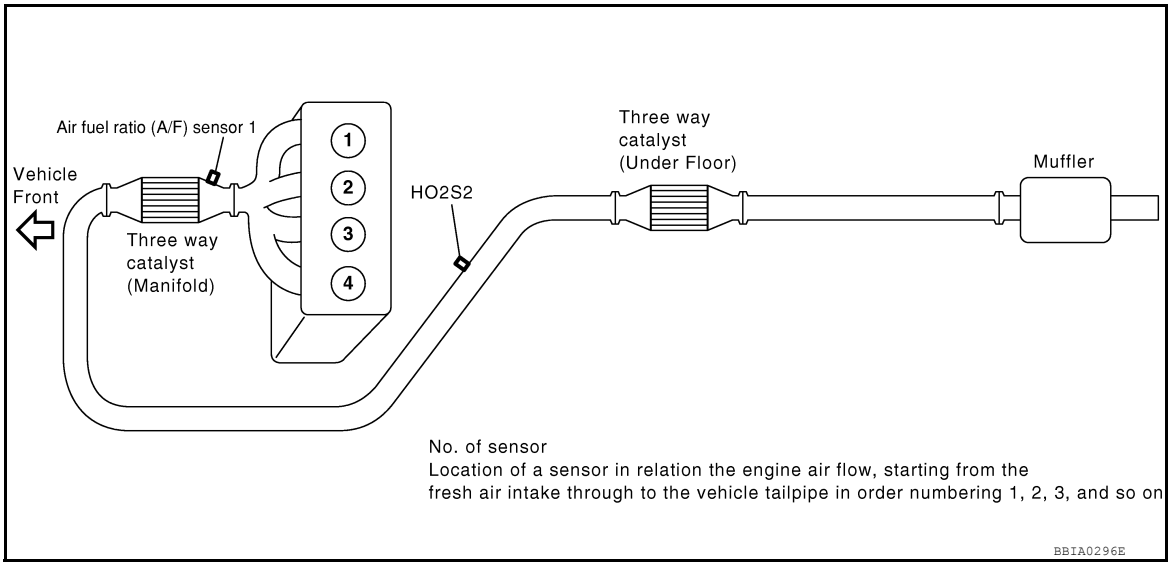
1. Intake valve timing control solenoid valve
2. Ignition coil (with power transistor) and spark plug
3. Knock sensor, Crankshaft position sensor (POS)
4. Air fuel ratio (A/F) sensor 1
5. Camshaft position sensor (PHASE)
6. Engine coolant temperature sensor
7. Transmission range switch (CVT models) Park/neutral position (PNP) switch (M/T models)
8. ECM
9. Refrigerant pressure sensor
10. Battery current sensor
11. IPDM E/R
12. Mass air flow sensor (with intake temperature sensor)
13. EVAP service port
14. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
15. EVAP canister purge volume control solenoid valve
16. Fuel injector
17. Power steering pressure sensor

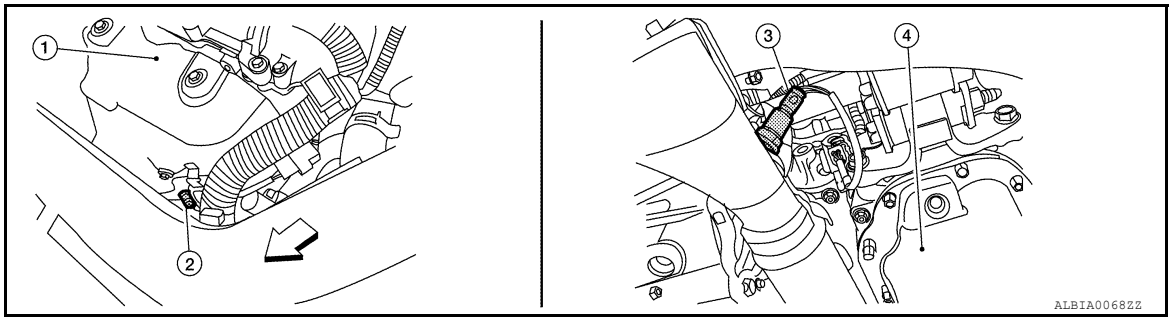


ALBIA0091ZZ

1. Battery
2. Fuel pump fuse (15A)
3. IPDM E/R
4. Brake master cylinder
5. Engine ground
6. Air cleaner assembly
7. Mass air flow sensor (with intake air temperature sensor)
8. Radiator hose (upper)
9. Engine coolant temperature sensor
10. Intake air duct
11. Camshaft position sensor (PHASE)
12. Tie rod (RH)
13. Power steering pressure sensor
14. Knock sensor
15. Engine oil cooler
16. Crankshaft position sensor (POS)
17. Drive shaft (RH)

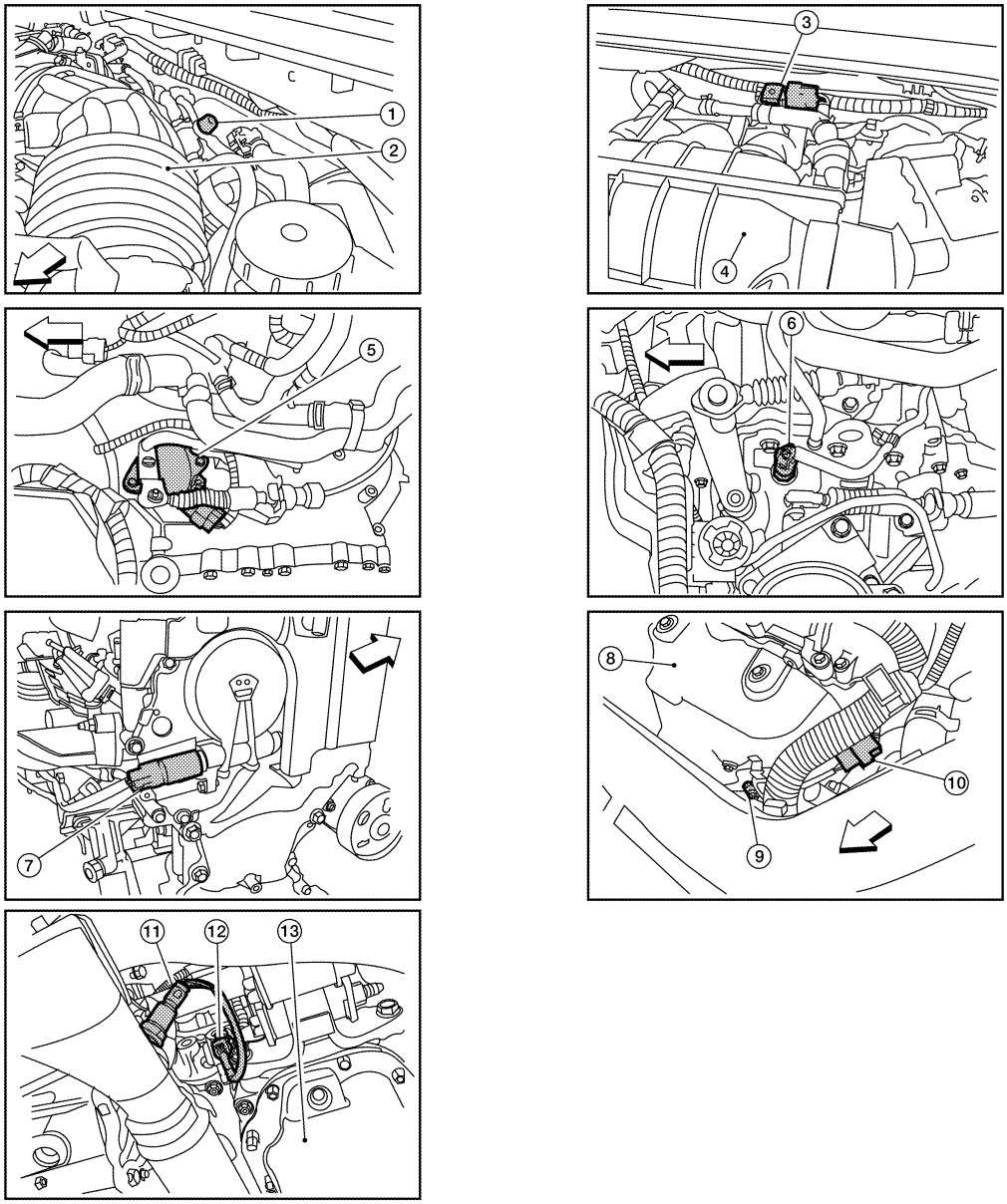
⇦: Vehicle front





1. Exhaust manifold cover
2. Air fuel ratio (A/F) sensor 1
3. Heated oxygen sensor 2 (This illustration is a view from under vehicle.)
4. Engine oil pan

⇦: Vehicle front



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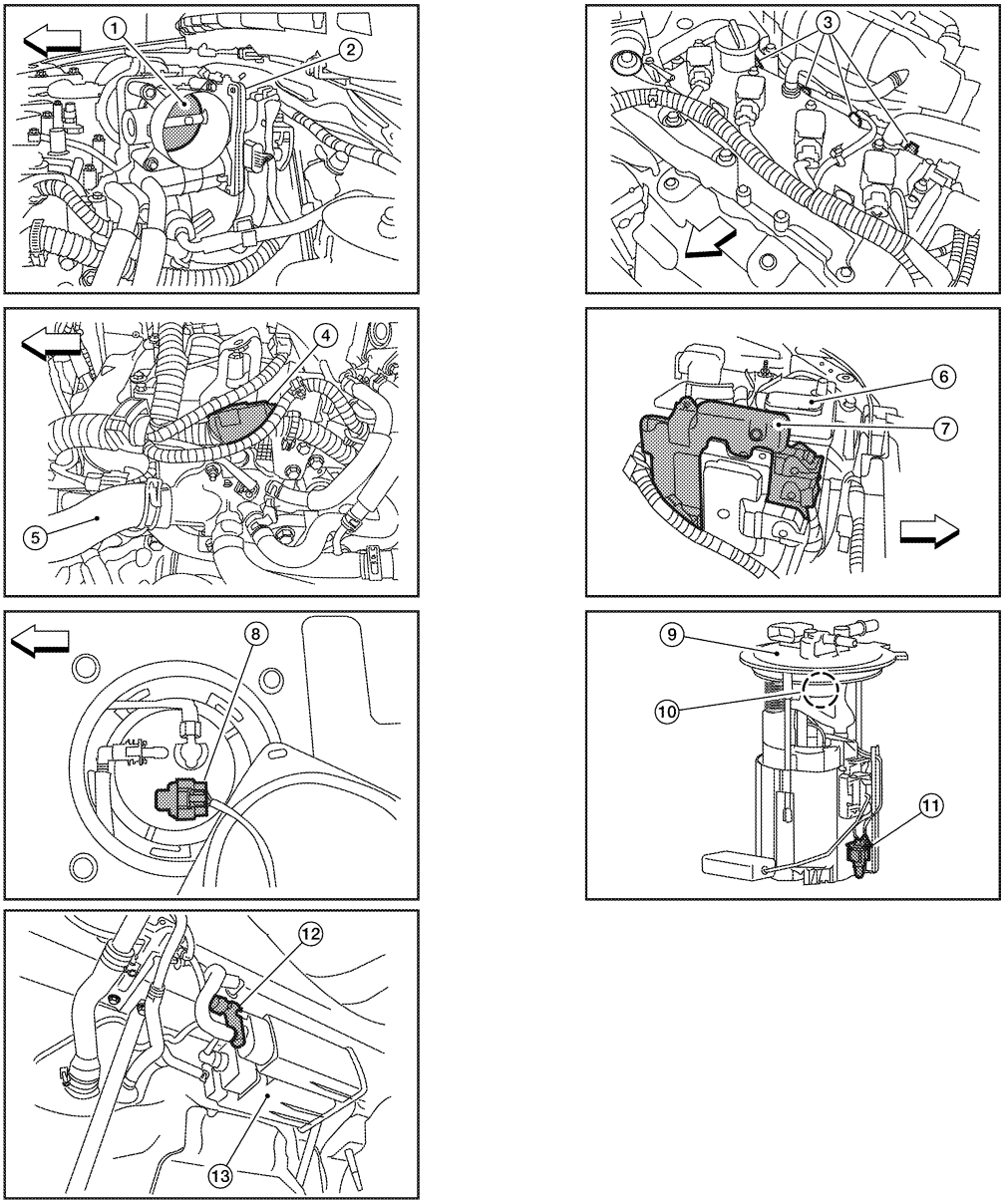
1. EVAP service port
2. Intake air duct
3. EVAP canister purge volume control solenoid valve
4. Intake manifold collector
5. Transmission range switch (CVT models) (This illustration is view with air cleaner assembly removed.)
6. Park/neutral position (PNP) switch (M/T models) (This illustration is view with air cleaner assembly removed.)
7. Intake valve timing control solenoid valve (This illustration is view with engine removed.)
8. Exhaust manifold cover
9. Air fuel ratio (A/F) sensor 1
10. Air fuel ratio (A/F) sensor 1 harness connector
11. Heated oxygen sensor 2 (This illustration is view from under vehicle.)
12. Heated oxygen sensor 2 harness connector (This illustration is view from under vehicle.)
13. Engine oil pan

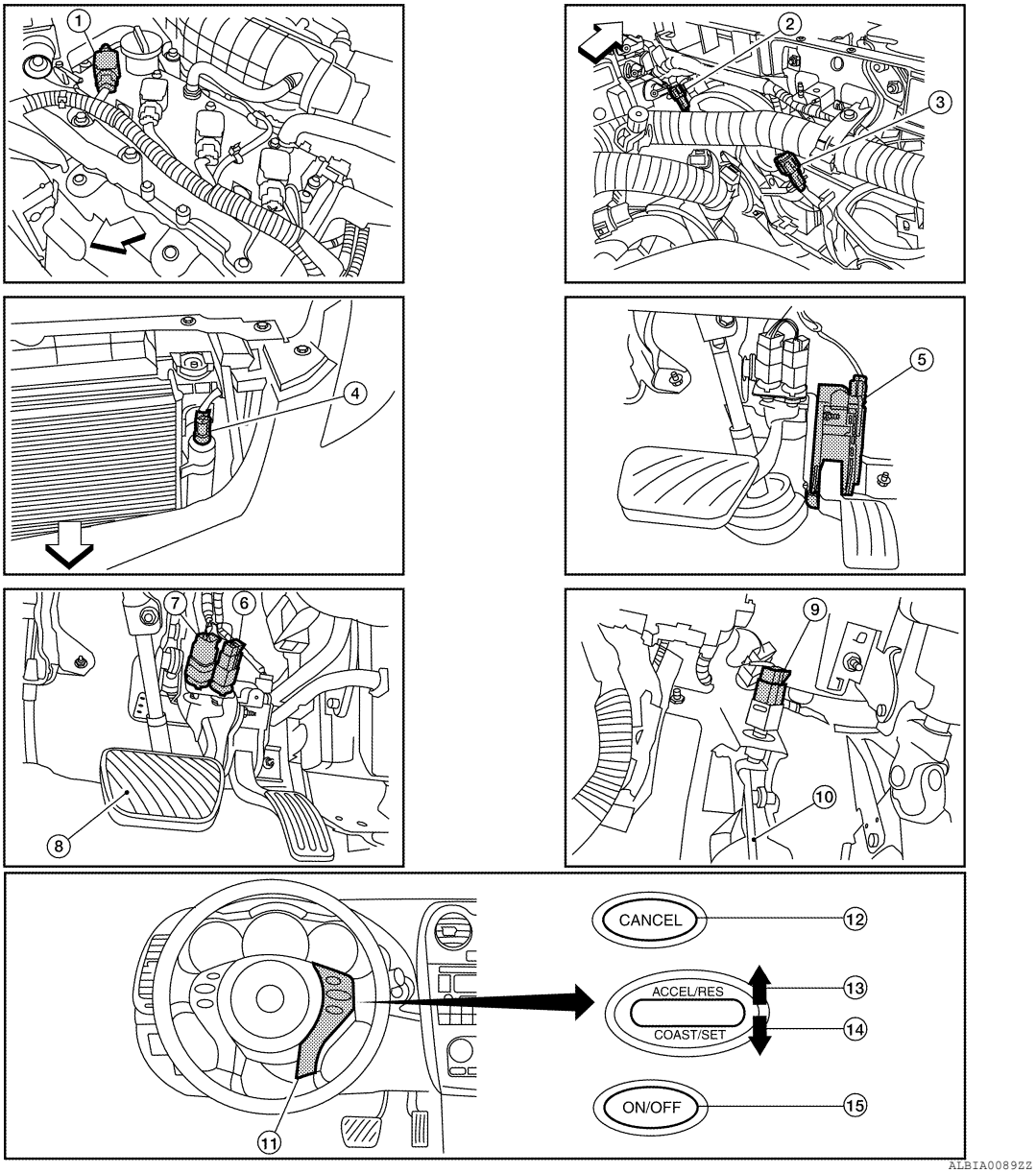
⇦: Vehicle front



ALBIA0518ZZ

1. Throttle valve (This illustration is view with intake air duct removed.)
2. Electric throttle control actuator
3. Fuel injector harness connector
4. Condenser-2
5. Radiator hose (upper)
6. Battery
7. ECM
8. Fuel level sensor unit and fuel pump harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
9. Fuel level sensor unit and fuel pump assembly
10. Fuel pressure regulator
11. Fuel tank temperature sensor
12. EVAP canister vent control valve (This illustration is view with rear suspension member removed.)
13. EVAP canister (This illustration is view with rear suspension member removed.)

⇦ : Vehicle front



1. No.1 ignition coil
2. Cooling fan motor-1 harness connector
3. Cooling fan motor-2 harness connector
4. Refrigerant pressure sensor
5. Accelerator pedal position sensor
6. ASCD brake switch
7. Stop lamp switch
8. Brake pedal
9. ASCD clutch switch
10. Clutch pedal
11. ASCD steering switch
12. CANCEL switch
13. RESUME/ACCELERATE switch
14. SET/COAST switch
15. MAIN switch

⇦: Vehicle front

Component Description

INFOID:0000000006391613

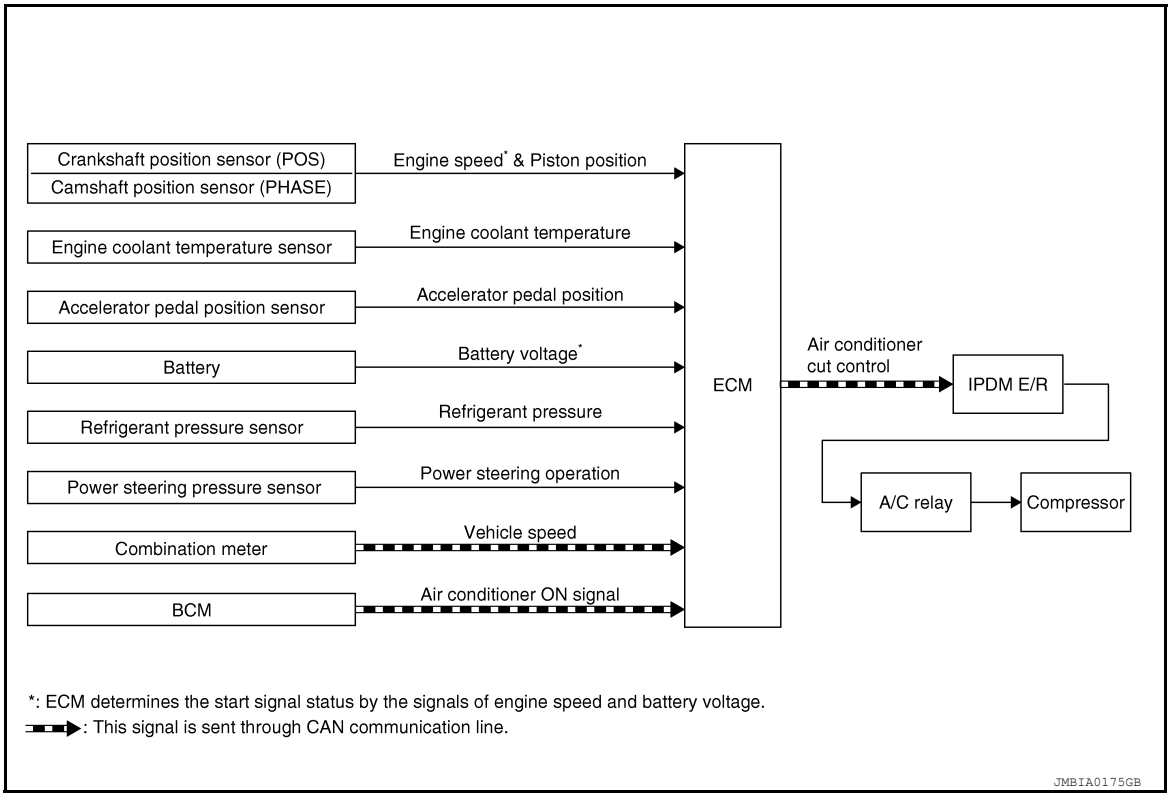
Component	Reference
Accelerator pedal position sensor	EC-208, "Description"
Camshaft position sensor (PHASE)	EC-148, "Description"
Crankshaft position sensor (POS)	EC-144, "Description"
Engine coolant temperature sensor	EC-133, "Description"

Component	Reference
Ignition signal	EC-264, "Description"
Knock sensor	EC-142, "Description"
Mass air flow sensor	EC-128, "Description"
Throttle position sensor	EC-136, "Description"
Vehicle speed sensor	EC-152, "Description"

AIR CONDITIONING CUT CONTROL

System Diagram

INFOID:0000000006391614



System Description

INFOID:0000000006391615

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		
Power steering pressure sensor	Power steering operation		
Combination meter	Vehicle speed*1		
BCM	Air conditioner ON signal*1		

*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

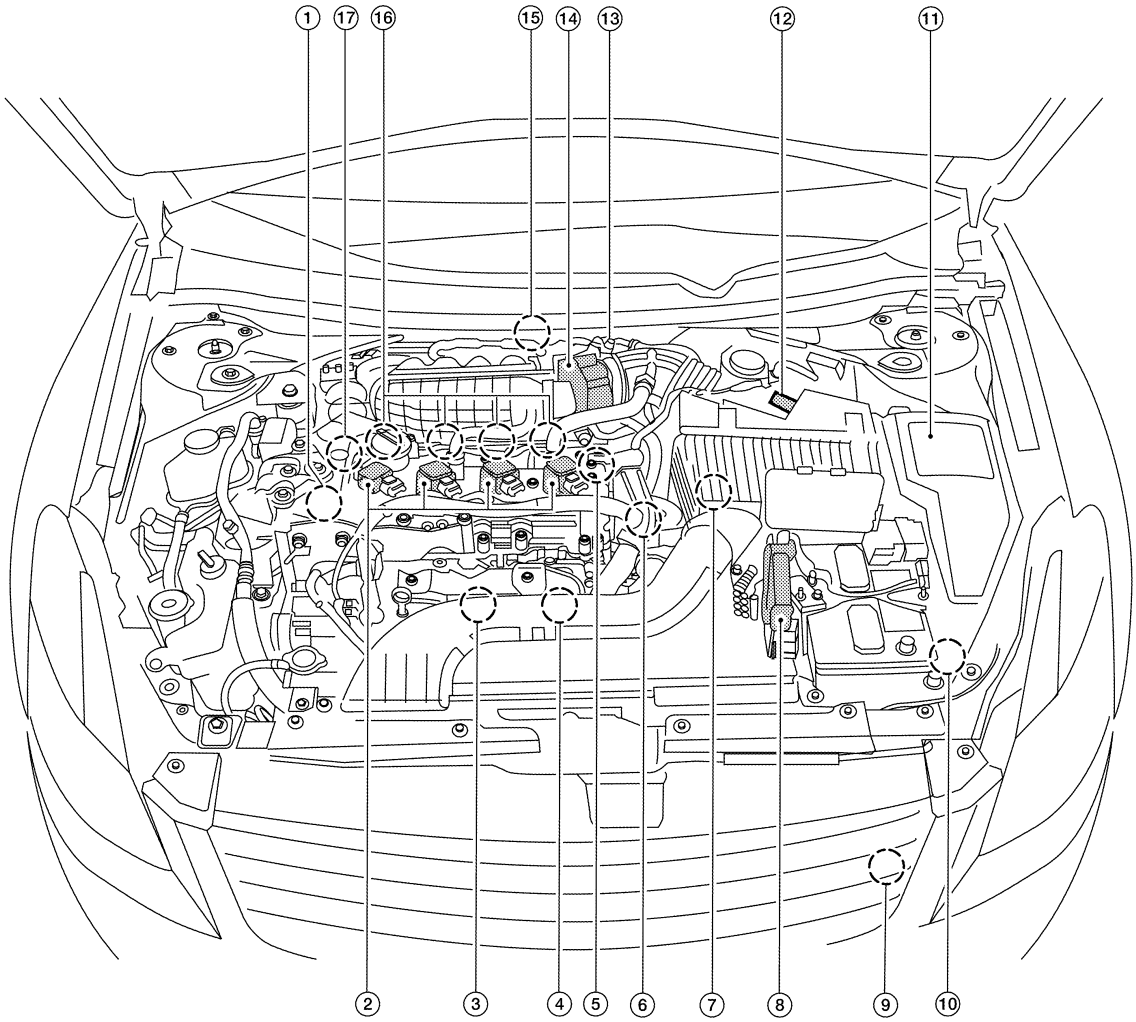
This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

- 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.

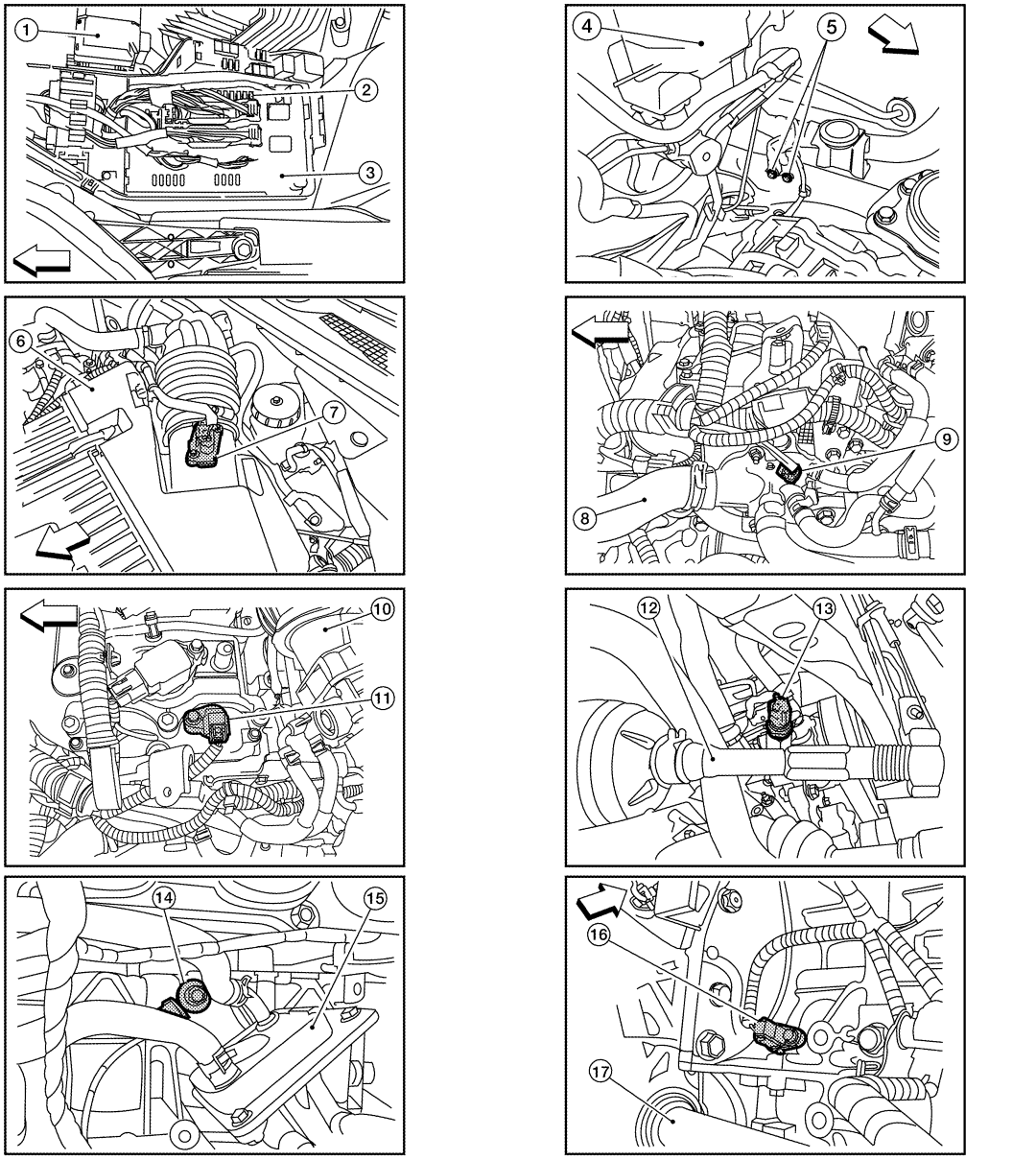
Component Parts Location

INFOID:0000000006391616



ALBIA0094ZZ

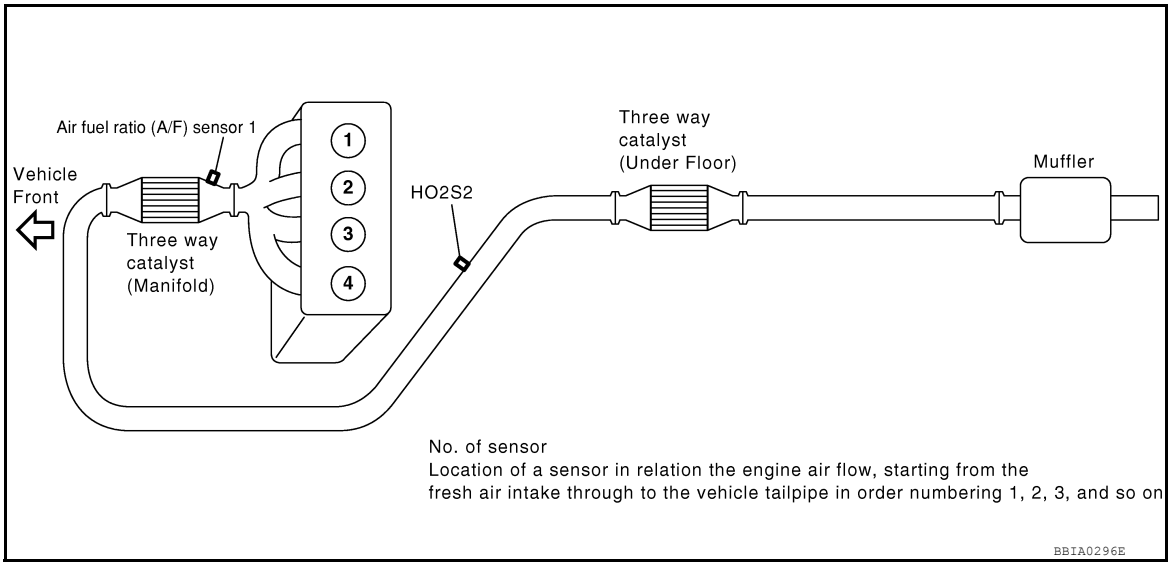
1. Intake valve timing control solenoid valve
2. Ignition coil (with power transistor) and spark plug
3. Knock sensor, Crankshaft position sensor (POS)
4. Air fuel ratio (A/F) sensor 1
5. Camshaft position sensor (PHASE)
6. Engine coolant temperature sensor
7. Transmission range switch (CVT models) Park/neutral position (PNP) switch (M/T models)
8. ECM
9. Refrigerant pressure sensor
10. Battery current sensor
11. IPDM E/R
12. Mass air flow sensor (with intake temperature sensor)
13. EVAP service port
14. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
15. EVAP canister purge volume control solenoid valve
16. Fuel injector
17. Power steering pressure sensor

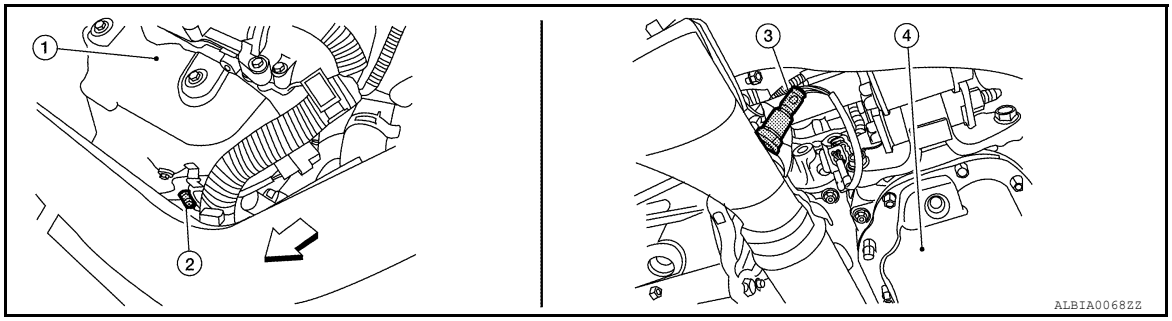


ALBIA0091ZZ

1. Battery
2. Fuel pump fuse (15A)
3. IPDM E/R
4. Brake master cylinder
5. Engine ground
6. Air cleaner assembly
7. Mass air flow sensor (with intake air temperature sensor)
8. Radiator hose (upper)
9. Engine coolant temperature sensor
10. Intake air duct
11. Camshaft position sensor (PHASE)
12. Tie rod (RH)
13. Power steering pressure sensor
14. Knock sensor
15. Engine oil cooler
16. Crankshaft position sensor (POS)
17. Drive shaft (RH)

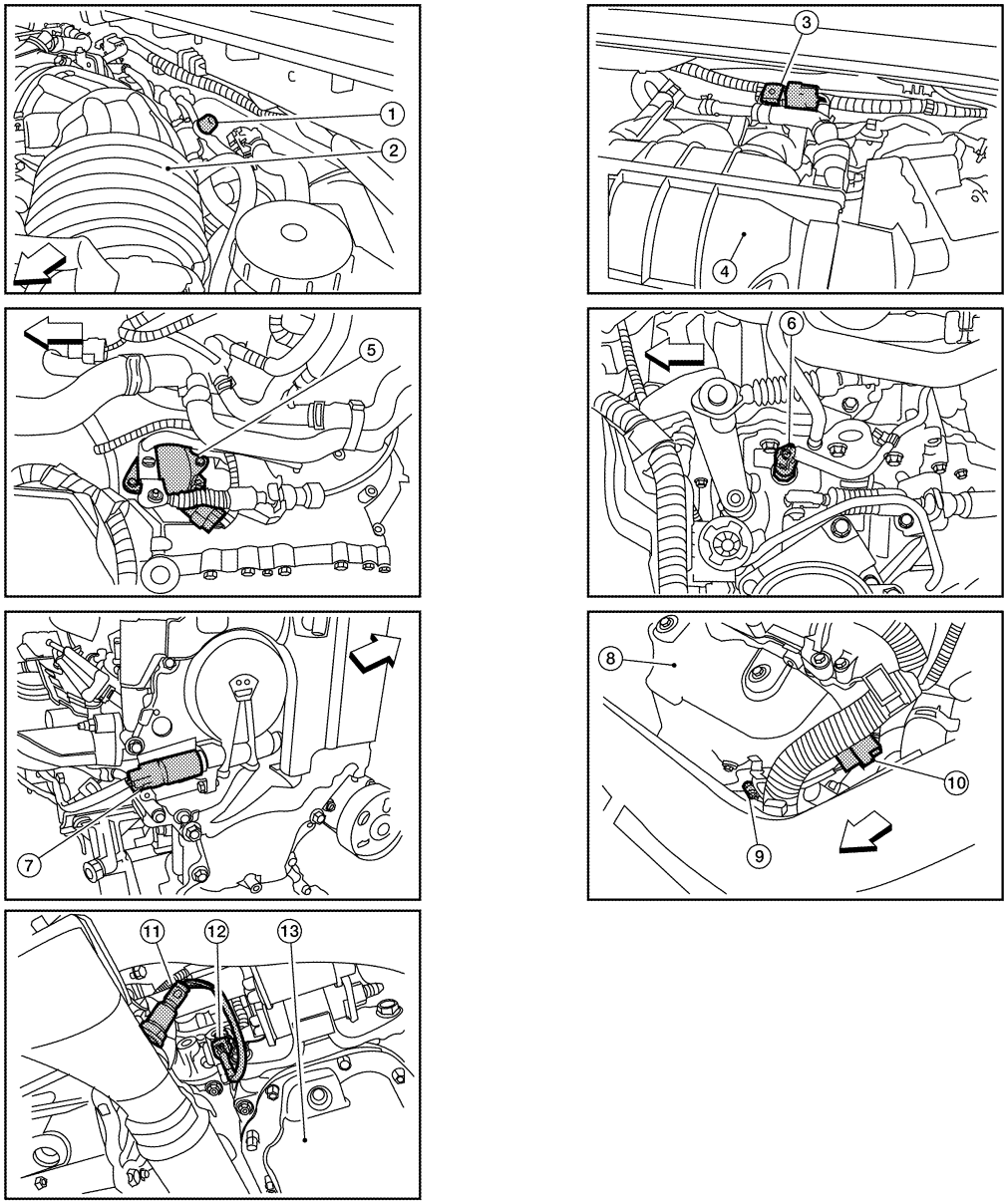
⇦: Vehicle front





1. Exhaust manifold cover
2. Air fuel ratio (A/F) sensor 1
3. Heated oxygen sensor 2 (This illustration is a view from under vehicle.)
4. Engine oil pan

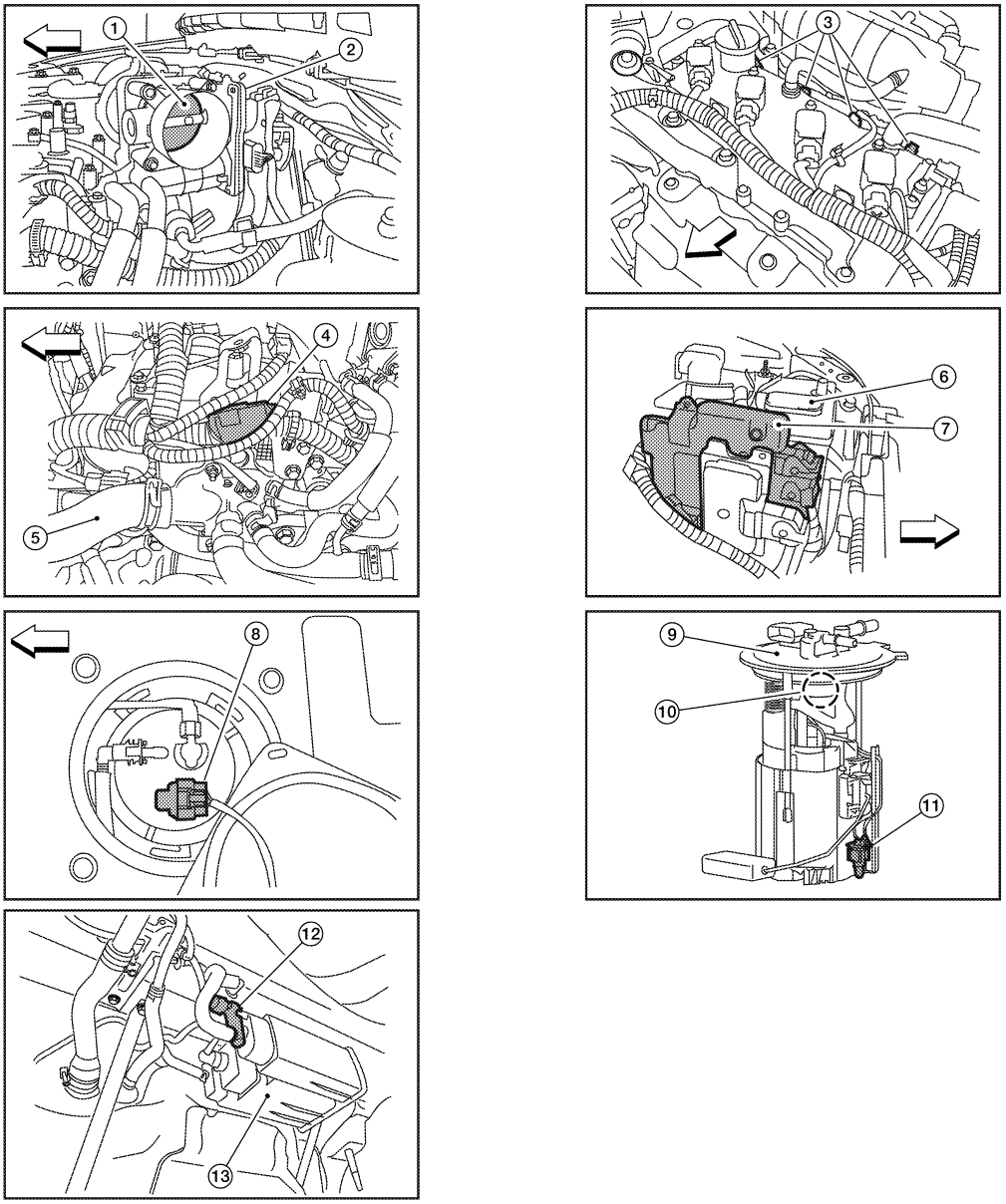
⇦: Vehicle front



ALBIA0095ZZ

1. EVAP service port
2. Intake air duct
3. EVAP canister purge volume control solenoid valve
4. Intake manifold collector
5. Transmission range switch (CVT models) (This illustration is view with air cleaner assembly removed.)
6. Park/neutral position (PNP) switch (M/T models) (This illustration is view with air cleaner assembly removed.)
7. Intake valve timing control solenoid valve (This illustration is view with engine removed.)
8. Exhaust manifold cover
9. Air fuel ratio (A/F) sensor 1
10. Air fuel ratio (A/F) sensor 1 harness connector
11. Heated oxygen sensor 2 (This illustration is view from under vehicle.)
12. Heated oxygen sensor 2 harness connector (This illustration is view from under vehicle.)
13. Engine oil pan

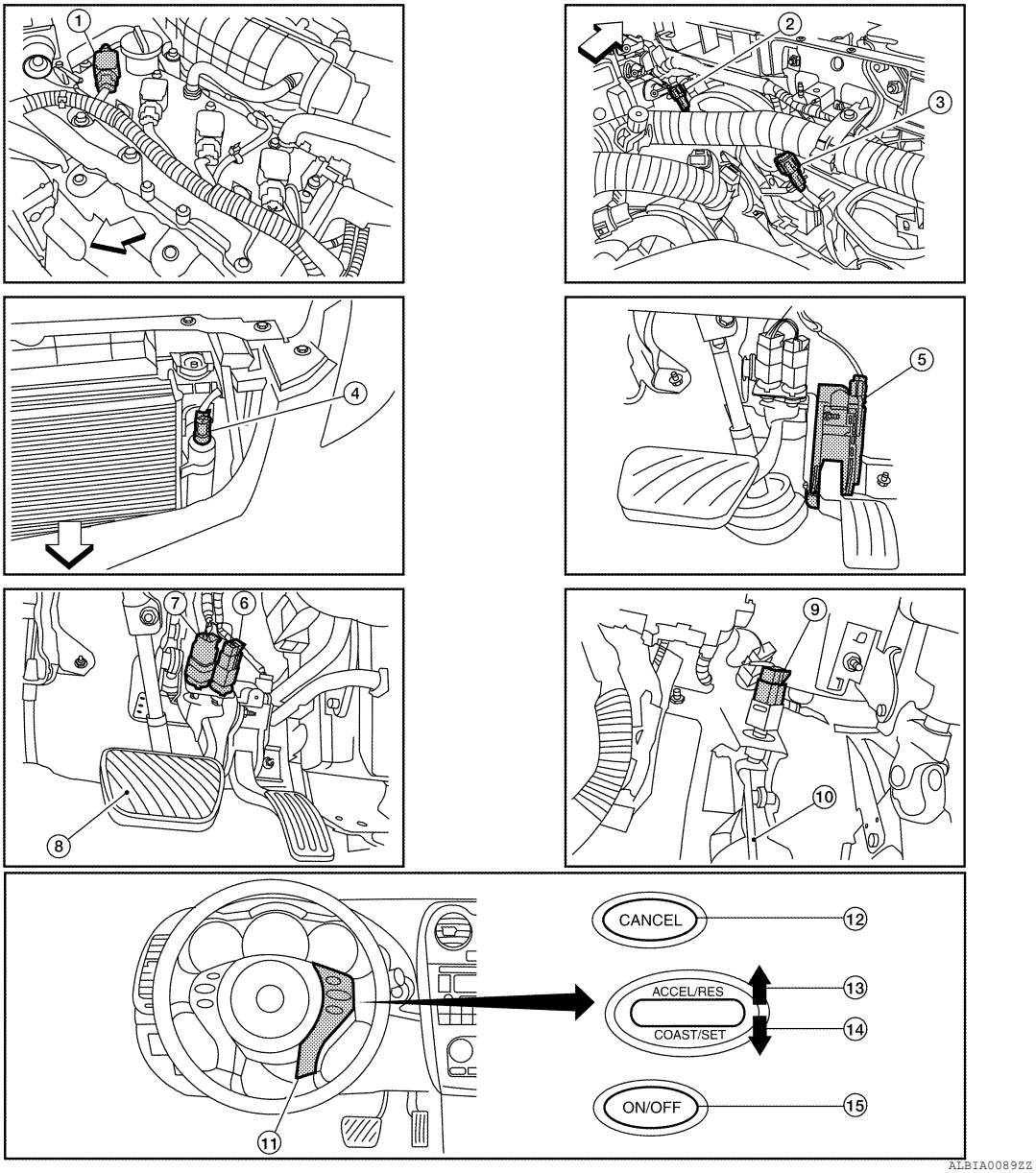
⇦: Vehicle front



ALBIA0518ZZ

1. Throttle valve (This illustration is view with intake air duct removed.)
2. Electric throttle control actuator
3. Fuel injector harness connector
4. Condenser-2
5. Radiator hose (upper)
6. Battery
7. ECM
8. Fuel level sensor unit and fuel pump harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
9. Fuel level sensor unit and fuel pump assembly
10. Fuel pressure regulator
11. Fuel tank temperature sensor
12. EVAP canister vent control valve (This illustration is view with rear suspension member removed.)
13. EVAP canister (This illustration is view with rear suspension member removed.)

⇦ : Vehicle front



1. No.1 ignition coil
2. Cooling fan motor-1 harness connector
3. Cooling fan motor-2 harness connector
4. Refrigerant pressure sensor
5. Accelerator pedal position sensor
6. ASCD brake switch
7. Stop lamp switch
8. Brake pedal
9. ASCD clutch switch
10. Clutch pedal
11. ASCD steering switch
12. CANCEL switch
13. RESUME/ACCELERATE switch
14. SET/COAST switch
15. MAIN switch

⇦: Vehicle front

Component Description

INFOID:0000000006391617

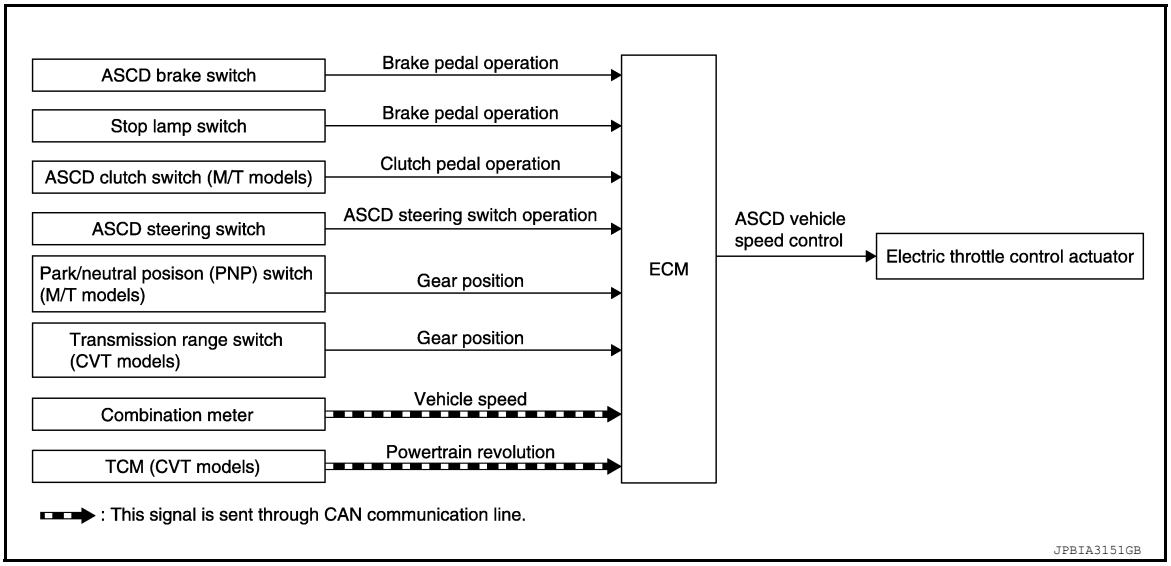
Component	Reference
Accelerator pedal position sensor	EC-208, "Description"
Camshaft position sensor (PHASE)	EC-148, "Description"
Crankshaft position sensor (POS)	EC-144, "Description"
Engine coolant temperature sensor	EC-133, "Description"

Component	Reference
Power steering pressure sensor	EC-154, "Description"
Refrigerant pressure sensor	EC-271, "Description"
Vehicle speed sensor	EC-152, "Description"

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Diagram

INFOID:0000000006391618



System Description

INFOID:0000000006391619

INPUT/OUTPUT SIGNAL CHART

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

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

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.
Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 180 km/h (112 MPH).
ECM controls throttle angle of electric throttle control actuator to regulate engine speed.
The ASCD operation status is indicated by two indicators (CRUISE and SET on the information display) on the combination meter. If any malfunction occurs in ASCD system, SET indicator blinks and ASCD control is deactivated.
NOTE:
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press MAIN switch. (CRUISE is indicated on the information display.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 180 km/h (112 MPH), press SET/COAST switch. (Then SET is indicated on the information display.)

ACCELERATE OPERATION

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

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.
- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to neutral position. (M/T models)
- Selector lever is changed to N, P, and R position (CVT 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 indicators.
- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE indicator may blink slowly.
  When the engine coolant temperature decreases to the normal operating temperature, CRUISE indicator will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ ACCELERATE switch.
- Malfunction for some self-diagnoses regarding ASCD control: SET indicator will blink quickly.

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

COAST OPERATION

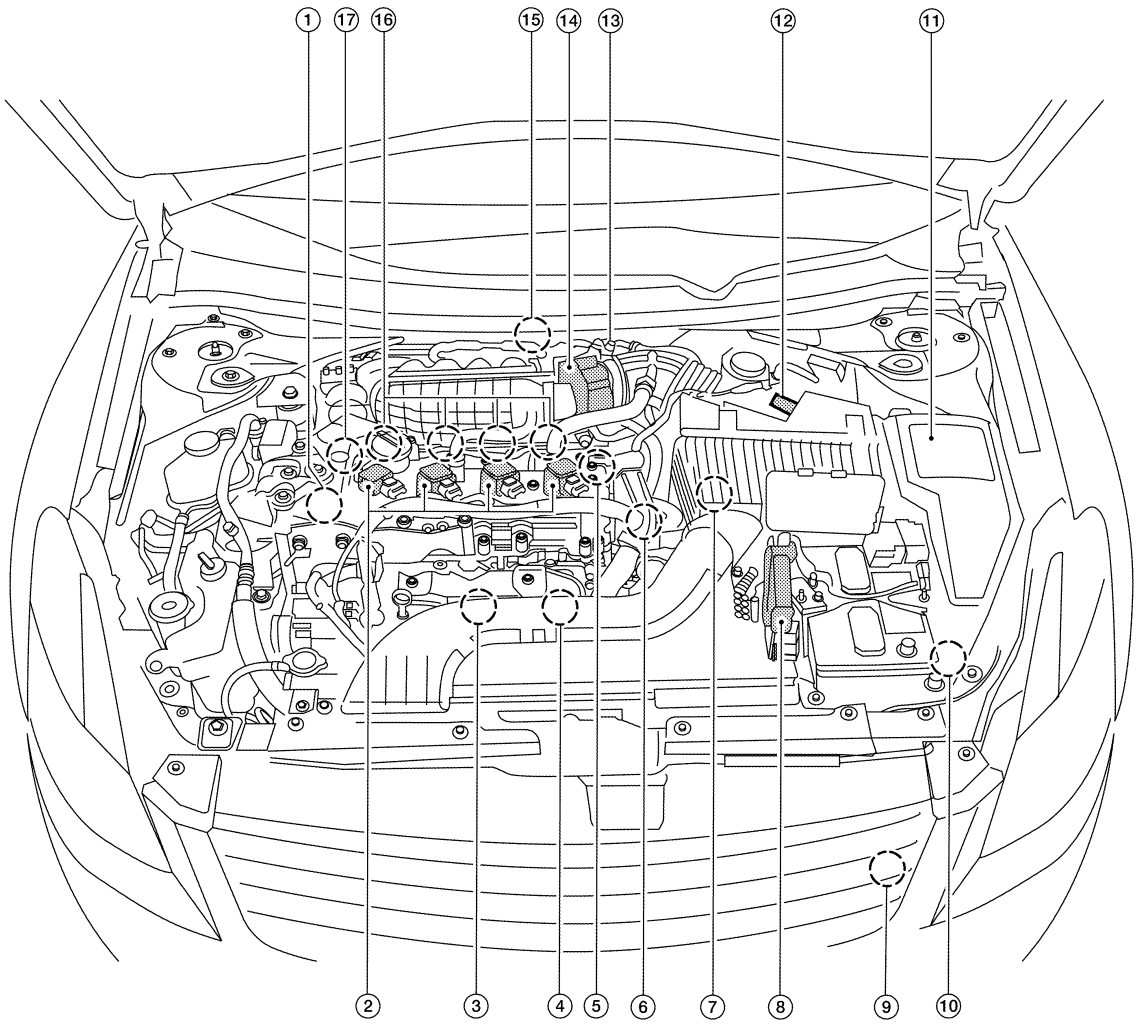
When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

RESUME OPERATION

When the RESUME/ACCELERATE switch is pressed after cancel operation other than pressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.
- Brake pedal is released
- Clutch pedal is released (M/T models)
- Selector lever is in other than P and N positions (CVT models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 180 km/h (112 MPH)

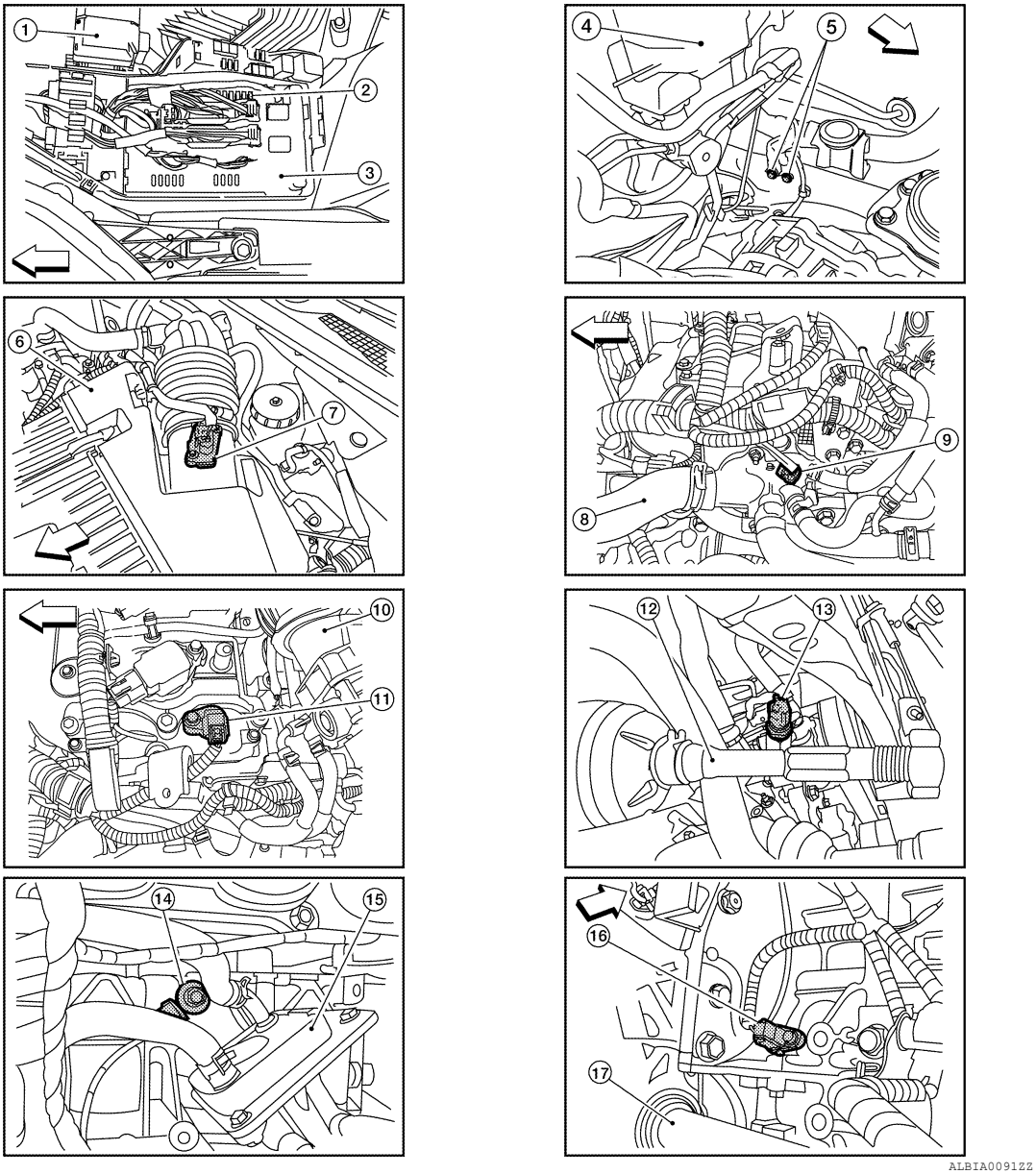
Component Parts Location

INFOID:0000000006391620



ALBIA0094ZZ

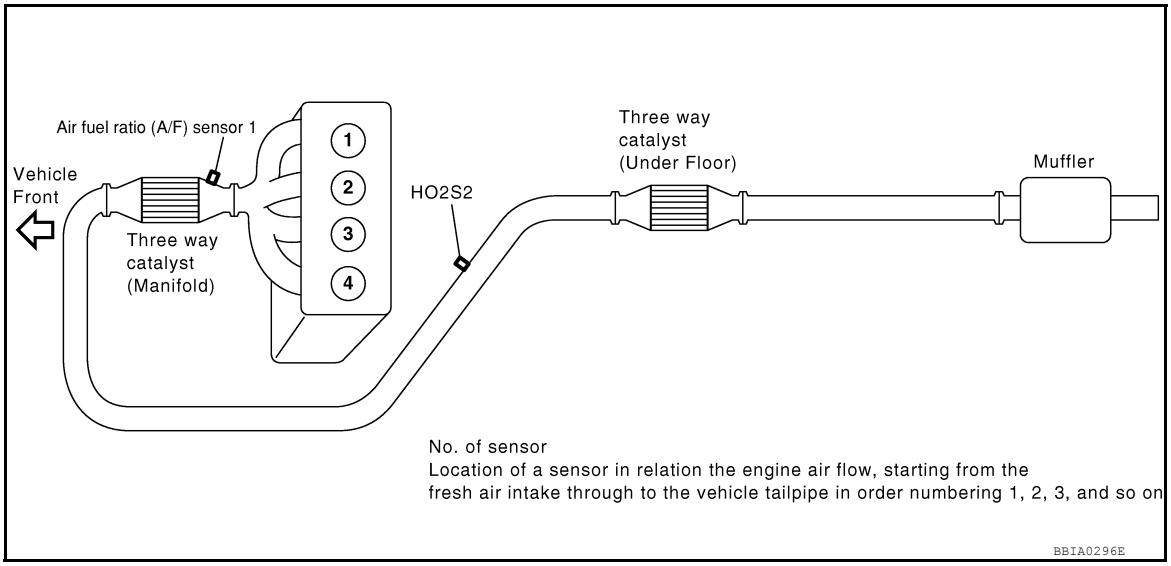
1. Intake valve timing control solenoid valve
2. Ignition coil (with power transistor) and spark plug
3. Knock sensor, Crankshaft position sensor (POS)
4. Air fuel ratio (A/F) sensor 1
5. Camshaft position sensor (PHASE)
6. Engine coolant temperature sensor
7. Transmission range switch (CVT models) Park/neutral position (PNP) switch (M/T models)
8. ECM
9. Refrigerant pressure sensor
10. Battery current sensor
11. IPDM E/R
12. Mass air flow sensor (with intake temperature sensor)
13. EVAP service port
14. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
15. EVAP canister purge volume control solenoid valve
16. Fuel injector
17. Power steering pressure sensor

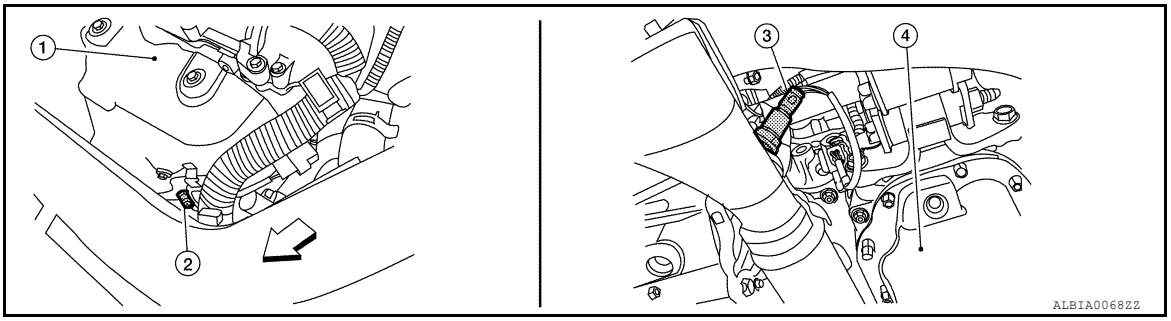


ALBIA0091ZZ

1. Battery
2. Fuel pump fuse (15A)
3. IPDM E/R
4. Brake master cylinder
5. Engine ground
6. Air cleaner assembly
7. Mass air flow sensor (with intake air temperature sensor)
8. Radiator hose (upper)
9. Engine coolant temperature sensor
10. Intake air duct
11. Camshaft position sensor (PHASE)
12. Tie rod (RH)
13. Power steering pressure sensor
14. Knock sensor
15. Engine oil cooler
16. Crankshaft position sensor (POS)
17. Drive shaft (RH)

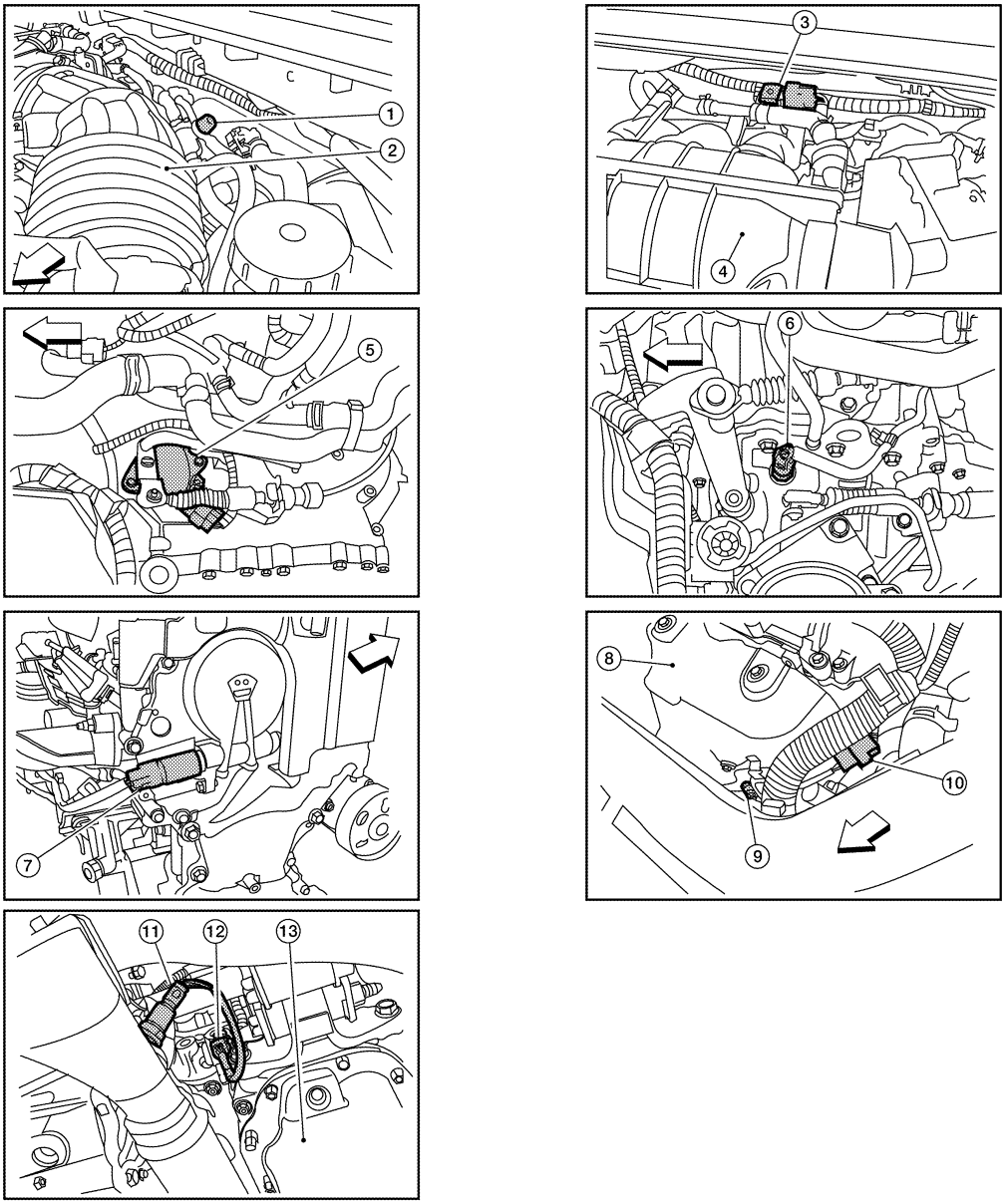
⇦: Vehicle front





1. Exhaust manifold cover
2. Air fuel ratio (A/F) sensor 1
3. Heated oxygen sensor 2 (This illustration is a view from under vehicle.)
4. Engine oil pan

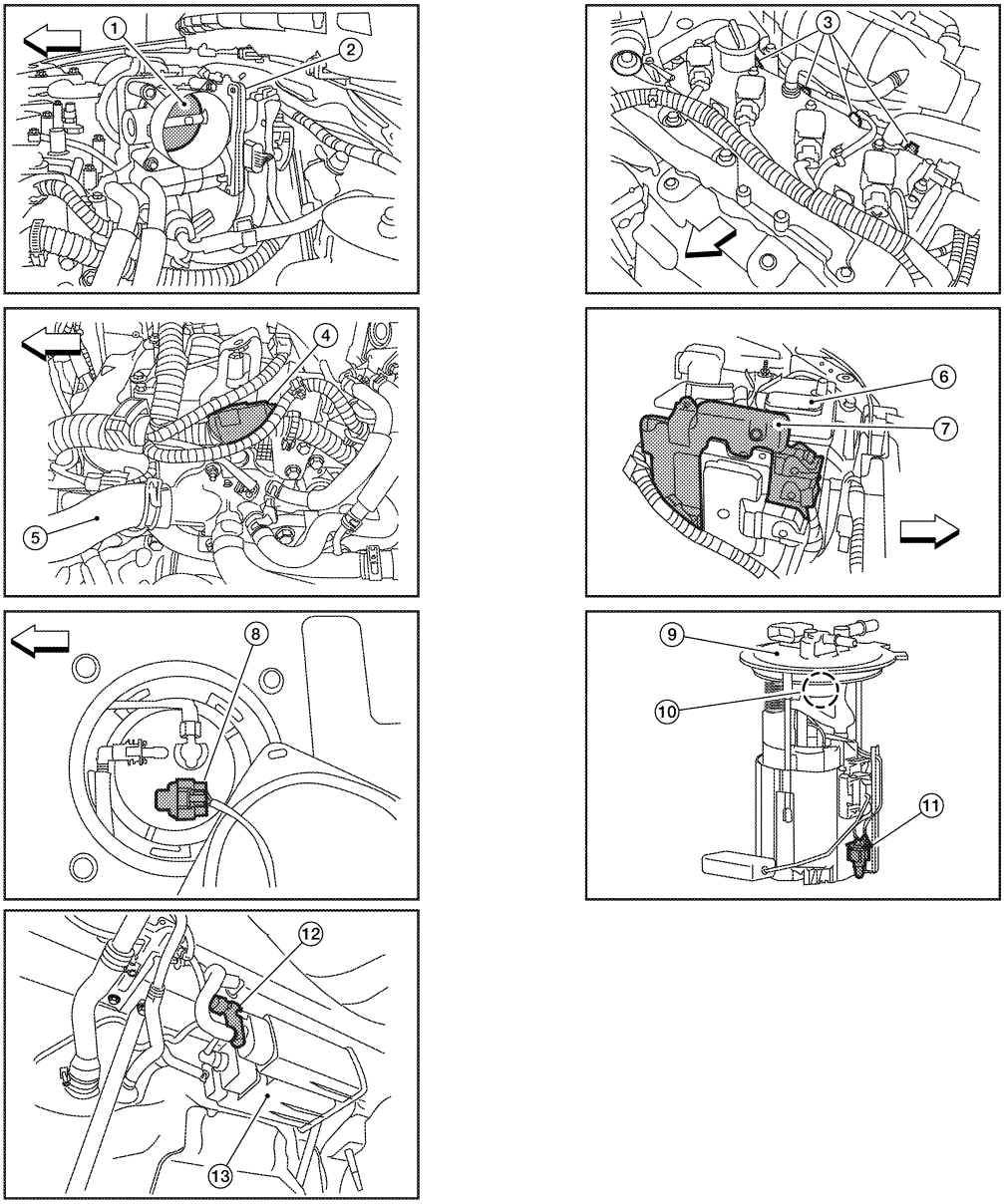
⇦: Vehicle front



ALBIA0095ZZ

1. EVAP service port
2. Intake air duct
3. EVAP canister purge volume control solenoid valve
4. Intake manifold collector
5. Transmission range switch (CVT models) (This illustration is view with air cleaner assembly removed.)
6. Park/neutral position (PNP) switch (M/T models) (This illustration is view with air cleaner assembly removed.)
7. Intake valve timing control solenoid valve (This illustration is view with engine removed.)
8. Exhaust manifold cover
9. Air fuel ratio (A/F) sensor 1
10. Air fuel ratio (A/F) sensor 1 harness connector
11. Heated oxygen sensor 2 (This illustration is view from under vehicle.)
12. Heated oxygen sensor 2 harness connector (This illustration is view from under vehicle.)
13. Engine oil pan

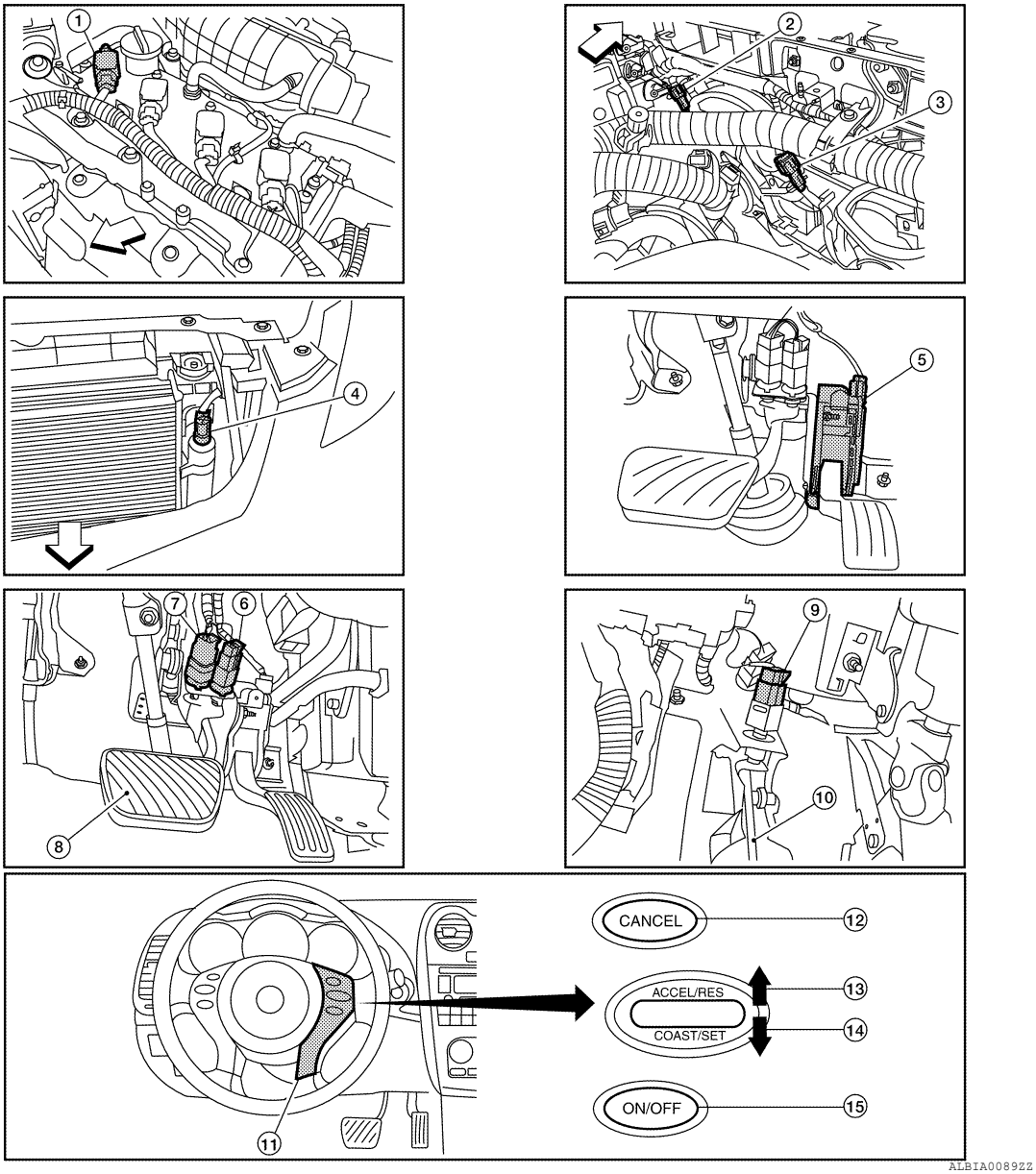
⇦: Vehicle front



ALBIA0518ZZ

1. Throttle valve (This illustration is view with intake air duct removed.)
2. Electric throttle control actuator
3. Fuel injector harness connector
4. Condenser-2
5. Radiator hose (upper)
6. Battery
7. ECM
8. Fuel level sensor unit and fuel pump harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
9. Fuel level sensor unit and fuel pump assembly
10. Fuel pressure regulator
11. Fuel tank temperature sensor
12. EVAP canister vent control valve (This illustration is view with rear suspension member removed.)
13. EVAP canister (This illustration is view with rear suspension member removed.)

⇦ : Vehicle front



ALBIA0089ZZ

1. No.1 ignition coil
2. Cooling fan motor-1 harness connector
3. Cooling fan motor-2 harness connector
4. Refrigerant pressure sensor
5. Accelerator pedal position sensor
6. ASCD brake switch
7. Stop lamp switch
8. Brake pedal
9. ASCD clutch switch
10. Clutch pedal
11. ASCD steering switch
12. CANCEL switch
13. RESUME/ACCELERATE switch
14. SET/COAST switch
15. MAIN switch

⇦: Vehicle front

Component Description

INFOID:0000000006391621

Component	Reference
ASCD steering switch	EC-176, "Description"
ASCD clutch switch	EC-179, "Description"
ASCD brake switch	EC-179, "Description"
Stop lamp switch	EC-193, "Description"

Component	Reference
Electric throttle control actuator	EC-206, "Description"
ASCD indicator	EC-227, "Description"

CAN COMMUNICATION

System Description

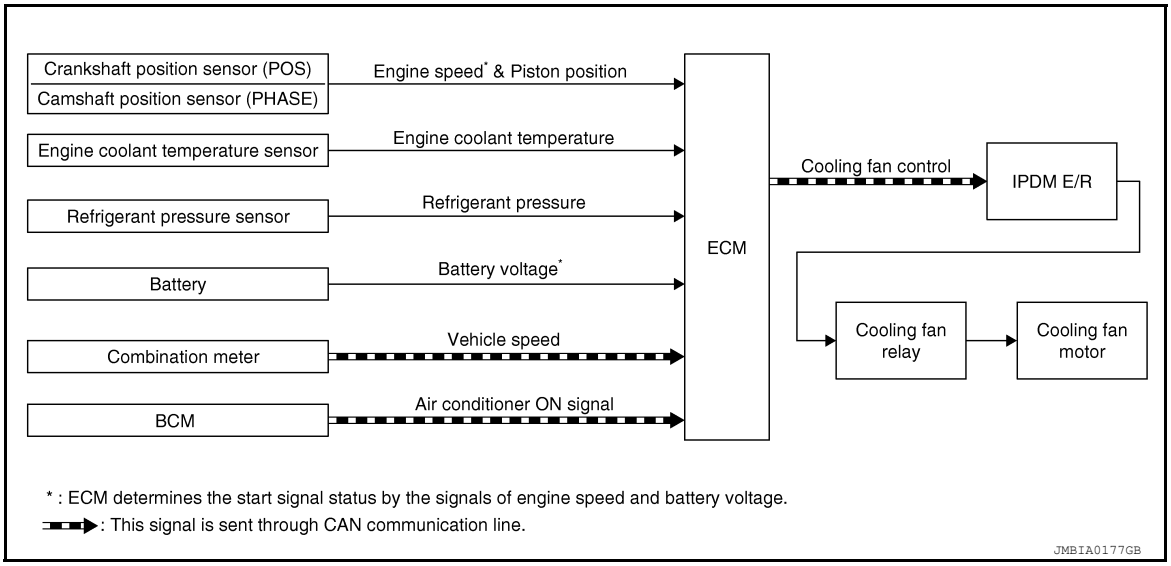
INFOID:0000000006391622

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-24, "CAN Communication Signal Chart", about CAN communication for detail.

COOLING FAN CONTROL

System Diagram

INFOID:0000000006391623



System Description

INFOID:0000000006391624

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	Cooling fan control	IPDM E/R ↓ Cooling fan relay ↓ Cooling fan motor
Battery	Battery voltage*1		
Combination meter	Vehicle speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
BCM	Air conditioner ON signal*2		
Refrigerant pressure sensor	Refrigerant pressure		

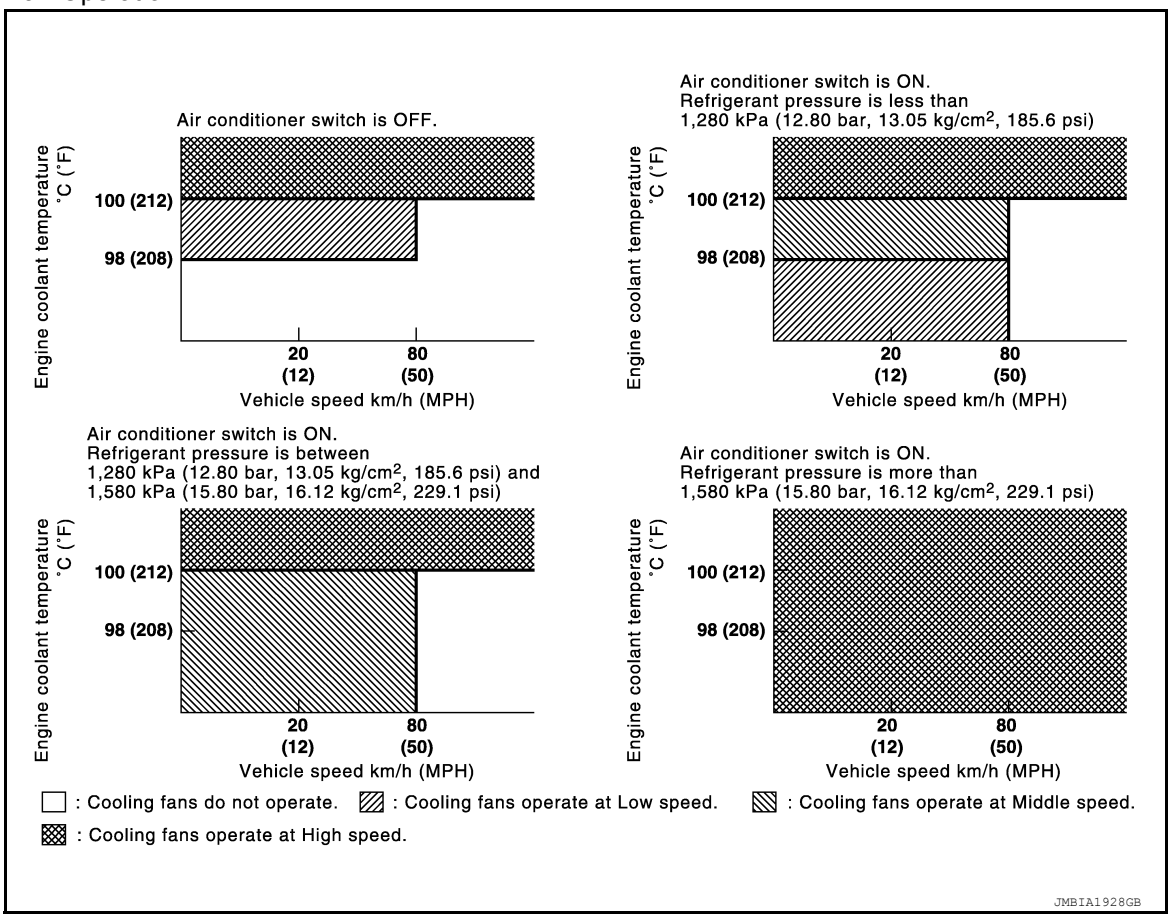
*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.

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

SYSTEM DESCRIPTION

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

Cooling Fan Operation



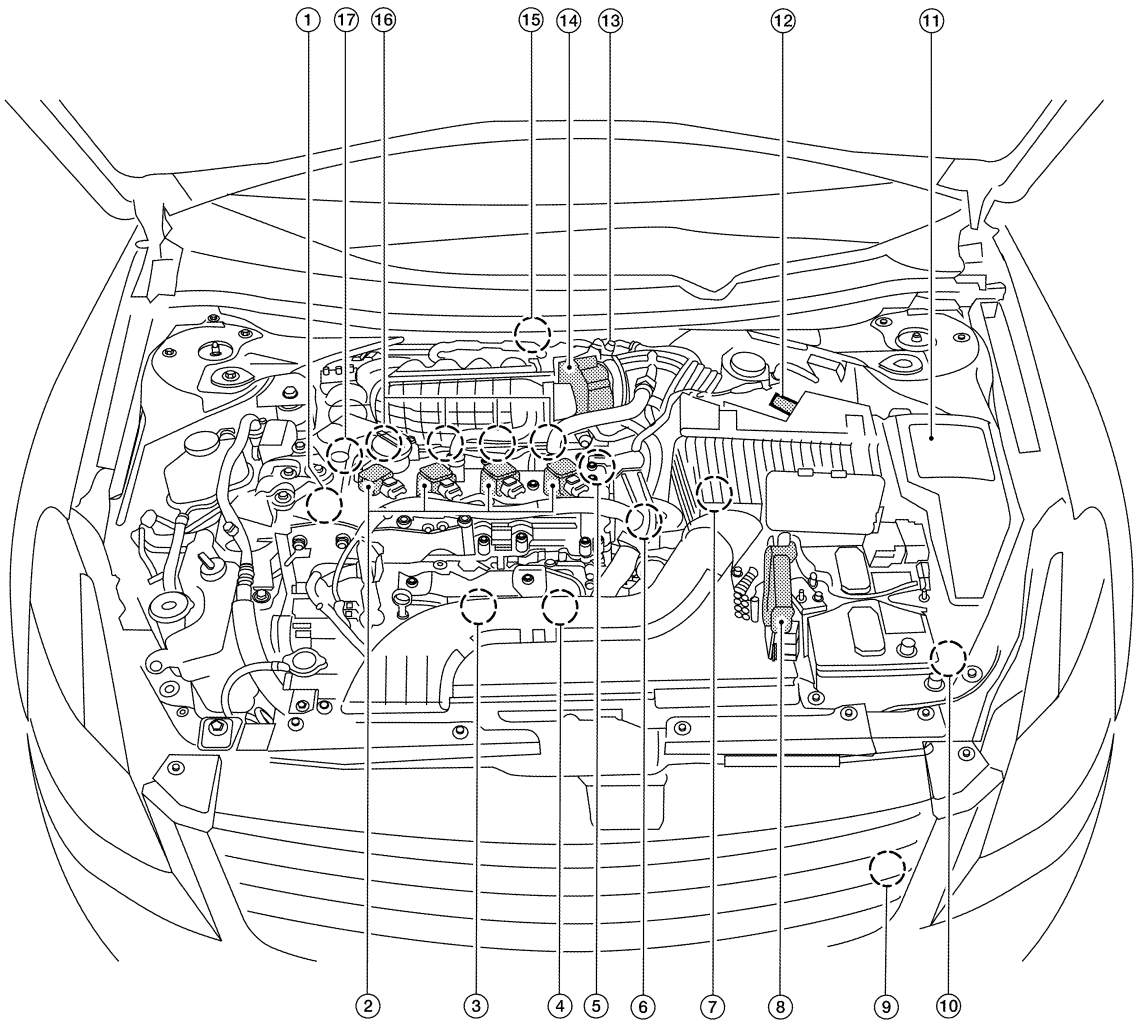
Cooling Fan Relay Operation

The ECM controls cooling fan relays through CAN communication line.

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

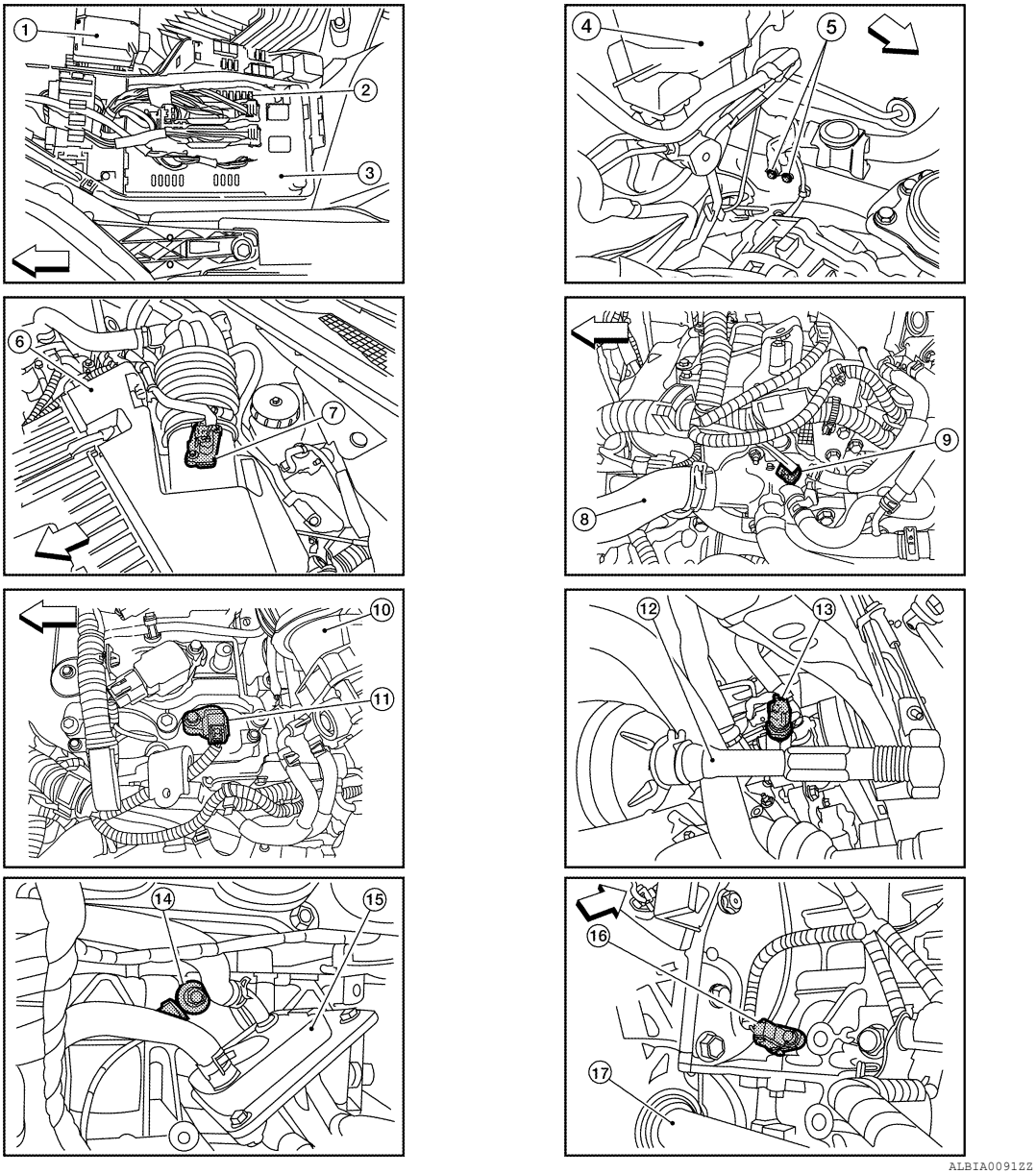
Component Parts Location

INFOID:0000000006391625



ALBIA0094ZZ

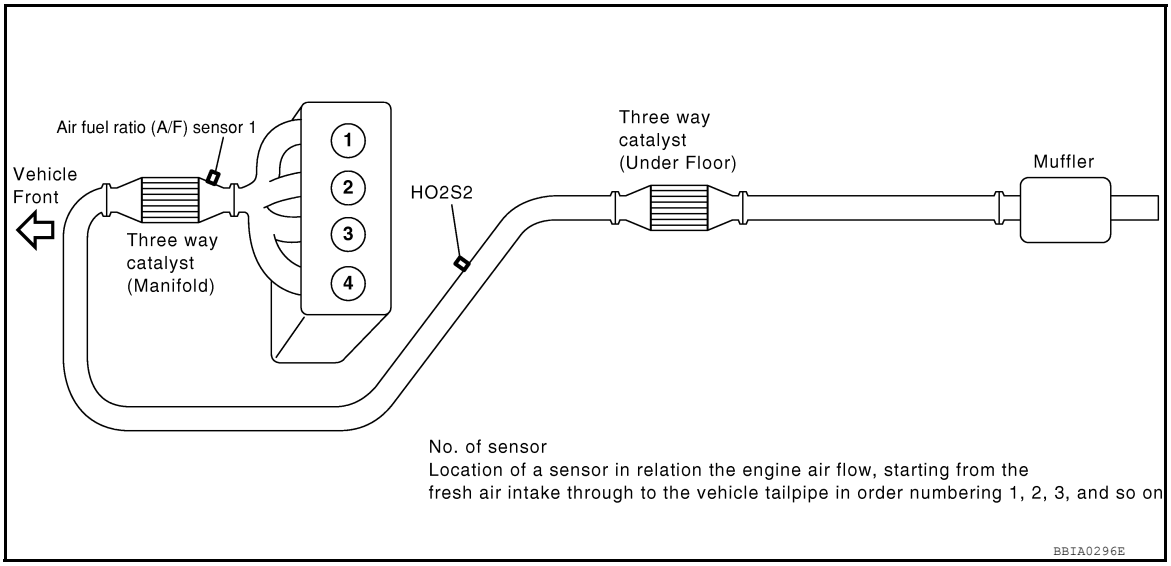
1. Intake valve timing control solenoid valve
2. Ignition coil (with power transistor) and spark plug
3. Knock sensor, Crankshaft position sensor (POS)
4. Air fuel ratio (A/F) sensor 1
5. Camshaft position sensor (PHASE)
6. Engine coolant temperature sensor
7. Transmission range switch (CVT models) Park/neutral position (PNP) switch (M/T models)
8. ECM
9. Refrigerant pressure sensor
10. Battery current sensor
11. IPDM E/R
12. Mass air flow sensor (with intake temperature sensor)
13. EVAP service port
14. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
15. EVAP canister purge volume control solenoid valve
16. Fuel injector
17. Power steering pressure sensor

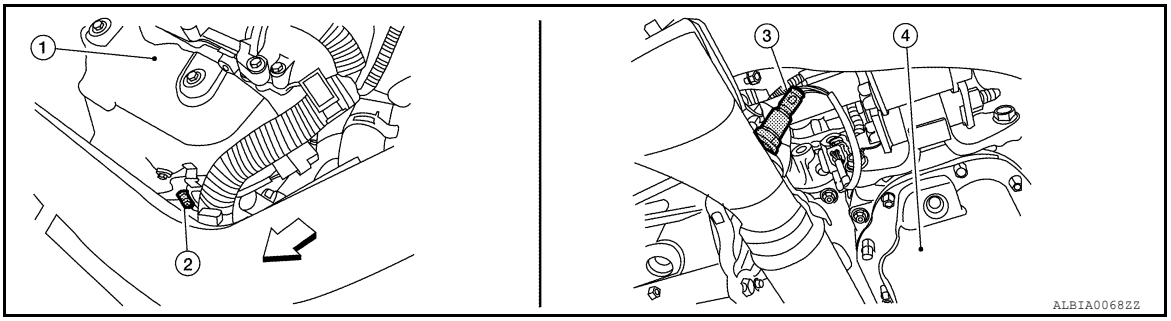


ALBIA0091ZZ

1. Battery
2. Fuel pump fuse (15A)
3. IPDM E/R
4. Brake master cylinder
5. Engine ground
6. Air cleaner assembly
7. Mass air flow sensor (with intake air temperature sensor)
8. Radiator hose (upper)
9. Engine coolant temperature sensor
10. Intake air duct
11. Camshaft position sensor (PHASE)
12. Tie rod (RH)
13. Power steering pressure sensor
14. Knock sensor
15. Engine oil cooler
16. Crankshaft position sensor (POS)
17. Drive shaft (RH)

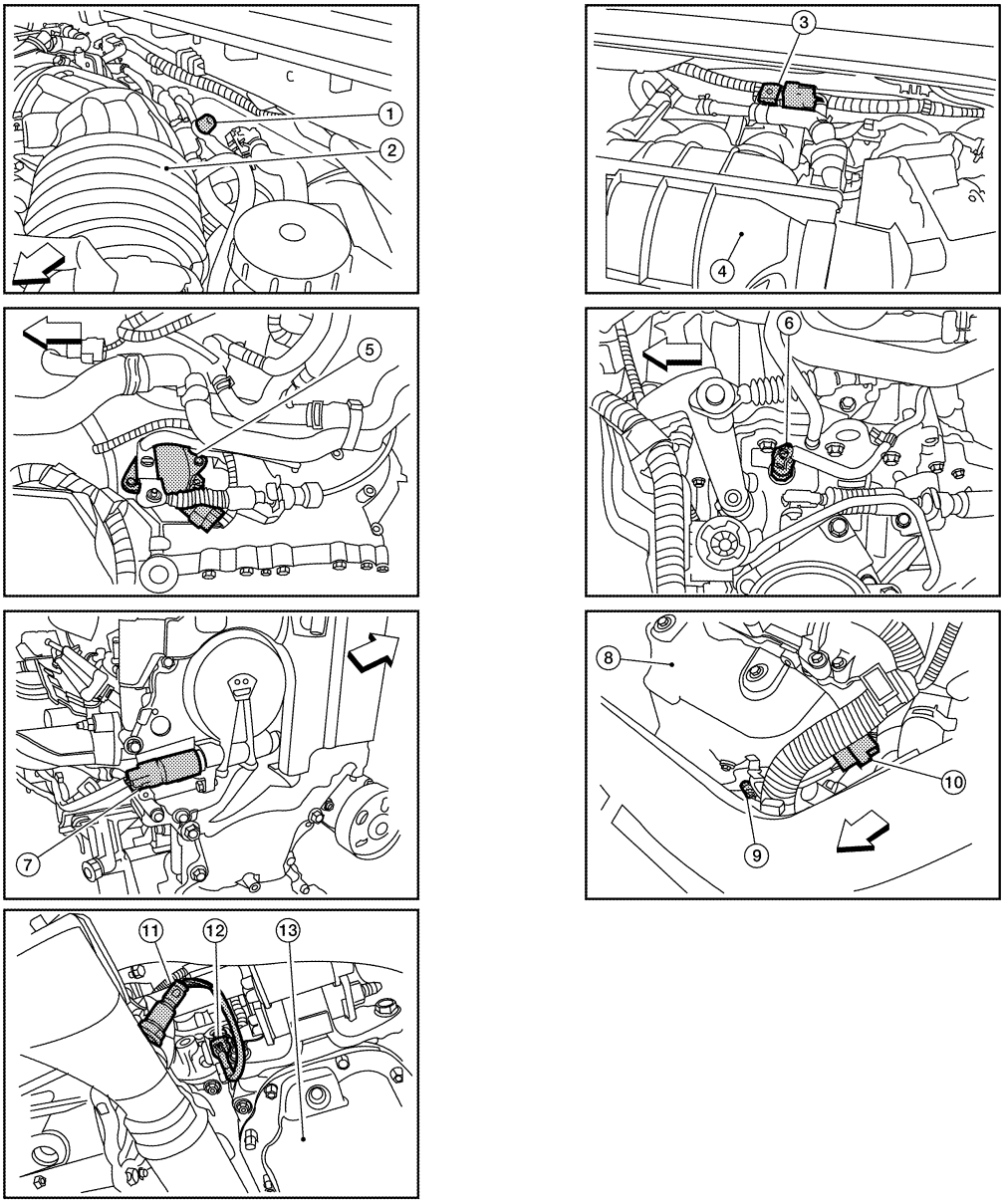
⇦: Vehicle front





1. Exhaust manifold cover
2. Air fuel ratio (A/F) sensor 1
3. Heated oxygen sensor 2 (This illustration is a view from under vehicle.)
4. Engine oil pan

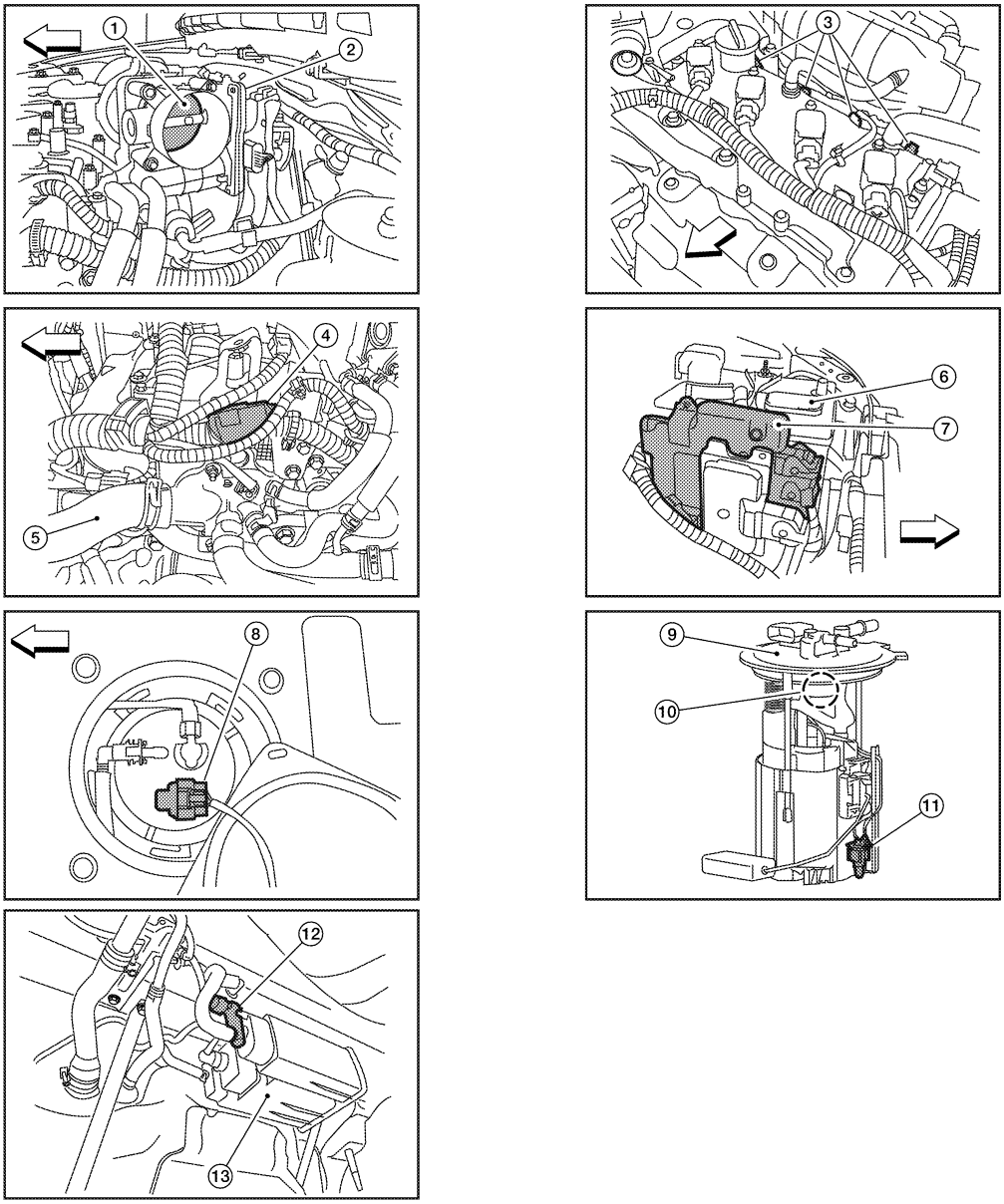
⇦: Vehicle front



ALBIA0095ZZ

1. EVAP service port
2. Intake air duct
3. EVAP canister purge volume control solenoid valve
4. Intake manifold collector
5. Transmission range switch (CVT models) (This illustration is view with air cleaner assembly removed.)
6. Park/neutral position (PNP) switch (M/T models) (This illustration is view with air cleaner assembly removed.)
7. Intake valve timing control solenoid valve (This illustration is view with engine removed.)
8. Exhaust manifold cover
9. Air fuel ratio (A/F) sensor 1
10. Air fuel ratio (A/F) sensor 1 harness connector
11. Heated oxygen sensor 2 (This illustration is view from under vehicle.)
12. Heated oxygen sensor 2 harness connector (This illustration is view from under vehicle.)
13. Engine oil pan

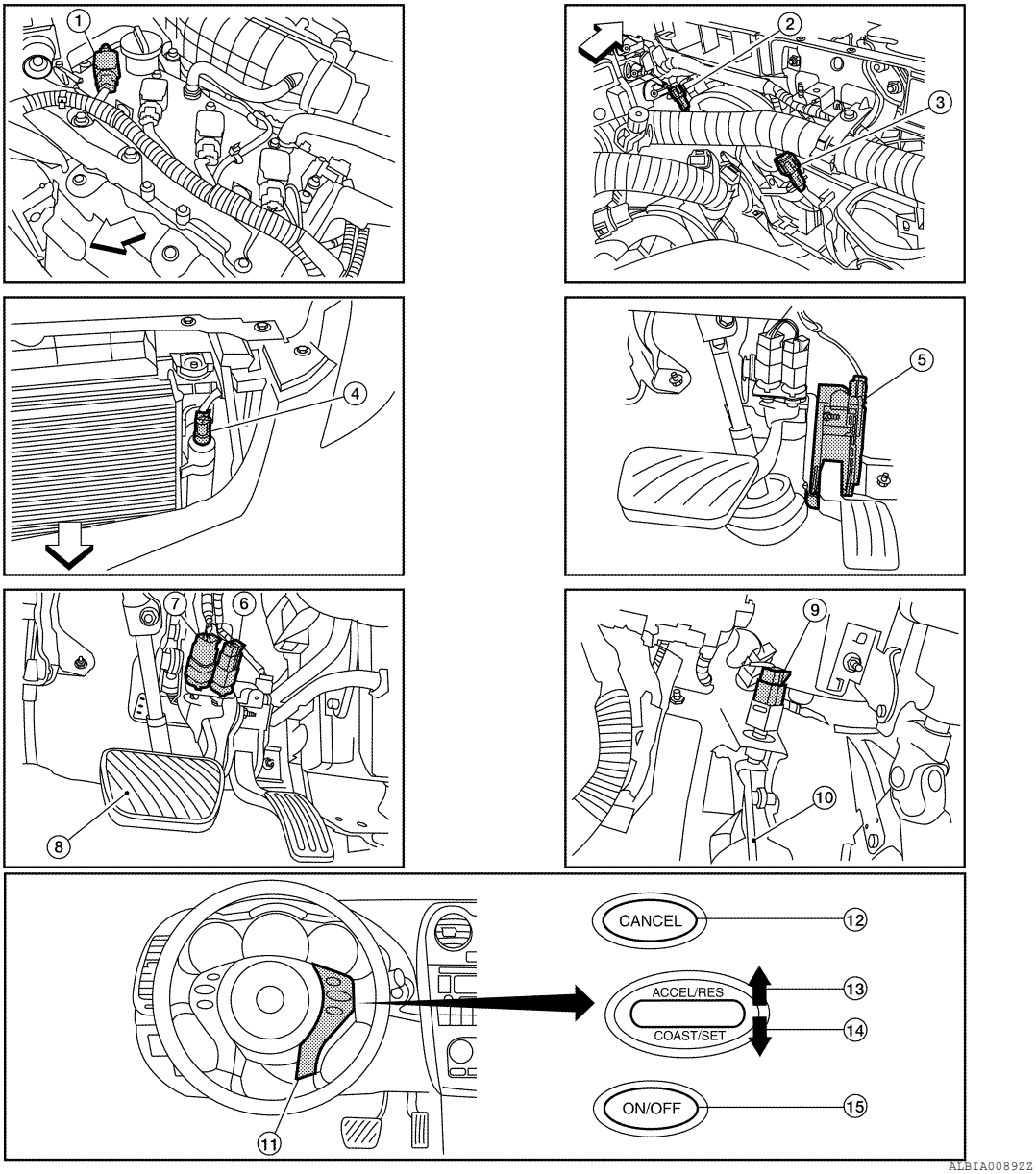
⇦: Vehicle front



ALBIA0518ZZ

1. Throttle valve (This illustration is view with intake air duct removed.)
2. Electric throttle control actuator
3. Fuel injector harness connector
4. Condenser-2
5. Radiator hose (upper)
6. Battery
7. ECM
8. Fuel level sensor unit and fuel pump harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
9. Fuel level sensor unit and fuel pump assembly
10. Fuel pressure regulator
11. Fuel tank temperature sensor
12. EVAP canister vent control valve (This illustration is view with rear suspension member removed.)
13. EVAP canister (This illustration is view with rear suspension member removed.)

⇦ : Vehicle front



1. No.1 ignition coil
2. Cooling fan motor-1 harness connector
3. Cooling fan motor-2 harness connector
4. Refrigerant pressure sensor
5. Accelerator pedal position sensor
6. ASCD brake switch
7. Stop lamp switch
8. Brake pedal
9. ASCD clutch switch
10. Clutch pedal
11. ASCD steering switch
12. CANCEL switch
13. RESUME/ACCELERATE switch
14. SET/COAST switch
15. MAIN switch

⇦: Vehicle front

Component Description

INFOID:0000000006391626

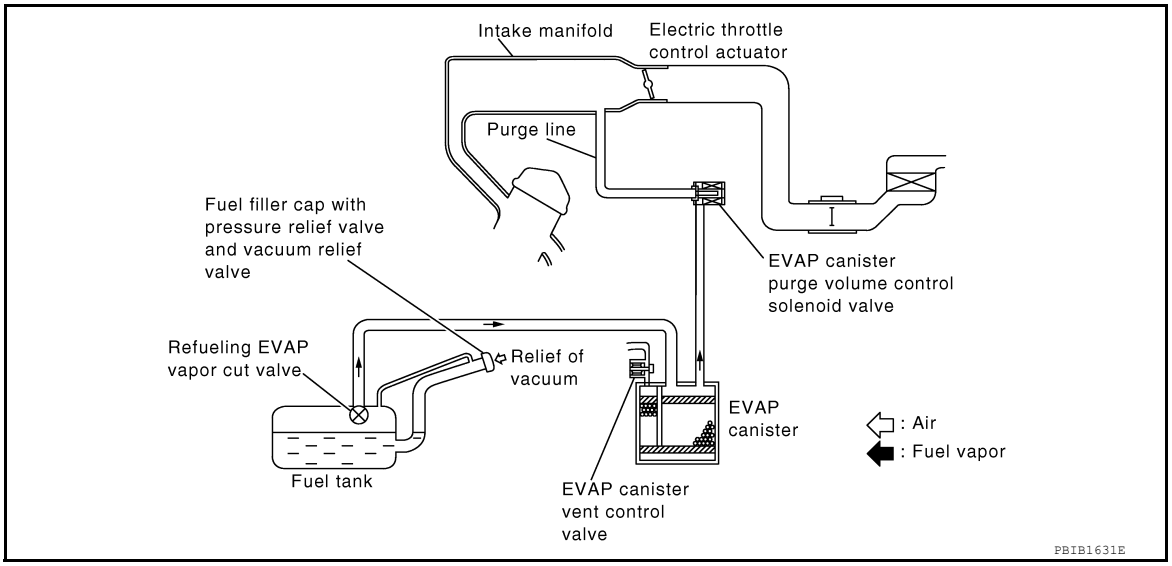
Component	Reference
Camshaft position sensor (PHASE)	EC-148, "Description"
Crankshaft position sensor (POS)	EC-144, "Description"
Cooling fan motor	EC-67, "System Description"

Component	Reference
Engine coolant temperature sensor	EC-133, "Description"
Refrigerant pressure sensor	EC-271, "Description"

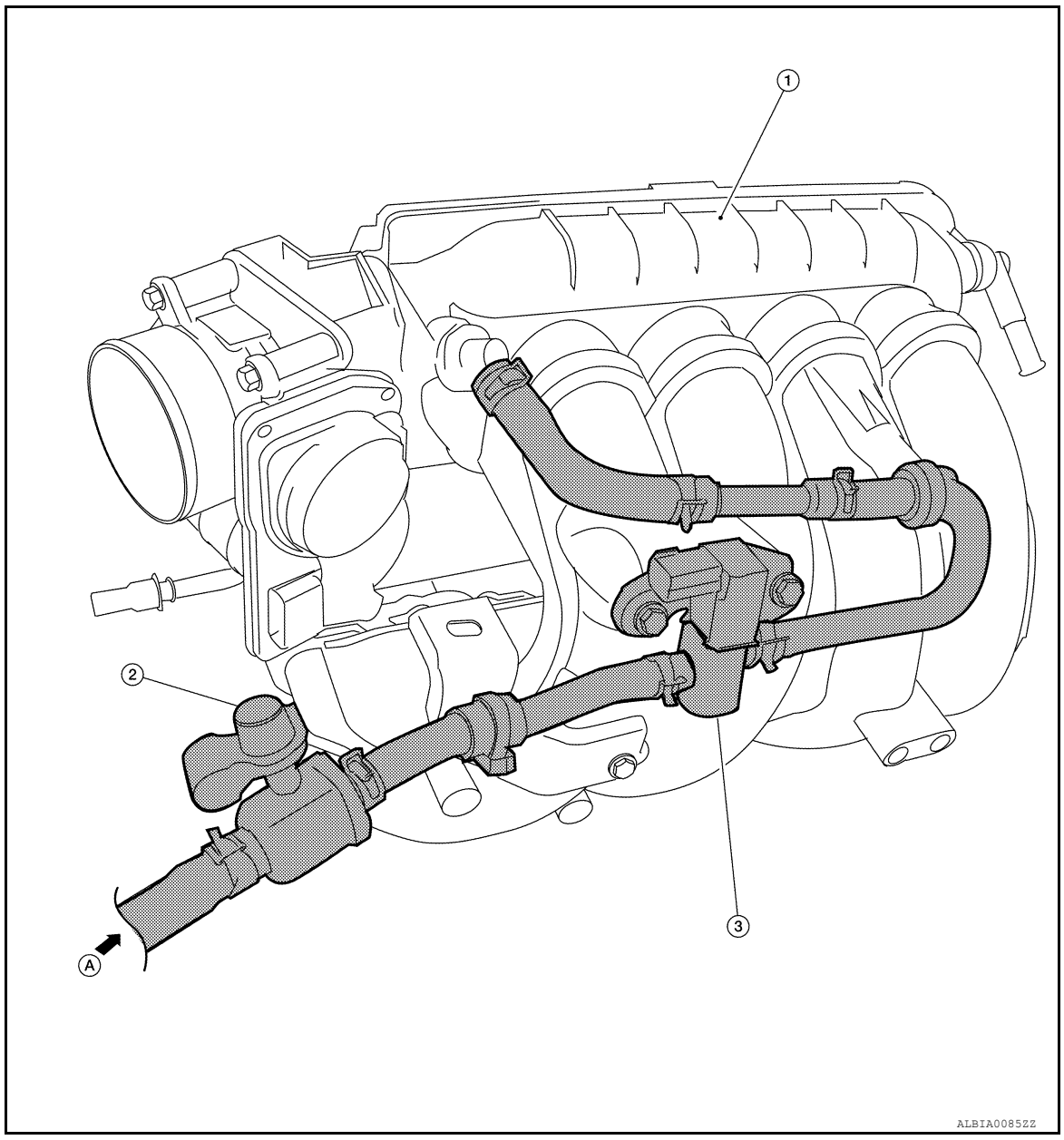
EVAPORATIVE EMISSION SYSTEM

System Diagram

INFOID:0000000006391627

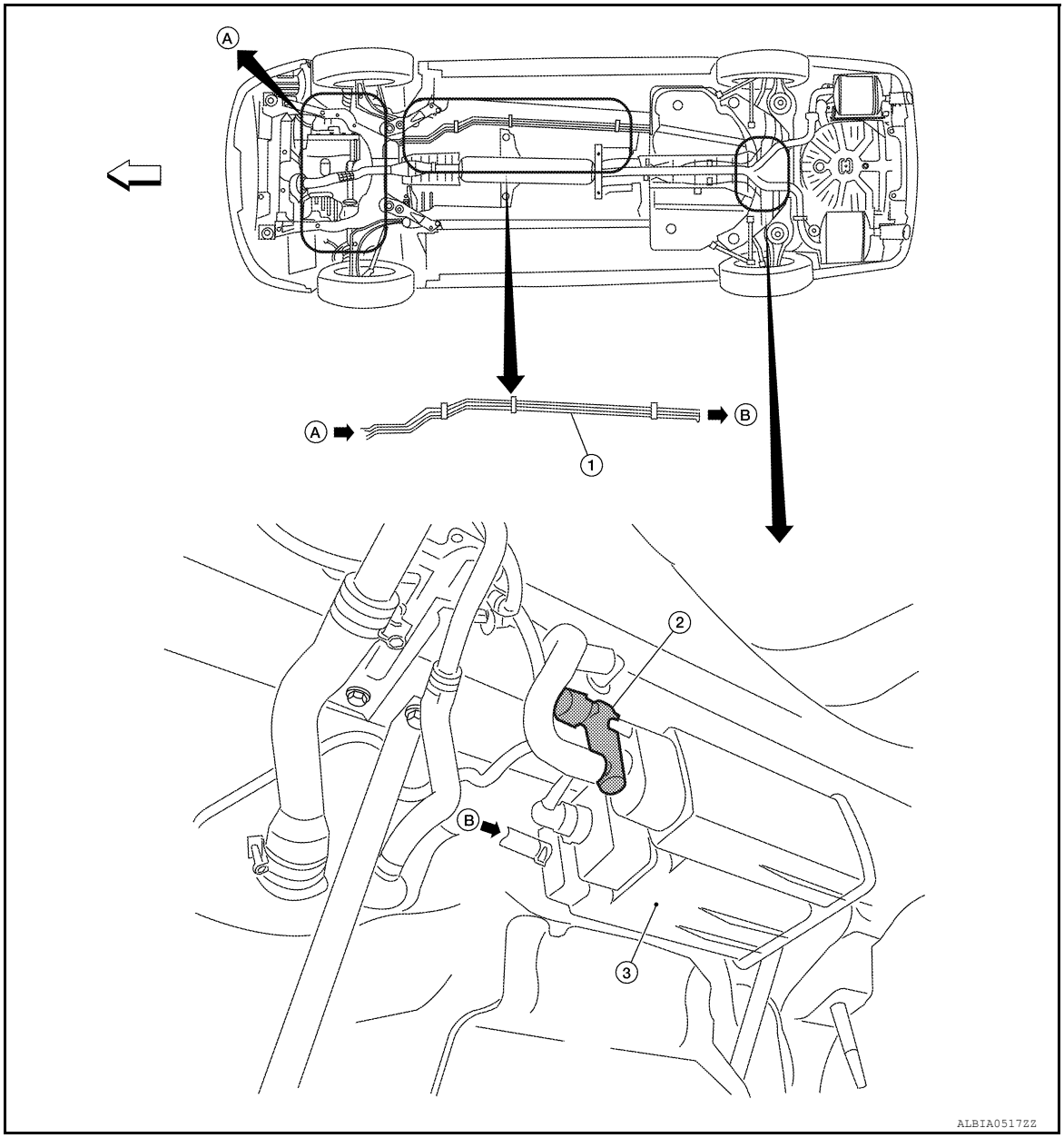


EVAPORATIVE EMISSION LINE DRAWING



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

A. From next figure



1. EVAP vapor purge line (view with rear suspension member removed)
2. EVAP canister vent control valve (view with rear suspension member removed)
3. EVAP canister (view with rear suspension member removed)

⇦ Vehicle front ⬅ Previous page

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

System Description

INFOID:0000000006391628

INPUT/OUTPUT SIGNAL CHART

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

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

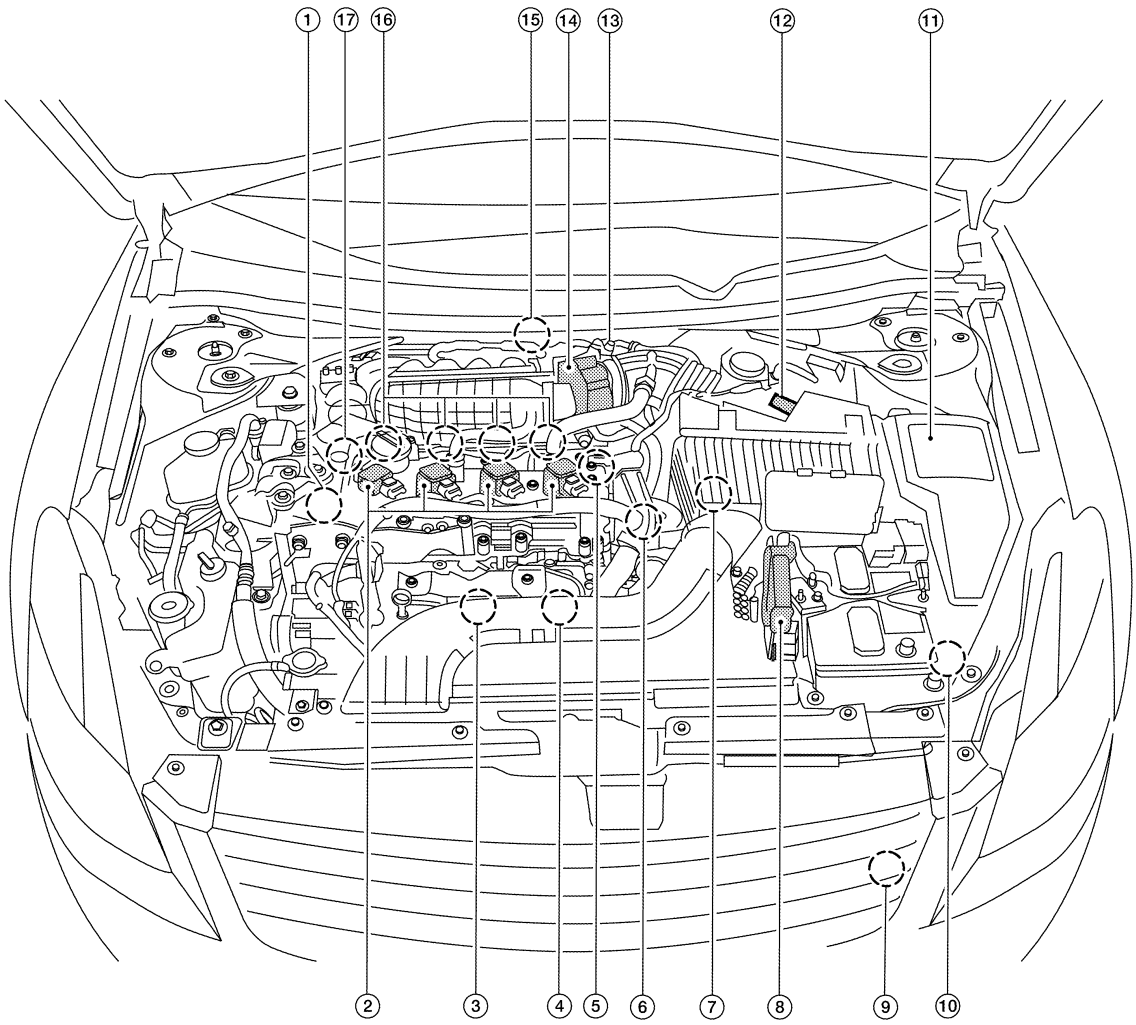
*2: This signal is sent to the ECM through CAN communication line.

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.

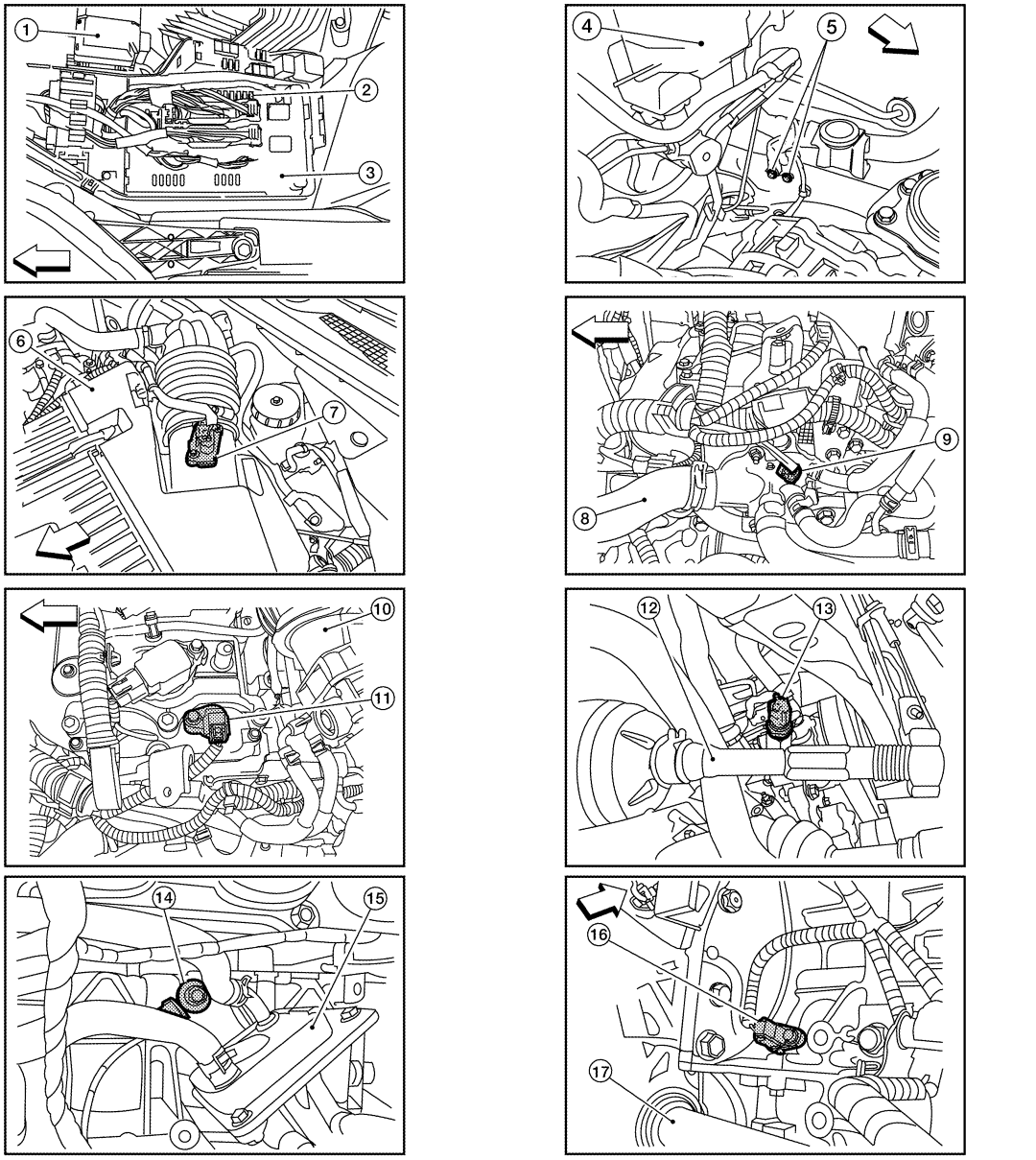
Component Parts Location

INFOID:0000000006391629



ALBIA0094ZZ

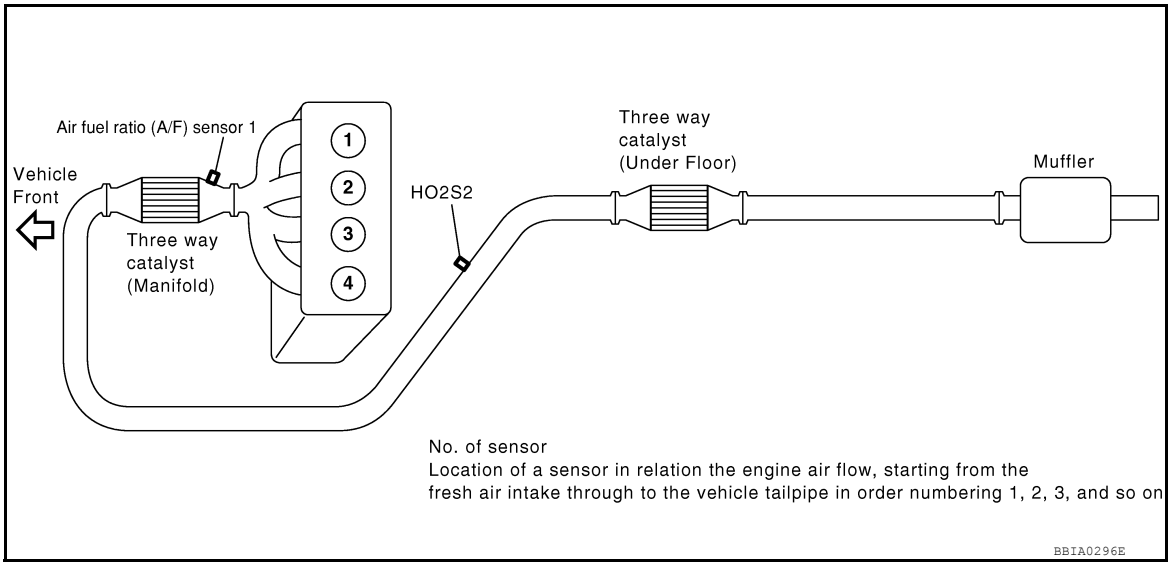
1. Intake valve timing control solenoid valve
2. Ignition coil (with power transistor) and spark plug
3. Knock sensor, Crankshaft position sensor (POS)
4. Air fuel ratio (A/F) sensor 1
5. Camshaft position sensor (PHASE)
6. Engine coolant temperature sensor
7. Transmission range switch (CVT models) Park/neutral position (PNP) switch (M/T models)
8. ECM
9. Refrigerant pressure sensor
10. Battery current sensor
11. IPDM E/R
12. Mass air flow sensor (with intake temperature sensor)
13. EVAP service port
14. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
15. EVAP canister purge volume control solenoid valve
16. Fuel injector
17. Power steering pressure sensor

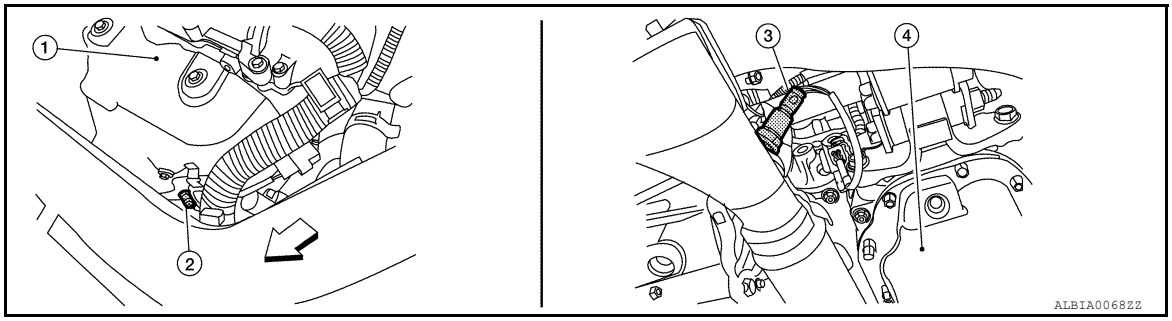


ALBIA0091ZZ

1. Battery
2. Fuel pump fuse (15A)
3. IPDM E/R
4. Brake master cylinder
5. Engine ground
6. Air cleaner assembly
7. Mass air flow sensor (with intake air temperature sensor)
8. Radiator hose (upper)
9. Engine coolant temperature sensor
10. Intake air duct
11. Camshaft position sensor (PHASE)
12. Tie rod (RH)
13. Power steering pressure sensor
14. Knock sensor
15. Engine oil cooler
16. Crankshaft position sensor (POS)
17. Drive shaft (RH)

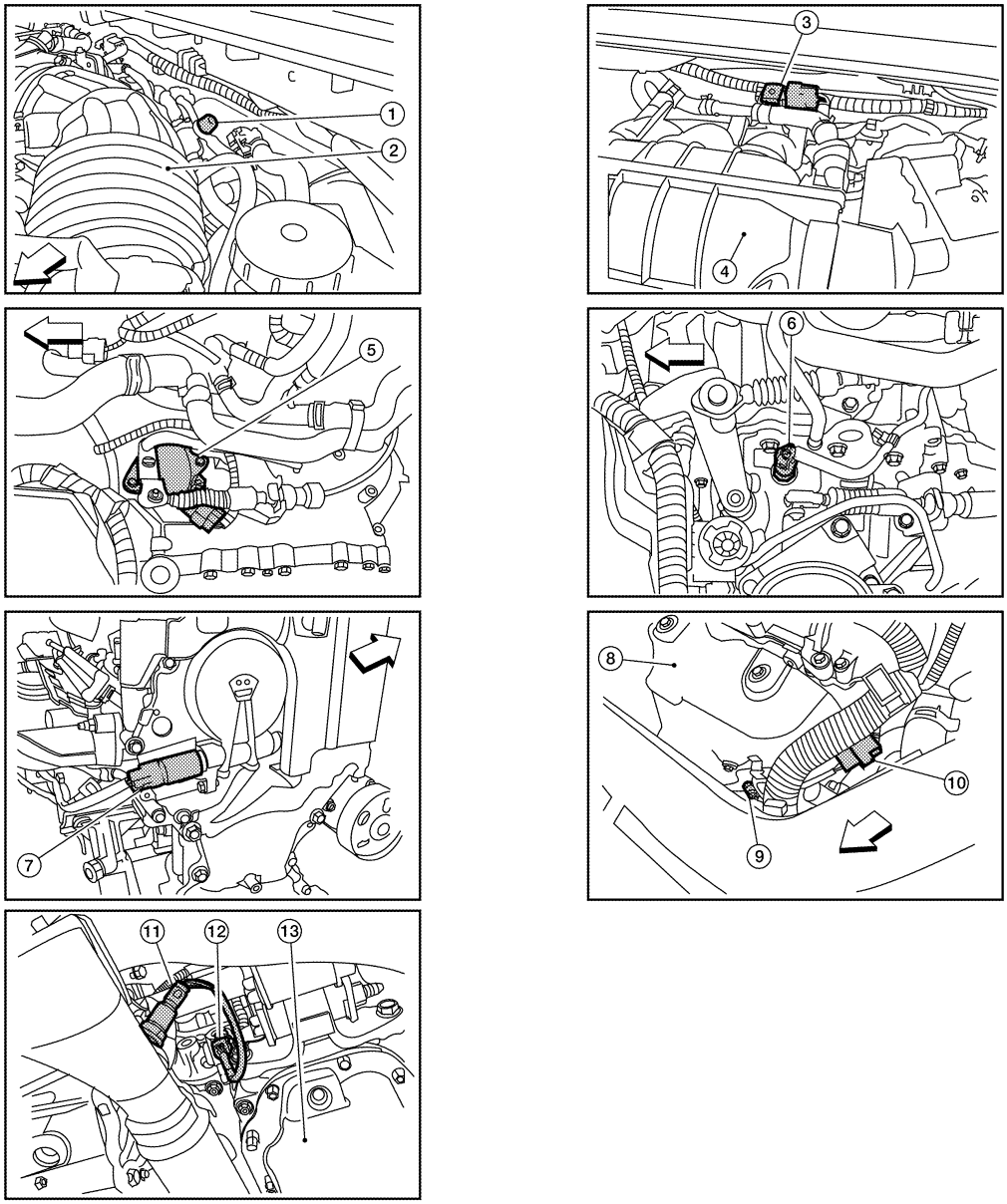
⇦: Vehicle front





1. Exhaust manifold cover
2. Air fuel ratio (A/F) sensor 1
3. Heated oxygen sensor 2 (This illustration is a view from under vehicle.)
4. Engine oil pan

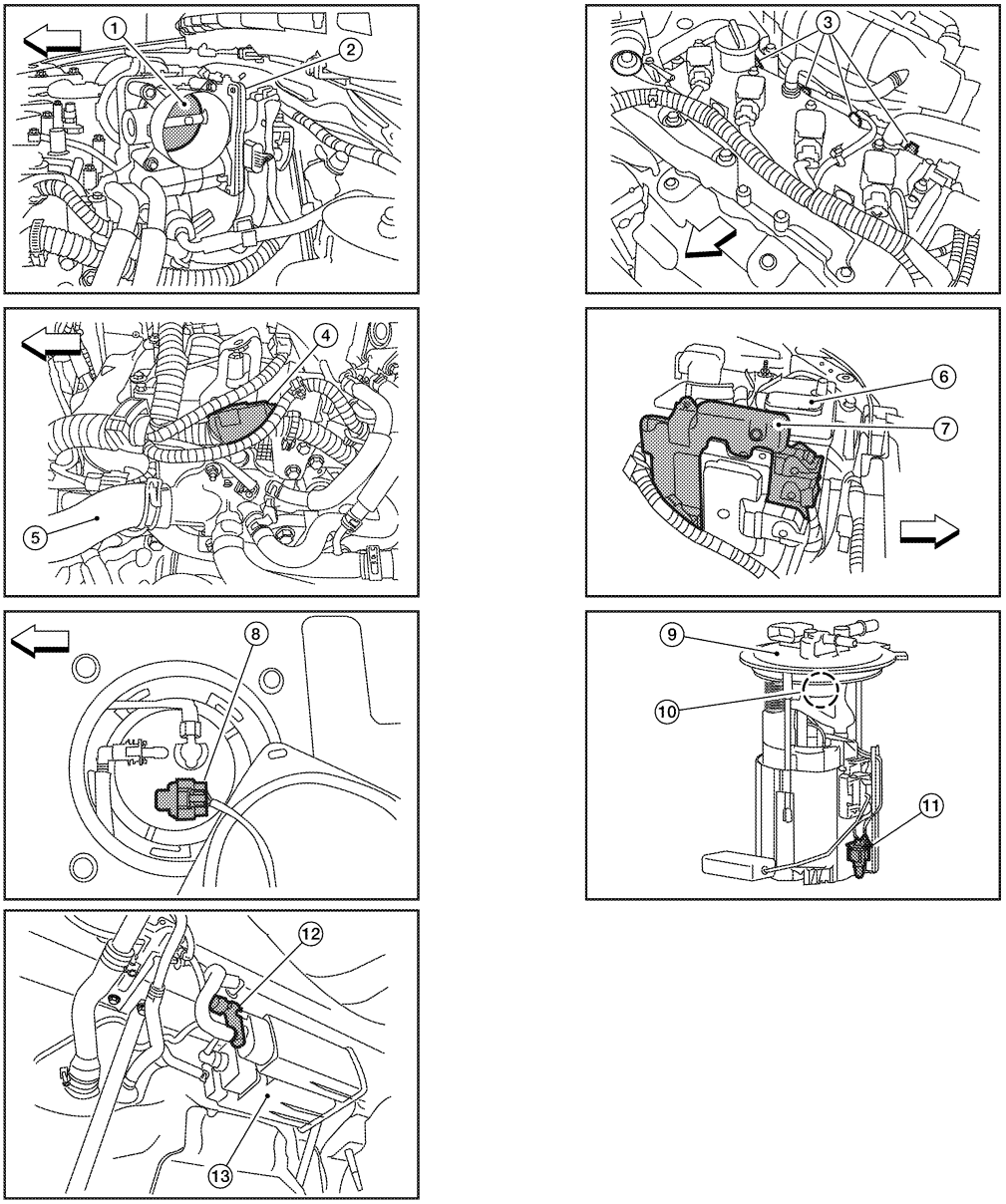
⇦: Vehicle front



ALBIA0095ZZ

1. EVAP service port
2. Intake air duct
3. EVAP canister purge volume control solenoid valve
4. Intake manifold collector
5. Transmission range switch (CVT models) (This illustration is view with air cleaner assembly removed.)
6. Park/neutral position (PNP) switch (M/T models) (This illustration is view with air cleaner assembly removed.)
7. Intake valve timing control solenoid valve (This illustration is view with engine removed.)
8. Exhaust manifold cover
9. Air fuel ratio (A/F) sensor 1
10. Air fuel ratio (A/F) sensor 1 harness connector
11. Heated oxygen sensor 2 (This illustration is view from under vehicle.)
12. Heated oxygen sensor 2 harness connector (This illustration is view from under vehicle.)
13. Engine oil pan

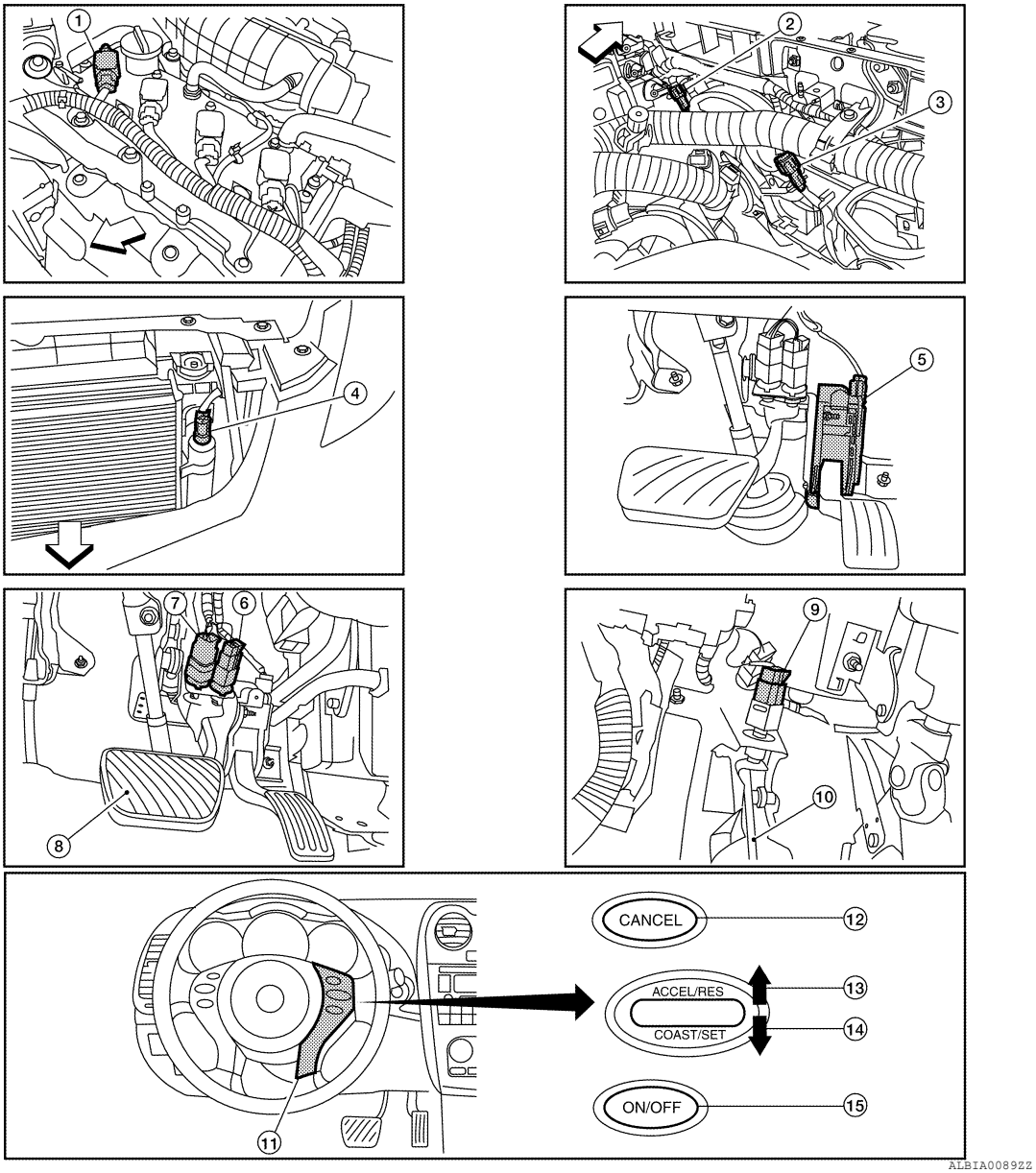
⇦: Vehicle front



ALBIA0518ZZ

1. Throttle valve (This illustration is view with intake air duct removed.)
2. Electric throttle control actuator
3. Fuel injector harness connector
4. Condenser-2
5. Radiator hose (upper)
6. Battery
7. ECM
8. Fuel level sensor unit and fuel pump harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
9. Fuel level sensor unit and fuel pump assembly
10. Fuel pressure regulator
11. Fuel tank temperature sensor
12. EVAP canister vent control valve (This illustration is view with rear suspension member removed.)
13. EVAP canister (This illustration is view with rear suspension member removed.)

⇦ : Vehicle front



1. No.1 ignition coil
2. Cooling fan motor-1 harness connector
3. Cooling fan motor-2 harness connector
4. Refrigerant pressure sensor
5. Accelerator pedal position sensor
6. ASCD brake switch
7. Stop lamp switch
8. Brake pedal
9. ASCD clutch switch
10. Clutch pedal
11. ASCD steering switch
12. CANCEL switch
13. RESUME/ACCELERATE switch
14. SET/COAST switch
15. MAIN switch

⇦: Vehicle front

Component Description

INFOID:0000000006391630

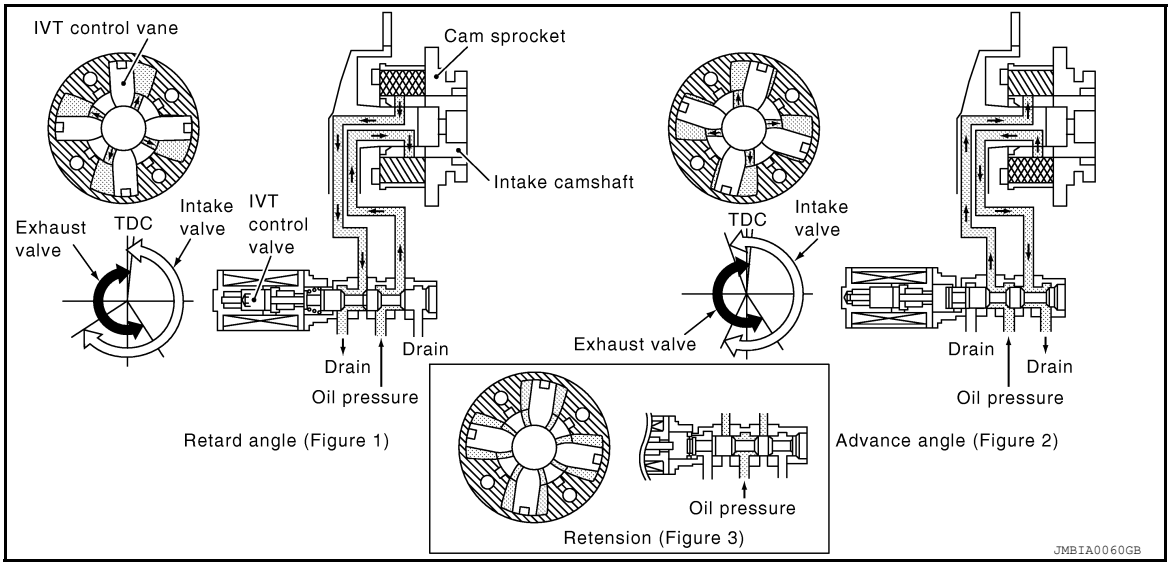
Component	Reference
A/F sensor 1	EC-228, "Description"
Accelerator pedal position sensor	EC-208, "Description"
Camshaft position sensor (PHASE)	EC-148, "Description"
Crankshaft position sensor (POS)	EC-144, "Description"

Component	Reference
Engine coolant temperature sensor	EC-133, "Description"
EVAP canister purge volume control solenoid valve	EC-241, "Description"
Mass air flow sensor	EC-128, "Description"
Throttle position sensor	EC-136, "Description"
Vehicle speed sensor	EC-152, "Description"

INTAKE VALVE TIMING CONTROL

System Diagram

INFOID:0000000006391631



System Description

INFOID:0000000006391632

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

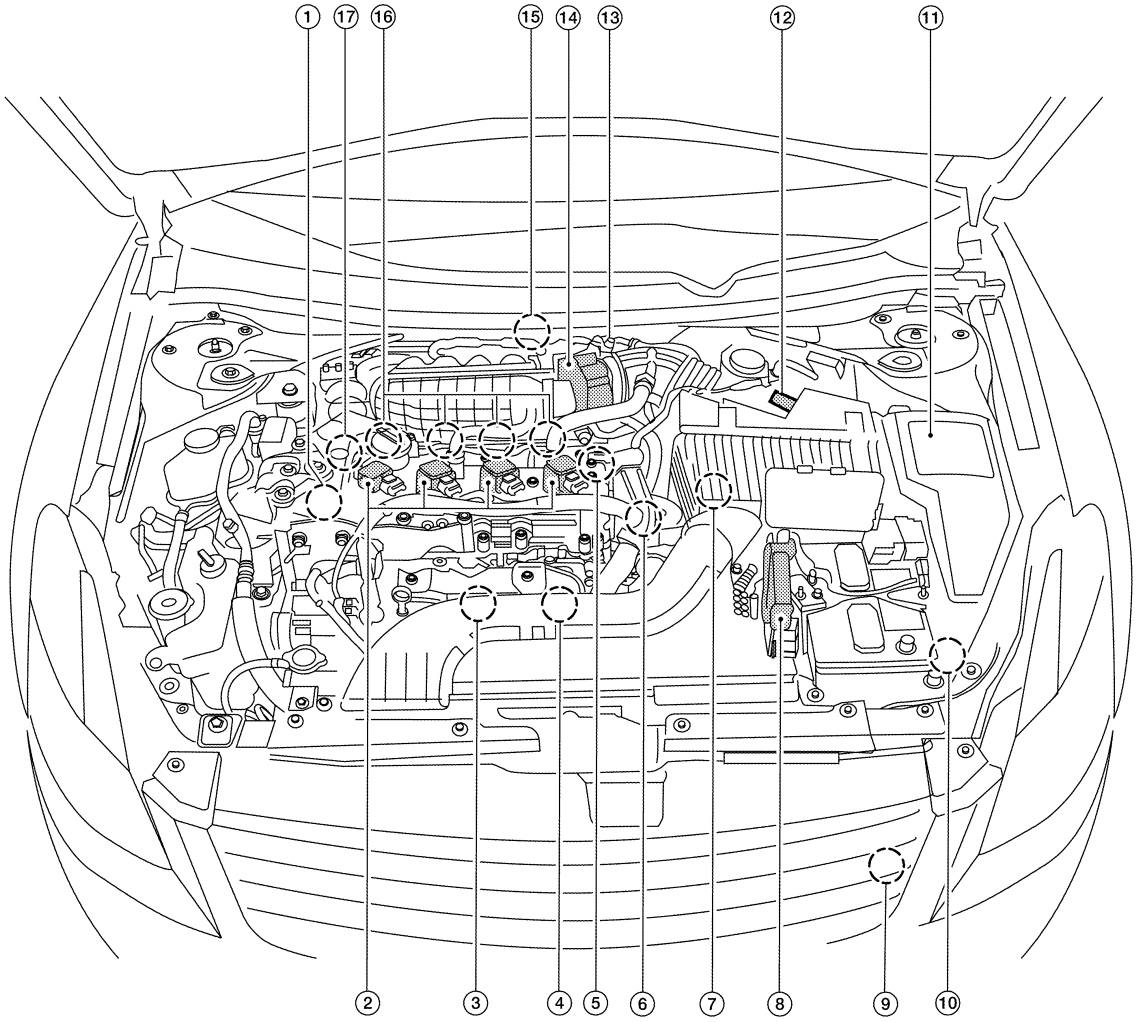
SYSTEM DESCRIPTION

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.

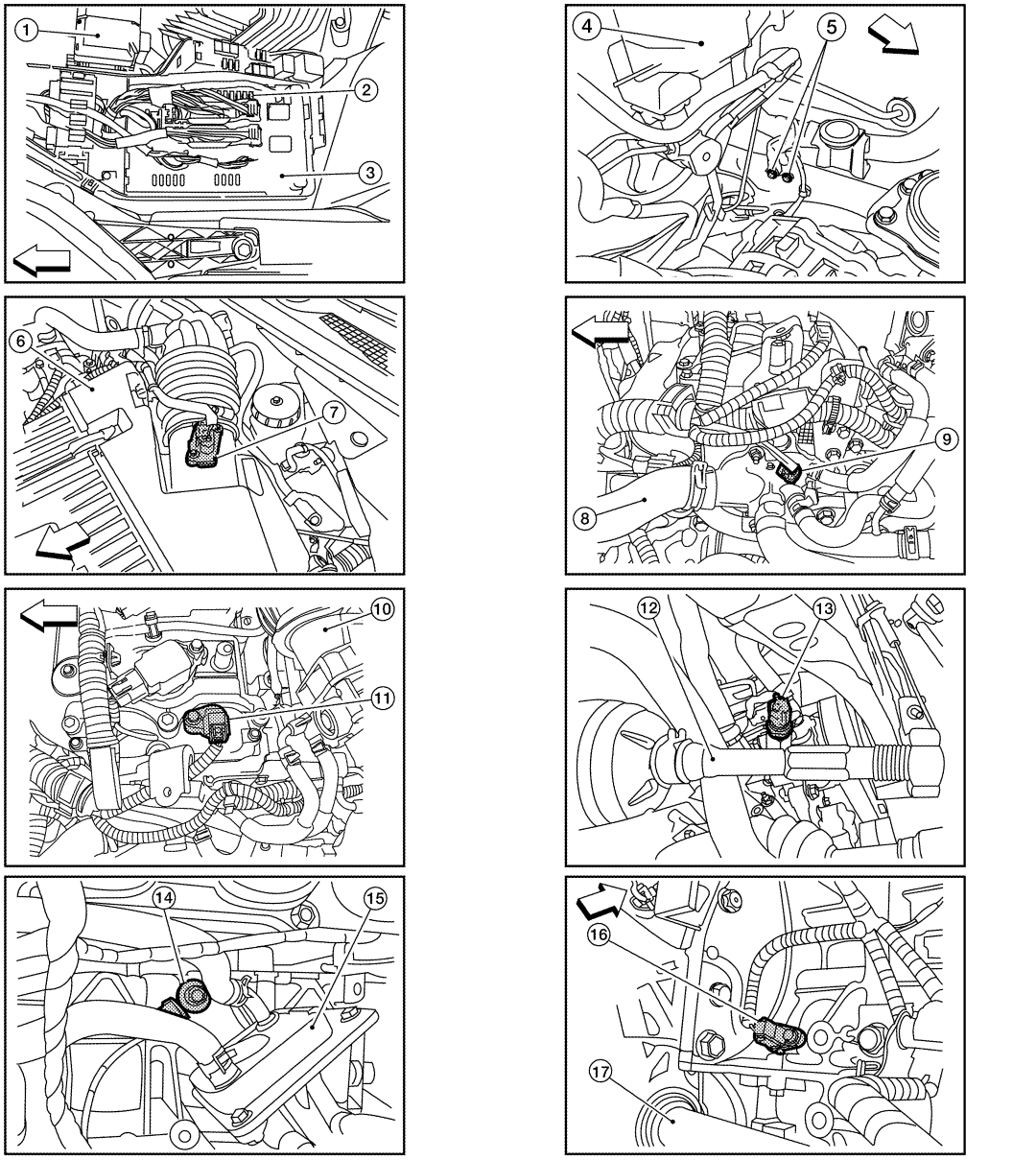
Component Parts Location

INFOID:0000000006391633



ALBIA0094ZZ

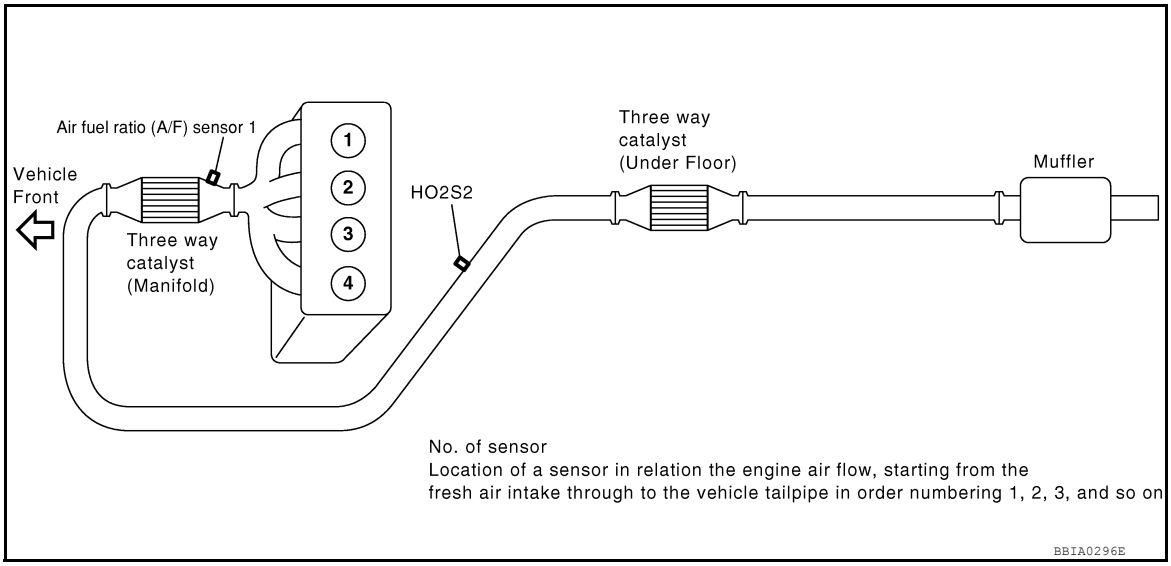
1. Intake valve timing control solenoid valve
2. Ignition coil (with power transistor) and spark plug
3. Knock sensor, Crankshaft position sensor (POS)
4. Air fuel ratio (A/F) sensor 1
5. Camshaft position sensor (PHASE)
6. Engine coolant temperature sensor
7. Transmission range switch (CVT models) Park/neutral position (PNP) switch (M/T models)
8. ECM
9. Refrigerant pressure sensor
10. Battery current sensor
11. IPDM E/R
12. Mass air flow sensor (with intake temperature sensor)
13. EVAP service port
14. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
15. EVAP canister purge volume control solenoid valve
16. Fuel injector
17. Power steering pressure sensor

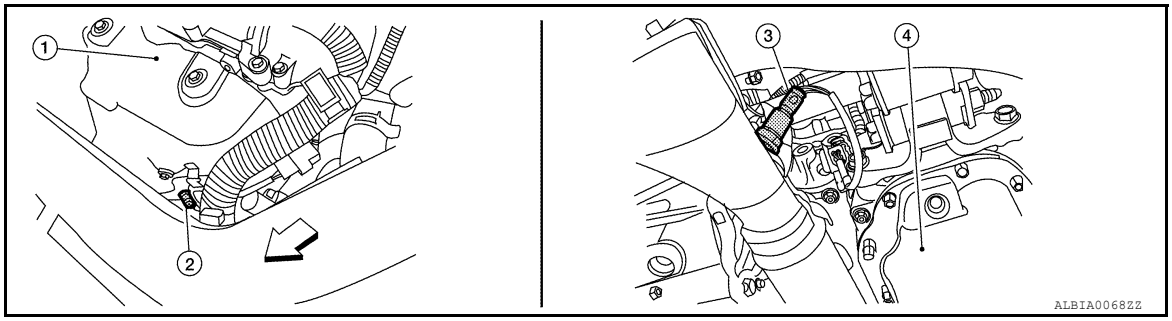


ALBIA0091ZZ

1. Battery
2. Fuel pump fuse (15A)
3. IPDM E/R
4. Brake master cylinder
5. Engine ground
6. Air cleaner assembly
7. Mass air flow sensor (with intake air temperature sensor)
8. Radiator hose (upper)
9. Engine coolant temperature sensor
10. Intake air duct
11. Camshaft position sensor (PHASE)
12. Tie rod (RH)
13. Power steering pressure sensor
14. Knock sensor
15. Engine oil cooler
16. Crankshaft position sensor (POS)
17. Drive shaft (RH)

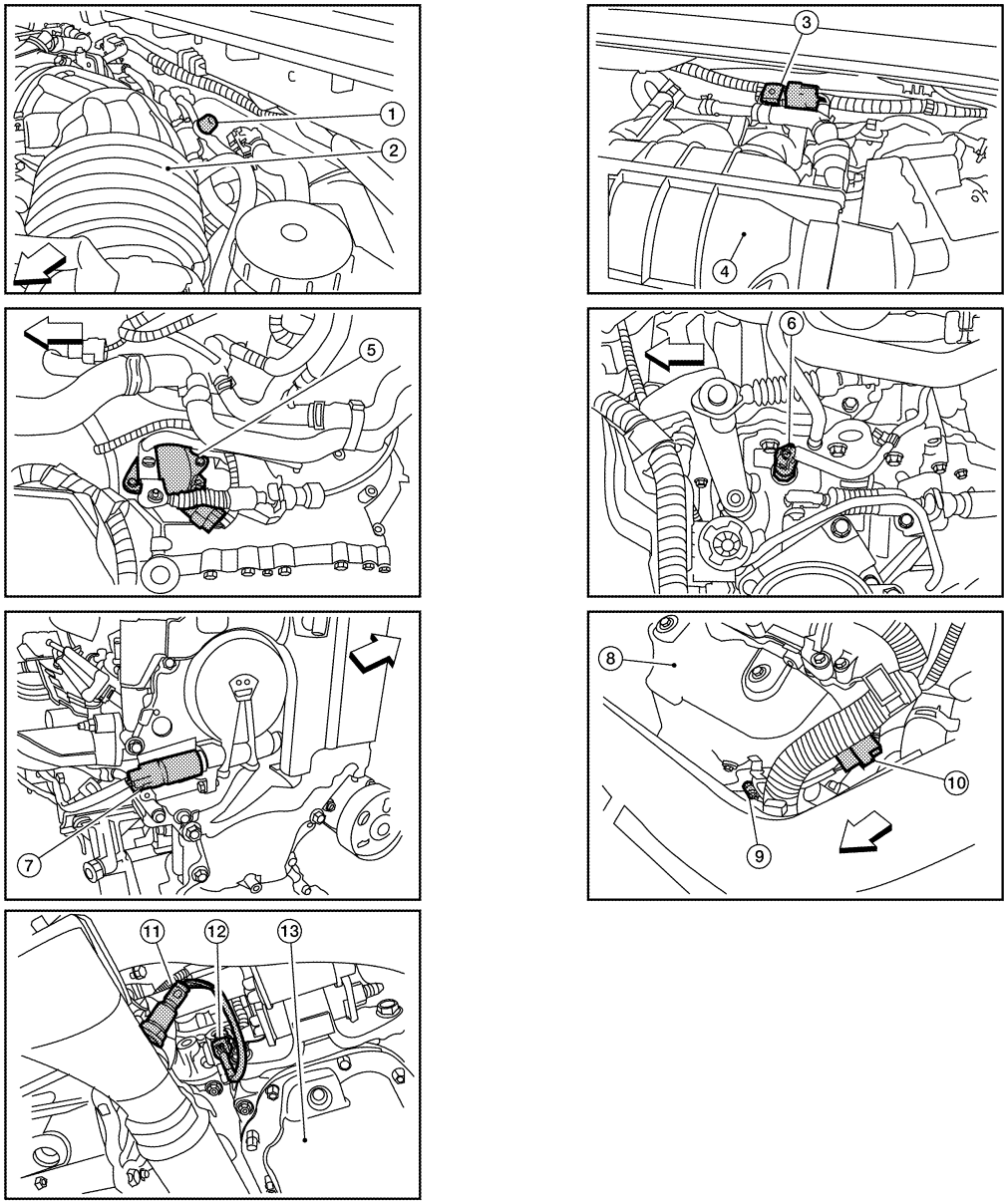
⇦: Vehicle front





1. Exhaust manifold cover
2. Air fuel ratio (A/F) sensor 1
3. Heated oxygen sensor 2 (This illustration is a view from under vehicle.)
4. Engine oil pan

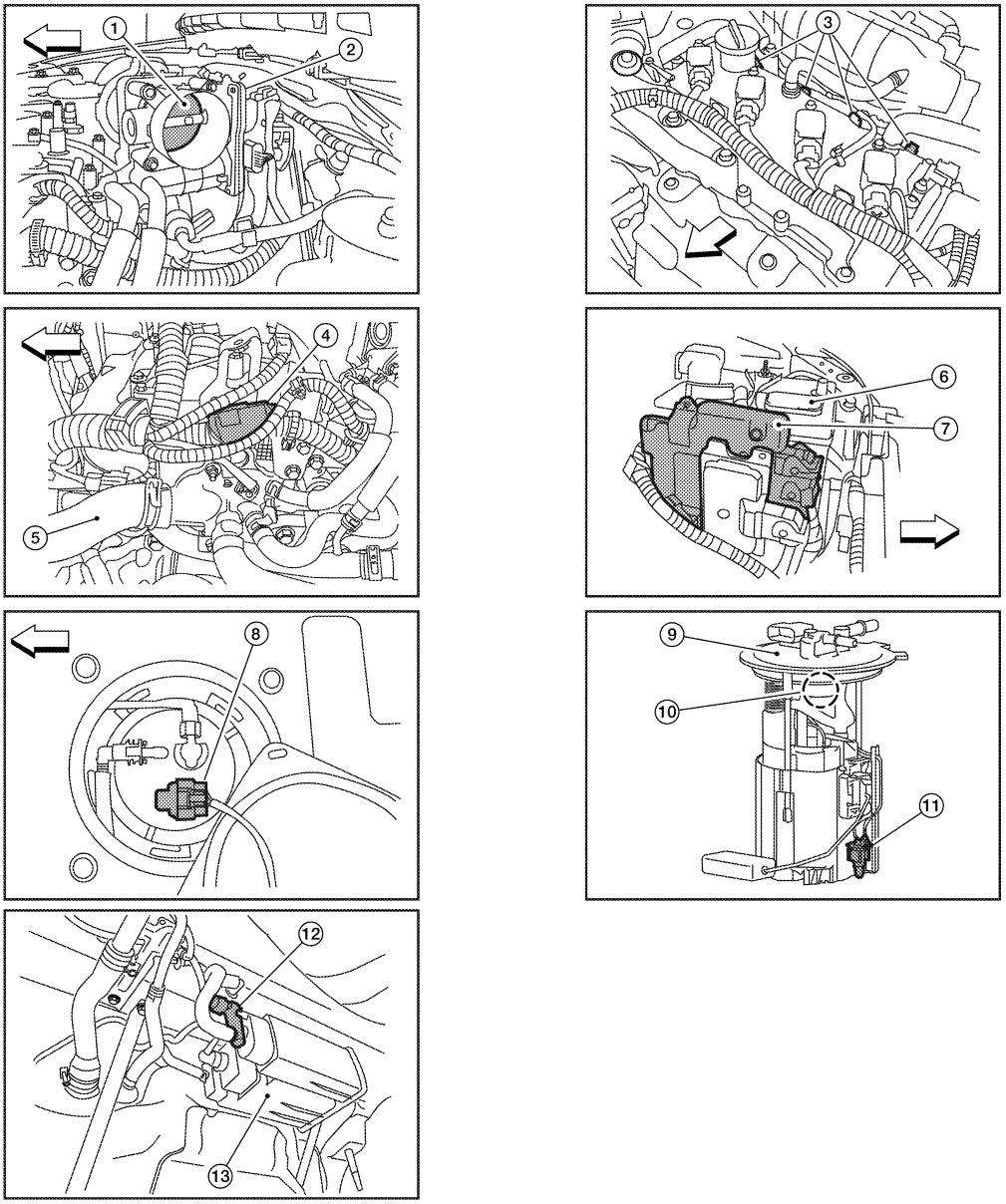
⇦: Vehicle front



ALBIA0095ZZ

1. EVAP service port
2. Intake air duct
3. EVAP canister purge volume control solenoid valve
4. Intake manifold collector
5. Transmission range switch (CVT models) (This illustration is view with air cleaner assembly removed.)
6. Park/neutral position (PNP) switch (M/T models) (This illustration is view with air cleaner assembly removed.)
7. Intake valve timing control solenoid valve (This illustration is view with engine removed.)
8. Exhaust manifold cover
9. Air fuel ratio (A/F) sensor 1
10. Air fuel ratio (A/F) sensor 1 harness connector
11. Heated oxygen sensor 2 (This illustration is view from under vehicle.)
12. Heated oxygen sensor 2 harness connector (This illustration is view from under vehicle.)
13. Engine oil pan

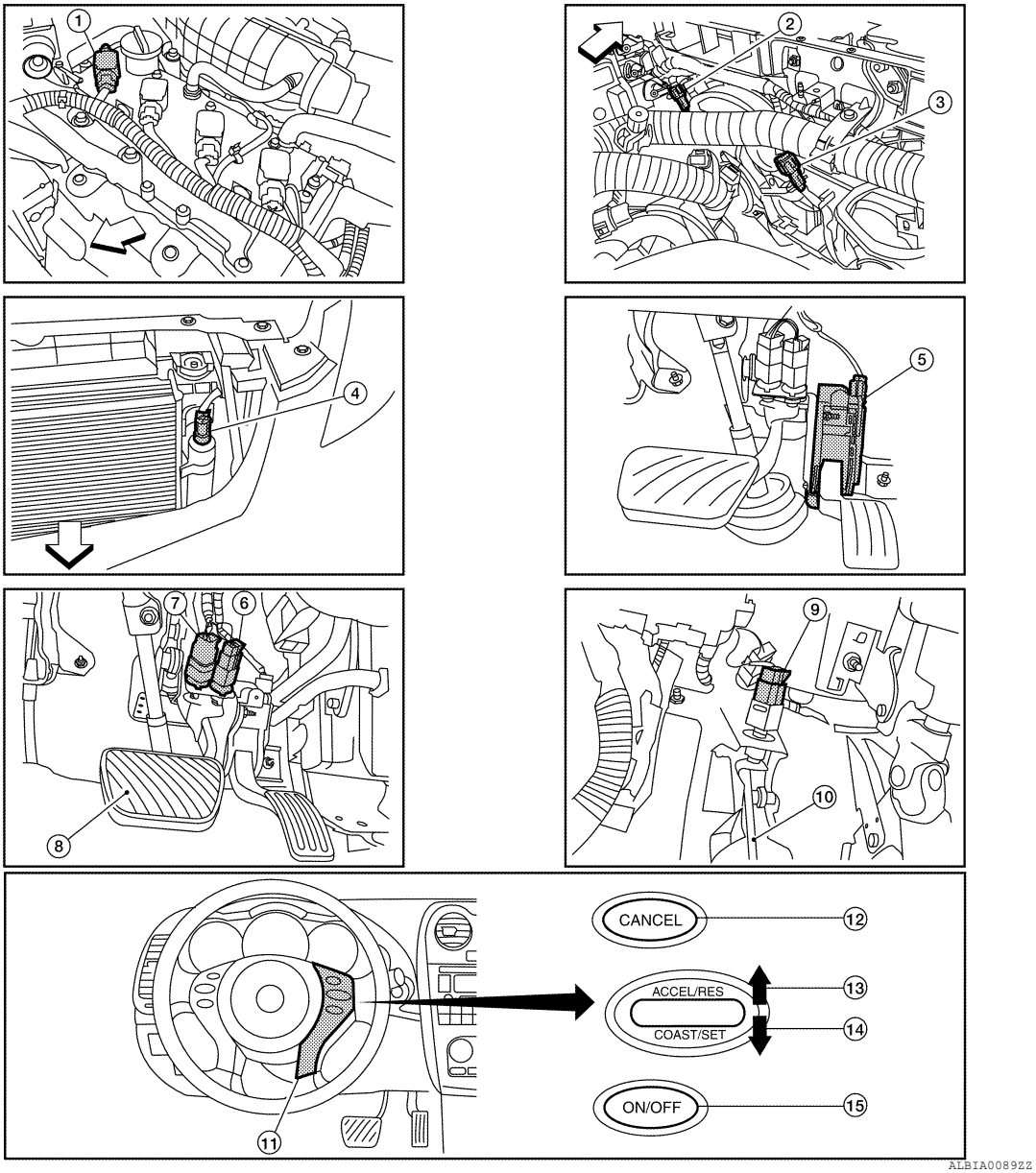
⇦: Vehicle front



ALBIA0518ZZ

1. Throttle valve (This illustration is view with intake air duct removed.)
2. Electric throttle control actuator
3. Fuel injector harness connector
4. Condenser-2
5. Radiator hose (upper)
6. Battery
7. ECM
8. Fuel level sensor unit and fuel pump harness connector (This illustration is view with rear seat cushion and inspection hole cover removed.)
9. Fuel level sensor unit and fuel pump assembly
10. Fuel pressure regulator
11. Fuel tank temperature sensor
12. EVAP canister vent control valve (This illustration is view with rear suspension member removed.)
13. EVAP canister (This illustration is view with rear suspension member removed.)

⇦ : Vehicle front



1. No.1 ignition coil
2. Cooling fan motor-1 harness connector
3. Cooling fan motor-2 harness connector
4. Refrigerant pressure sensor
5. Accelerator pedal position sensor
6. ASCD brake switch
7. Stop lamp switch
8. Brake pedal
9. ASCD clutch switch
10. Clutch pedal
11. ASCD steering switch
12. CANCEL switch
13. RESUME/ACCELERATE switch
14. SET/COAST switch
15. MAIN switch

⇦: Vehicle front

Component Description

INFOID:0000000006391634

Component	Reference
Camshaft position sensor (PHASE)	EC-148, "Description"
Crankshaft position sensor (POS)	EC-144, "Description"
Engine coolant temperature sensor	EC-133, "Description"

Component	Reference
Intake valve timing control solenoid valve	EC-87, "System Description"
Vehicle speed sensor	EC-152, "Description"

DIAGNOSIS SYSTEM (ECM)

Diagnosis Description

INFOID:0000000006391635

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 (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-284, "Fail Safe".)

TWO TRIP DETECTION LOGIC

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

If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL lights up. The MIL lights up at the same time when the DTC is stored. <2nd trip> The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation.

DTC AND FREEZE FRAME DATA

DTC and 1st Trip DTC

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

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

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

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. The freeze frame data and 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. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is

detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. If freeze frame data is stored in the ECM memory and another freeze frame data occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in “How to Erase DTC and 1ST Trip DTC”.

How to Read DTC and 1st Trip DTC

With CONSULT-III
CONSULT-III displays the DTC in “SELF-DIAG RESULTS” mode. Example: P0340, P0850, etc.
(CONSULT-III also displays the malfunctioning component or system.)

Without CONSULT-III
The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0340, 0850, 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 does not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-III can identify malfunction status. Therefore, using CONSULT-III (if available) is recommended.**

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

How to Erase DTC and 1st Trip DTC

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

1. Select “ENGINE” with CONSULT-III.
2. Select “SELF-DIAGNOSTIC RESULTS”.
3. Touch “ERASE”. (DTC in ECM will be erased.)

No Tools
NOTE:
If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once.
Wait at least 10 seconds and then turn it ON (engine stopped) again.

1. Erase DTC in ECM. Refer to How to Erase Diagnostic Test Mode II (Self-diagnostic Results).

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

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data

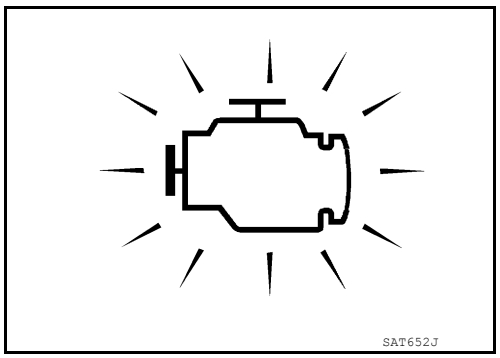
Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

MALFUNCTION INDICATOR LAMP (MIL)

Description

The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
   If the MIL does not light up, refer to EC-269, "Component Function Check".
2. When the engine is started, the MIL should go off.
   If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.



On Board Diagnostic System Function

The on board diagnostic system has the following three functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped 	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL 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 MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up the MIL in the 1st trip. • One trip detection diagnoses
Mode II	Ignition switch in ON position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.

Diagnostic Test Mode I — Bulb Check

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to EC-269, "Component Function Check".

Diagnostic Test Mode I — Malfunction Warning

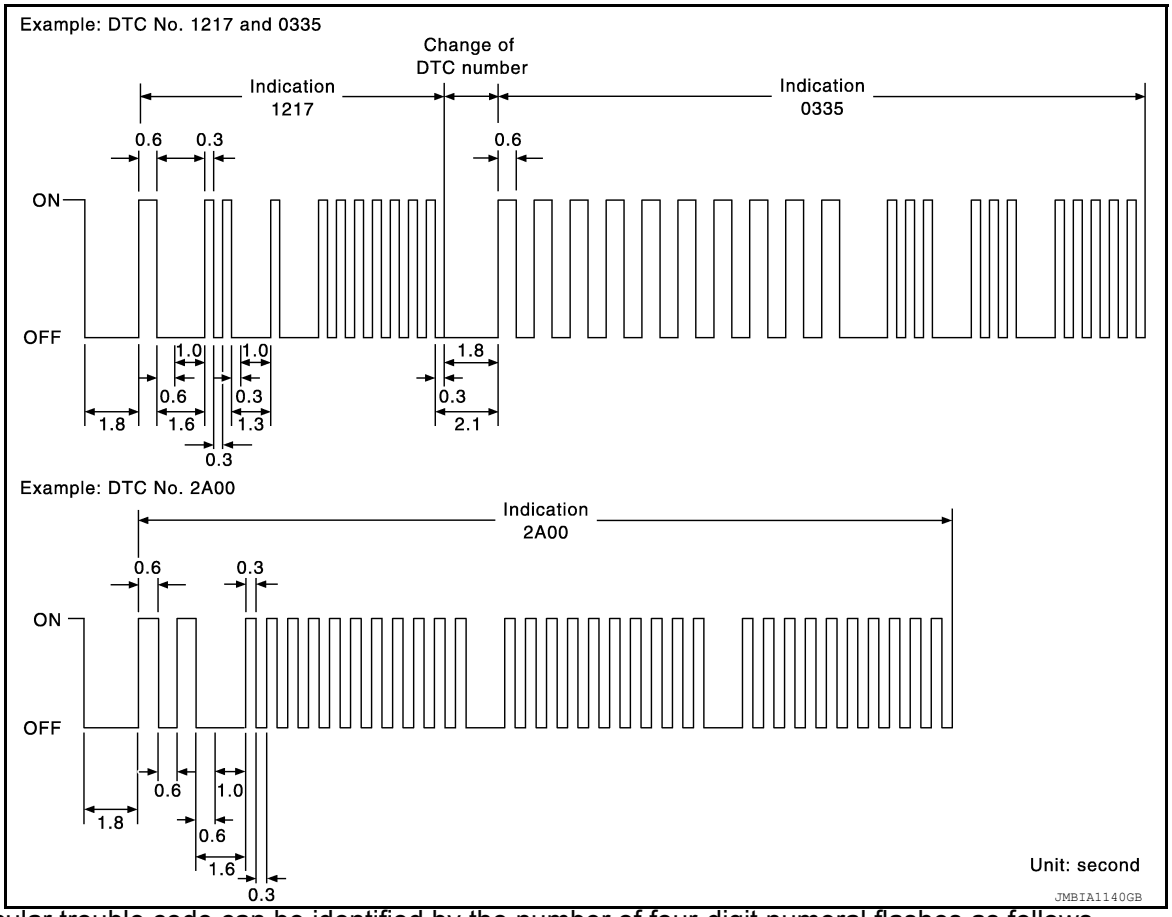
MIL	Condition
ON	When the malfunction is detected.
OFF	No malfunction.

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

Diagnostic Test Mode II — Self-diagnostic Results

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

tified 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-286, "DTC Index")

How to Switch Diagnostic Test Mode

NOTE:

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

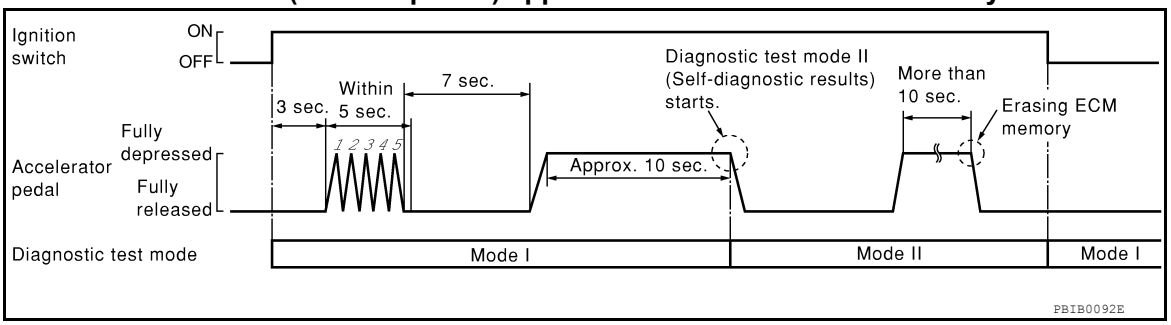
HOW TO SET DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS)

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

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

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MIL 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 Erase Diagnostic Test Mode II (Self-diagnostic Results)

NOTE:

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

The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal.

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.

- **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.**

CONSULT-III Function

INFOID:0000000006391636

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 Result	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data Monitor	Input/Output data in the ECM can be read.
Active Test	Diagnostic Test Mode in which CONSULT-III drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Function Test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECU Identification	ECM part number can be read.

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

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data

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		×	×	×	×
		Air fuel ratio (A/F) sensor 1				×	
		Heated oxygen sensor 2				×	
		Vehicle speed sensor		×	×	×	
		Accelerator pedal position sensor		×		×	
		Throttle position sensor		×	×	×	
		Intake air temperature sensor			×	×	
		Knock sensor		×			
		Refrigerant pressure sensor				×	
		Closed throttle position switch (accelerator pedal position sensor signal)				×	
		Air conditioner switch				×	
		Transmission range switch (CVT models) Park/neutral position (PNP) switch (M/T models)		×		×	
		Stop lamp switch		×		×	
		Power steering pressure sensor		×		×	
		Battery voltage				×	
		Load signal				×	
		Input speed sensor		×		×	
		ASCD steering switch		×		×	
		ASCD brake switch		×		×	
	OUTPUT	Fuel injector				×	×
		Power transistor (Ignition timing)				×	×
		Throttle control motor relay		×		×	
		Throttle control motor		×			
		EVAP canister purge volume control solenoid valve				×	×
		Air conditioner relay				×	
		Fuel pump relay	×			×	×
		Cooling fan relay				×	×
		Air fuel ratio (A/F) sensor 1 heater				×	
		Heated oxygen sensor 2 heater				×	
		EVAP canister vent control valve				×	×
		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-95, "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-DIAGNOSTIC RESULT MODE

Self Diagnostic Item
Regarding items of DTC and 1st trip DTC, refer to EC-286, "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-286, "DTC Index".)
FUEL SYS-B1	• “Fuel injection system status” at the moment a malfunction is detected is displayed. • One mode in the following is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	• The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	• The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	• “Long-term fuel trim” at the moment a malfunction is detected is displayed. • The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
S-FUEL TRM-B1 [%]	• “Short-term fuel trim” at the moment a malfunction is detected is displayed. • The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	• The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	• The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH·P/S [%]	• The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	• The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	• The intake air temperature at the moment a malfunction is detected is displayed.

Freeze frame data item*	Description
FUEL SYS-B2	These items displayed but are not applicable to this model.
L-FUEL TRM-B2 [%]	
S-FUEL TRM-B2 [%]	
INT MANI PRES [kPa]	
COMBUST CONDITION	

*: 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	ms	• “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	• When engine is running specification range is indicated in “SPEC”.
A/F ALPHA-B1	%	• The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • 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.
A/F SEN1 (B1)	V	• The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed.	
HO2S2 (B1)	V	• The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S2 MNTR(B1)	RICH/LEAN	• Display of heated oxygen sensor 2 signal: RICH: means the amount of oxygen after three way catalyst is relatively small. LEAN: means the amount of oxygen after three way catalyst is relatively large.	• When the engine is stopped, a certain value is indicated.
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT	V	• The power supply voltage of ECM is displayed.	
ACCEL SEN 1	V	• The accelerator pedal position sensor signal voltage is displayed.	• ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2	V		
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	V		

Monitored item	Unit	Description	Remarks
INT/A TEMP SE	°C or °F	• The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
START SIGNAL	ON/OFF	• Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	• After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS	ON/OFF	• Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG	ON/OFF	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW	ON/OFF	• Indicates [ON/OFF] condition from the park/neutral position (PNP) signal.	
PW/ST SIGNAL	ON/OFF	• [ON/OFF] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor) 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.
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.	
VENT CONT/V	ON/OFF	• The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. ON: Closed OFF: Open	• Always “OFF” is displayed.

Monitored item	Unit	Description	Remarks
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 MID: Middle speed operation LOW: Low speed operation OFF: Stop	
HO2S2 HTR (B1)	ON/OFF	• Indicates [ON/OFF] condition of heated oxygen sensor 3 heater determined by ECM according to the input signals.	
I/P PULLY SPD	rpm	• Indicates the engine speed computed from the input shaft revolution signal.	
VEHICLE SPEED	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
IDL A/V LEARN	YET/CMPLT	• Display the condition of Idle Air Volume Learning YET: Idle air volume learning has not been performed yet. CMPLT: Idle air volume learning has already been performed successfully.	
TRVL AFTER MIL	km or mile	• Distance traveled while MIL is activated.	
A/F S1 HTR(B1)	%	• Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals. • The current flow to the heater becomes larger as the value increases.	
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 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.	

Monitored item	Unit	Description	Remarks
AT OD MONITOR	ON/OFF	• Indicates [ON/OFF] condition of CVT O/D according to the input signal from the TCM.	• For M/T models, always “OFF” is displayed.
AT OD CANCEL	ON/OFF	• Indicates [ON/OFF] condition of CVT O/D cancel request signal.	• For M/T models, always “OFF” is displayed.
CRUISE LAMP	ON/OFF	• Indicates [ON/OFF] condition of CRUISE indicator determined by the ECM according to the input signals.	
SET LAMP	ON/OFF	• Indicates [ON/OFF] condition of SET indicator determined by the ECM according to the input signals.	
A/F ADJ-B1	—	• Indicates the correction of factor stored in ECM. The factor is calculated from the difference between the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 signal.	

NOTE:

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

ACTIVE TEST MODE

Test Item

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

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
VENT CONTROL/V	• Ignition switch: ON (Engine stopped) • Turn solenoid valve “ON” and “OFF” with the CONSULT-III and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connectors • Solenoid valve
V/T ASSIGN ANGLE	• Engine: Return to the original trouble condition • Change intake valve timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Intake valve timing control solenoid valve

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

DTC/CIRCUIT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:0000000006391637

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 MIL.
The SP value will be displayed for the following three items:
- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (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:0000000006391638

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)
- Engine speed: Idle
- Transmission: Warmed-up
  - CVT models: After the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (CVT fluid temperature sensor signal) indicates more than 60°C (140°F).
  - M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied
  - Rear window defogger switch, air conditioner switch, lighting switch are OFF.
    Steering wheel is straight ahead.

>> 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-15, "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.

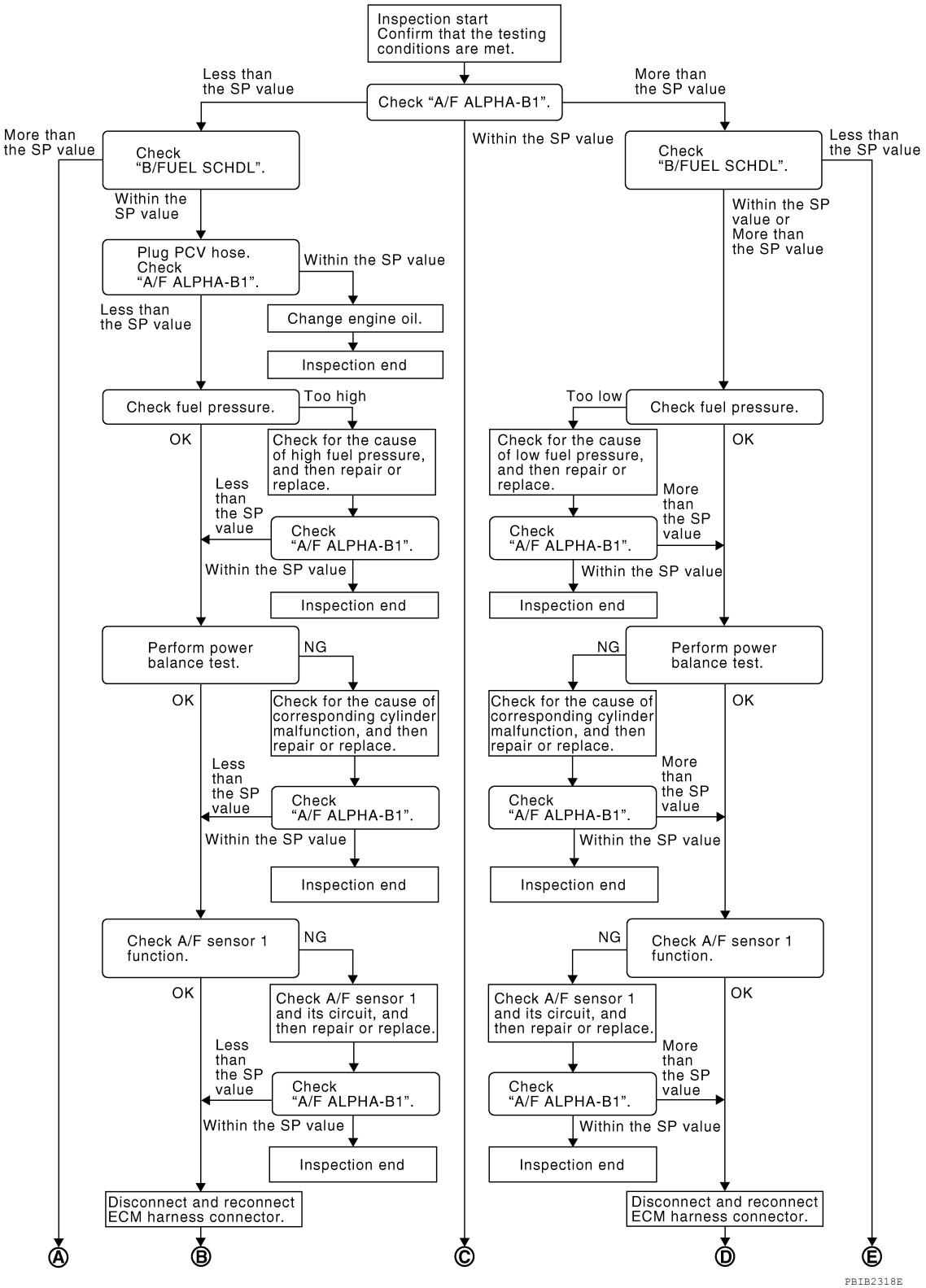
Is the inspection result normal?

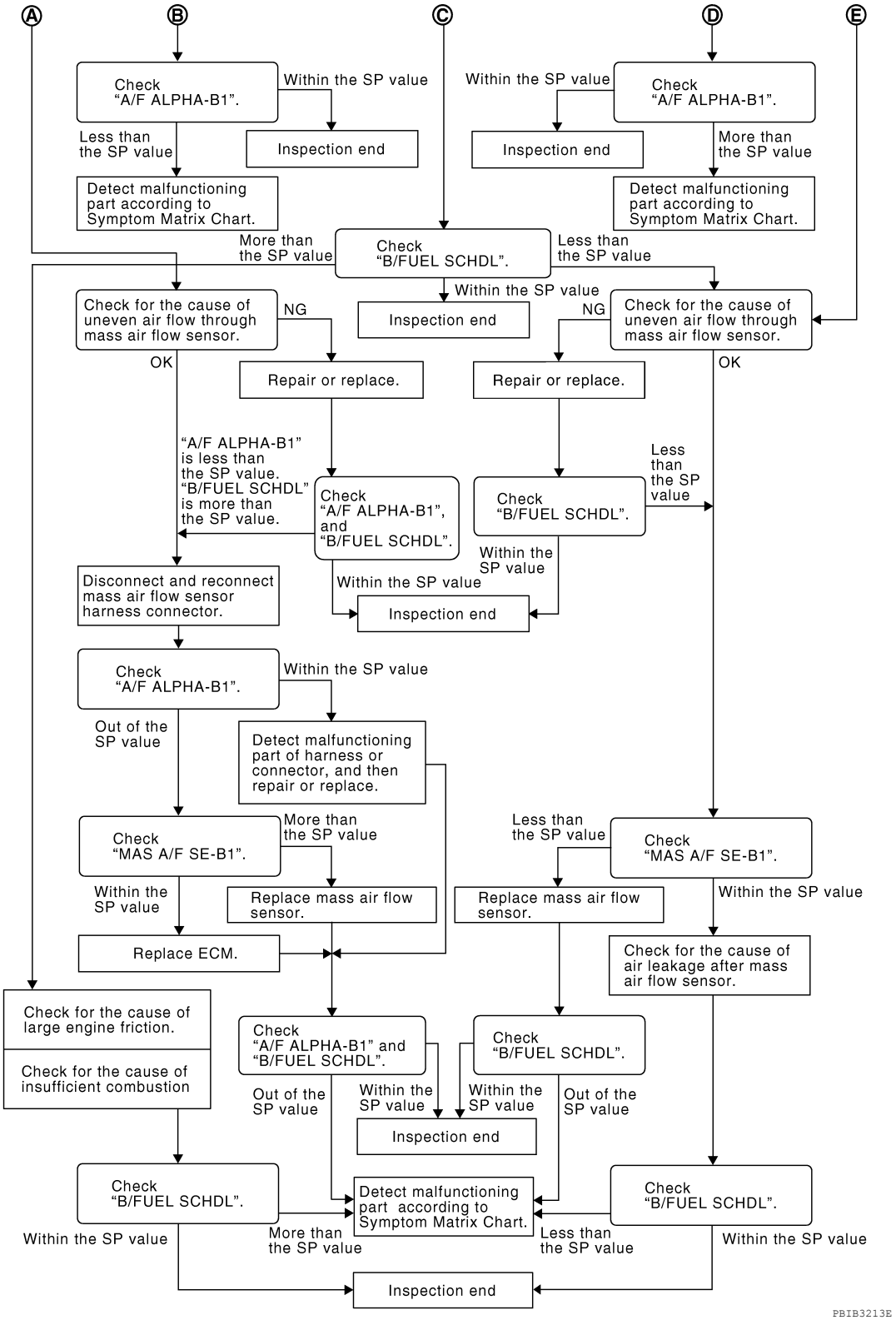
YES >> END
NO >> Go to EC-108, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006391639

OVERALL SEQUENCE





DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1"

With CONSULT-III

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-107, "Component Function Check".
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the each indication is within the SP value.

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

Is the measurement value within the SP value?

YES >> GO TO 19.
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 21.

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 27.

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-323, "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-264, "Component Function Check".)
2. Fuel injector and its circuit (Refer to EC-247, "Component Function Check".)
3. Intake air leakage
4. Low compression pressure (Refer to EM-23, "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 A/F SENSOR 1 HEATER FUNCTION

Perform Component Function Check related with A/F sensor 1 heater. Refer to EC-231, "Component Function Check".

Is the inspection result normal?

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

13.CHECK A/F SENSOR 1 HEATER CIRCUIT

Perform Diagnosis Procedure. Refer to EC-231, "Diagnosis Procedure".

>> GO TO 16.

14.CHECK A/F SENSOR 1 FUNCTION

Perform Component Function Check related with A/F sensor 1. Refer to EC-228, "Component Function Check".

Is the inspection result normal?

YES >> GO TO 16.
NO >> GO TO 15.

15.CHECK A/F SENSOR 1 CIRCUIT

Perform Diagnostic Procedure. Refer to EC-228, "Diagnosis Procedure".

>> 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 each indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 17.

17. 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 18.

18. 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-311, "Symptom Table".

19. 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 20.
NO-2 >> Less than the SP value: GO TO 25.

20. DETECT MALFUNCTIONING PART

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

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

21. 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 23.
NO >> Repair or replace malfunctioning part, and then GO TO 22.

22. 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 23.

23. 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 24.

24. 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-128, "DTC Logic". Then GO TO 31.
NO >> GO TO 25.

25. 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 26.
NO >> More than the SP value: Replace mass air flow sensor, and then GO TO 31.

26. REPLACE ECM

1. Replace ECM.
2. Go to EC-18, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 31.

27. 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 29.
NO >> Repair or replace malfunctioning part, and then GO TO 28.

28. 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 29.

29. 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 30.
NO >> Less than the SP value: Replace mass air flow sensor, and then GO TO 32.

30. 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 32.

31. 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-311, "Symptom Table".

32. 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-311, "Symptom Table".

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000006391640

1.INSPECTION START

Start engine.

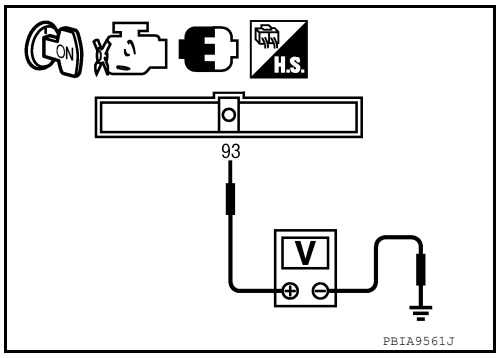
Is engine running?

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

2.CHECK ECM POWER SUPPLY CIRCUIT-I

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

ECM		Ground	Voltage
Connector	Terminal		
E10	93	Ground	Battery voltage



Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R harness connector E18
- 10A fuse (No. 35)
- Harness for open or short between ECM and fuse

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

4.CHECK GROUND CONNECTION-I

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

Is the inspection result normal?

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

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

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

ECM		Ground	Continuity
Connector	Terminal		
F14	12	Ground	Existed
	16		
E10	107		
	108		
	111		
	112		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

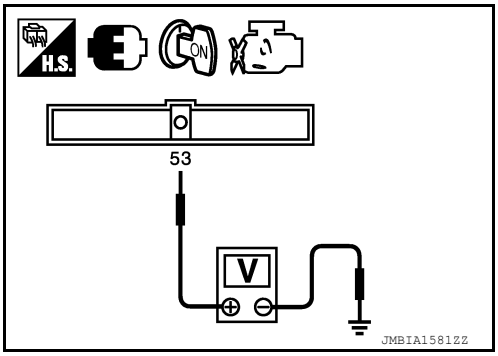
6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F2, E11
- 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.



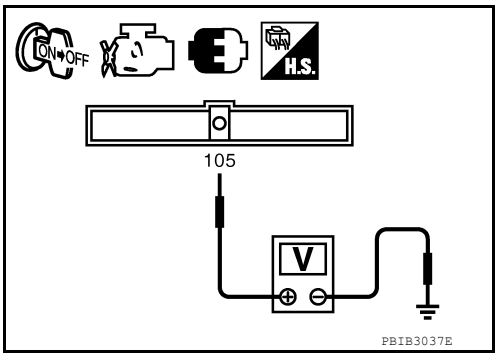
IPDM E/R		Ground	Voltage
Connector	Terminal		
F10	53	Ground	Battery voltage

Is the inspection result normal?

YES >> Go to EC-264, "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 and ground.



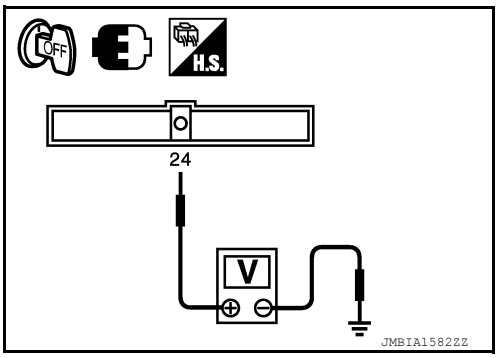
ECM		Ground	Voltage
Connector	Terminal		
E10	105	Ground	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.

Is the inspection result normal?

YES >> GO TO 13.
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 and ground.



ECM		Ground	Voltage
Connector	Terminal		
F14	24	Ground	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 E18.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

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

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

Is the inspection result normal?

YES >> GO TO 16.
NO >> Repair open circuit or short to ground 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 F10.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

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

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

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair open circuit or short to ground or short power in harness or connectors.

12. CHECK 15A FUSE

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

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace 15A fuse.

13. CHECK GROUND CONNECTION-II

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

Is the inspection result normal?

YES >> GO TO 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		
F14	12	Ground	Existed
	16		
E10	107		
	108		
	111		
	112		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 16.
NO >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors F2, E11
- Harness for open or short between ECM and ground

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

16. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

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

U1000, U1001 CAN COMM CIRCUIT

Description

INFOID:0000000006391641

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:0000000006391642

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> EC-119, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391643

Go to LAN-15, "Trouble Diagnosis Flow Chart".

U1010 CONTROL UNIT (CAN)

Description

INFOID:0000000006391644

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:0000000006391645

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-120, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391646

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC Confirmation Procedure.
   See EC-120, "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-18, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

P0011 IVT CONTROL

DTC Logic

INFOID:0000000006391647

DTC DETECTION LOGIC

NOTE:
If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for EC-161, "DTC Logic".

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

DTC CONFIRMATION PROCEDURE

1.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 3.5 msec (CVT) More than 4.2 msec (M/T)
Shift lever	D position (CVT) 5th position (M/T)

CAUTION:
Always drive at a safe speed.

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-123, "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	1,700 - 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-123, "Diagnosis Procedure"
NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-122, "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-123, "Diagnosis Procedure".

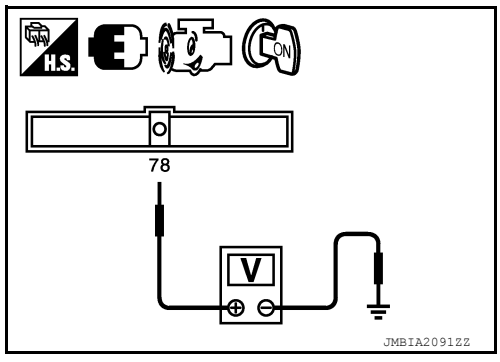
Component Function Check

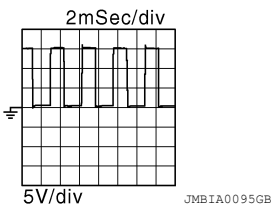
INFOID:0000000006391648

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.



ECM		Ground	Condition	Voltage signal
Connector	Terminal			
F13	78 (Intake valve timing control solenoid valve)	Ground	At idle	0 V
			When revving engine up to 2,000 rpm quickly	7 - 10 V★ 

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Is the inspection result normal?

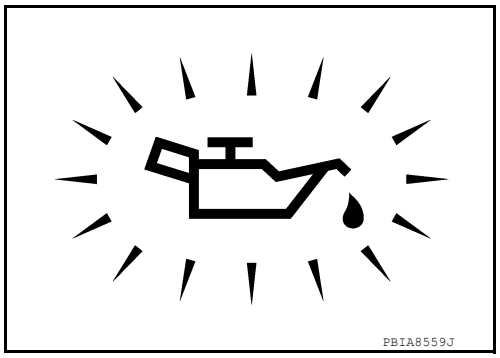
YES >> INSPECTION END
NO >> Go to EC-123, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006391649

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-9, "Inspection".
NO >> GO TO 2.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-124, "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-147, "Component Inspection".

Is the inspection result normal?

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

4.CHECK CAMSHAFT POSITION SENSOR (PHASE)

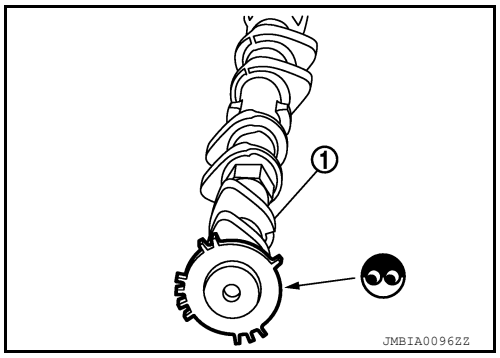
Refer to EC-150, "Component Inspection".

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-53, "Removal and Installation".
NO >> GO TO 7.

7.CHECK LUBRICATION CIRCUIT

Refer to EM-68, "Inspection After Disassembly".

Is the inspection result normal?

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

8.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

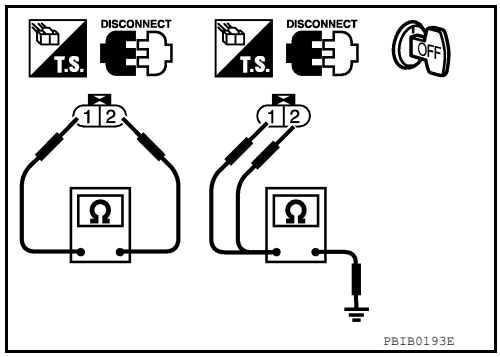
>> INSPECTION END

Component Inspection

INFOID:0000000006391650

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

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



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

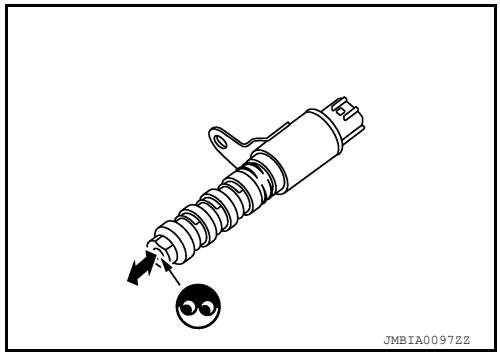
Is the inspection result normal?

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

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

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

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



Is the inspection result normal?

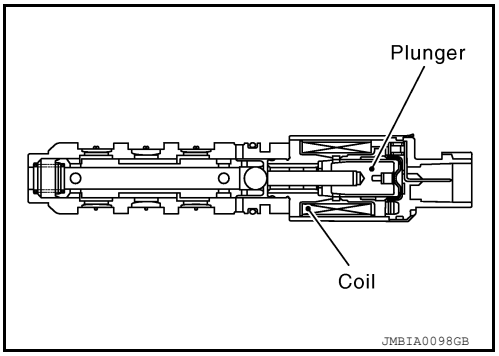
YES >> INSPECTION END
NO >> Replace intake valve timing control solenoid valve.

P0075 IVT CONTROL SOLENOID VALVE

Description

INFOID:0000000006391651

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:0000000006391652

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

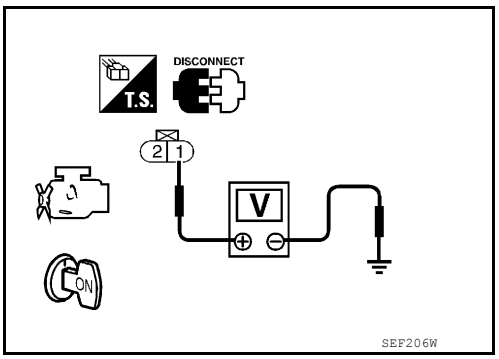
YES >> Go to EC-125, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391653

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		
F59	1	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
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	
F59	2	F13	78	Existed

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

Is the inspection result normal?

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

3.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-126, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace intake valve timing control solenoid valve.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

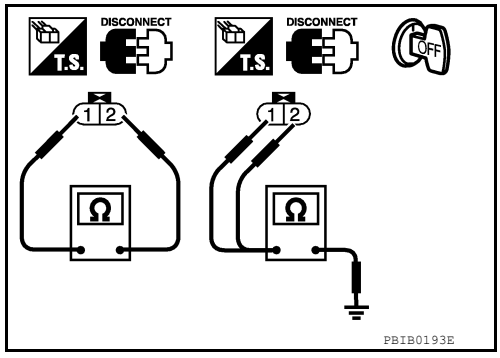
>> INSPECTION END

Component Inspection

INFOID:0000000006391654

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

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



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

Is the inspection result normal?

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

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve.

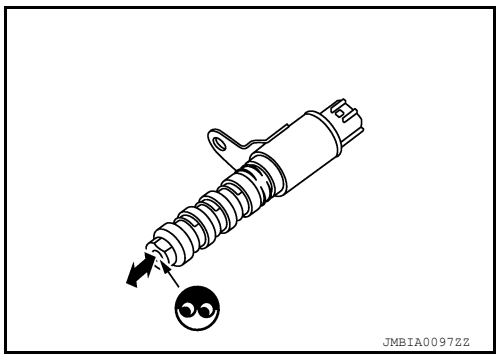
2. Provide 12V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:

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

NOTE:

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



Is the inspection result normal?

YES >> INSPECTION END

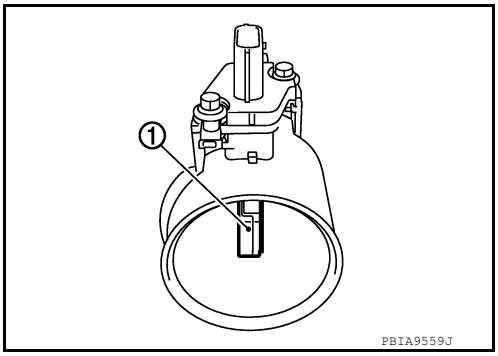
NO >> Replace intake valve timing control solenoid valve.

P0102, P0103 MAF SENSOR

Description

INFOID:0000000006391655

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:0000000006391656

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-129, "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-129, "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-129, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391657

1.INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

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

2.CHECK INTAKE SYSTEM

Check the following for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold

Is the inspection result normal?

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

3.CHECK GROUND CONNECTION

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

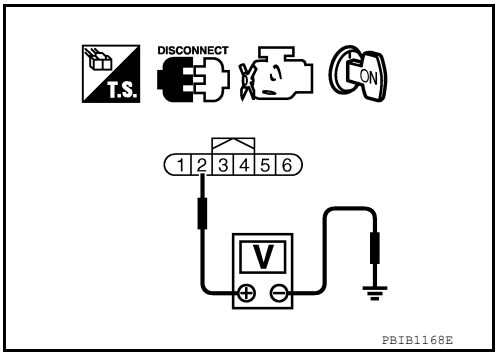
Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace ground connection.

4.CHECK MAF SENSOR POWER SUPPLY CIRCUIT

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

MAF 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	F13	56	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	F13	58	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-130, "Component Inspection".

Is the inspection result normal?

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

8.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006391658

1.CHECK MASS AIR FLOW SENSOR-I

With CONSULT-III

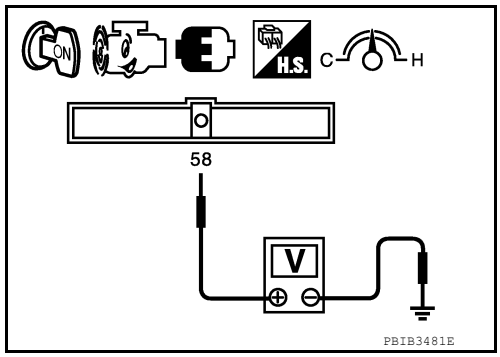
1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT-III and select “DATA MONITOR” mode.
5. Select “MAS A/F SE-B1” and check indication.

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 and ground.



ECM		Ground	Condition	Voltage
Connector	Terminal			
F13	58 (MAF sensor signal)	Ground	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

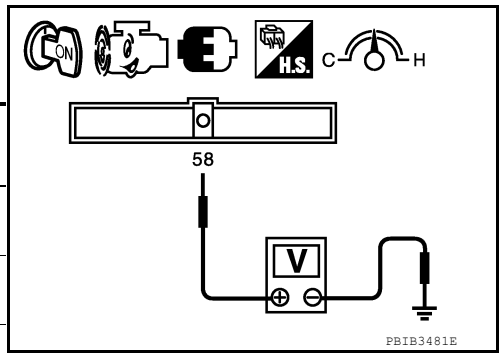
1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-III and select “DATA MONITOR” mode.
4. Select “MAS A/F SE-B1” and check indication.

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 and ground.



ECM		Ground	Condition	Voltage
Connector	Terminal			
F13	58 (MAF sensor signal)	Ground	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

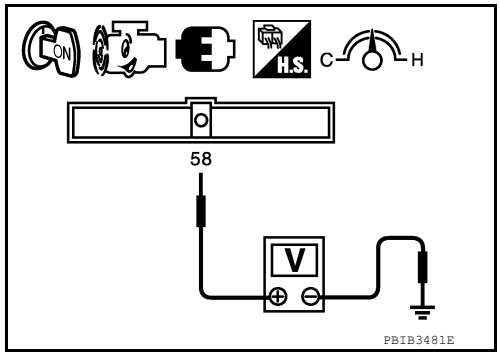
1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT-III and select “DATA MONITOR” mode.
5. Select “MAS A/F SE-B1” and check indication.

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 and ground.



ECM		Ground	Condition	Voltage
Connector	Terminal			
F13	58 (MAF sensor signal)	Ground	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?

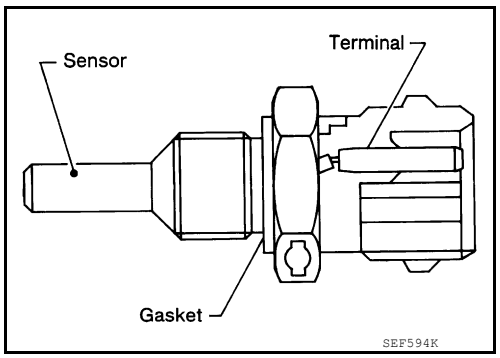
YES >> INSPECTION END
NO >> Clean or replace mass air flow sensor.

P0117, P0118 ECT SENSOR

Description

INFOID:0000000006391659

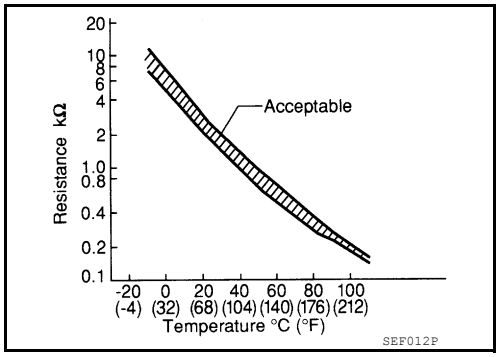
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

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

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



CAUTION:

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

DTC Logic

INFOID:0000000006391660

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-134, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391661

1.CHECK GROUND CONNECTION

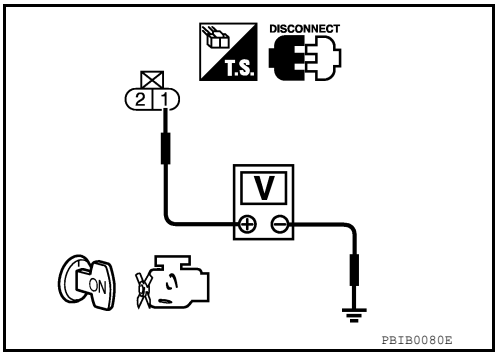
1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK 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		
F11	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	
F11	2	F13	52	Existed

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

Is the inspection result normal?

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

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-134, "Component Inspection".

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

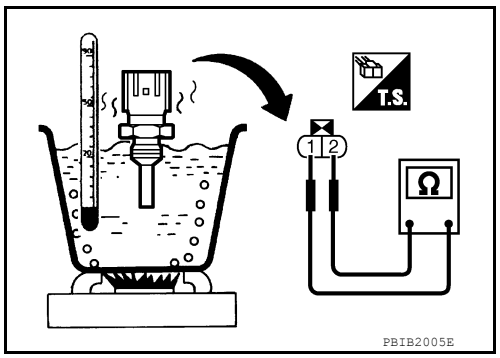
Component Inspection

INFOID:0000000006391662

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

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

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



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

Is the inspection result normal?

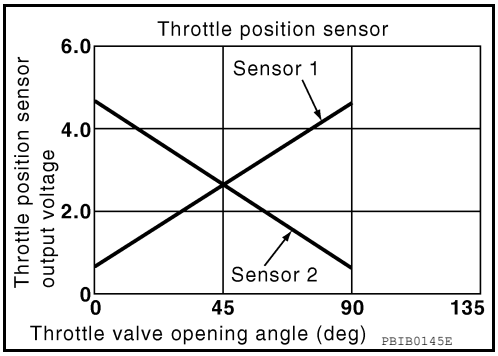
YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor.

P0122, P0123 TP SENSOR

Description

INFOID:0000000006391663

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:0000000006391664

DTC DETECTION LOGIC

NOTE:
If DTC P0122 or P0123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-161, "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 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-136, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391665

1.CHECK GROUND CONNECTION

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

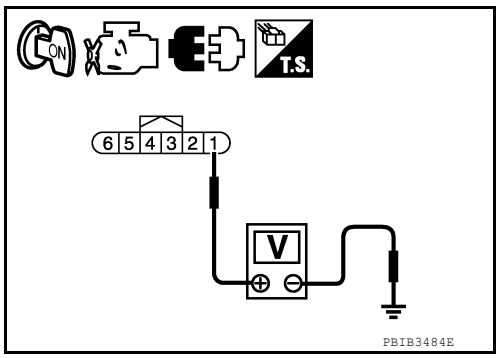
Is the inspection result normal?

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

2.CHECK THROTTLE POSITION SENSOR 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		
F57	1	Ground	Approx. 5V

Is the inspection result normal?

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

3. CHECK THROTTLE POSITION SENSOR 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	
F57	4	F13	36	Existed

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

Is the inspection result normal?

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

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

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

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

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

Is the inspection result normal?

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

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-138, "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-138, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

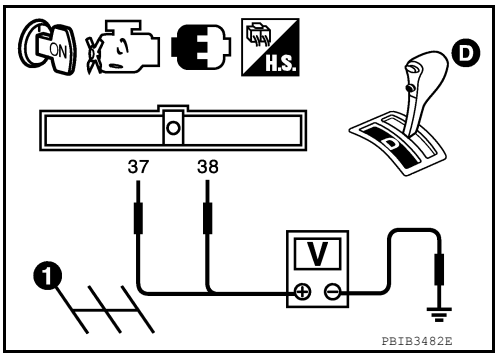
>> INSPECTION END

Component Inspection

INFOID:0000000006391666

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector and ground.



ECM		Ground	Condition		Voltage
Connector	Terminal				
F13	37 (TP sensor 1 signal)	Ground	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	38 (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-138, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006391667

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

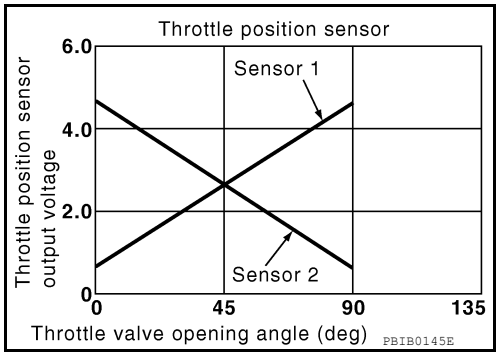
>> END

P0222, P0223 TP SENSOR

Description

INFOID:0000000006391668

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:0000000006391669

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	• Harness or connectors (TP sensor 1 circuit is open or shorted.) • 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 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-139, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391670

1.CHECK GROUND CONNECTION

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

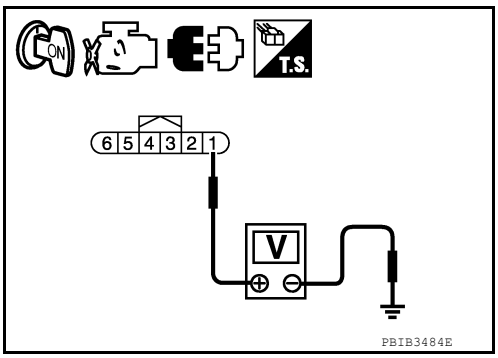
Is the inspection result normal?

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

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator harness connector.
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		
F57	1	Ground	Approx. 5V

Is the inspection result normal?

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

3. CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
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	
F57	4	F13	36	Existed

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

Is the inspection result normal?

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

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

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F57	2	F13	37	Existed

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

Is the inspection result normal?

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

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-141, "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-141, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

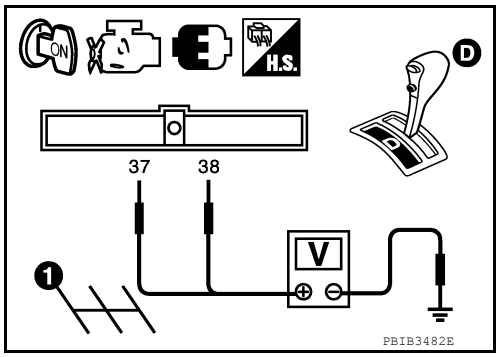
>> INSPECTION END

Component Inspection

INFOID:0000000006391671

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector and ground.



ECM		Ground	Condition		Voltage
Connector	Terminal				
F13	37 (TP sensor 1 signal)	Ground	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	38 (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-141, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006391672

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

P0327, P0328 KS

Description

INFOID:0000000006391673

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:0000000006391674

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-142, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391675

1.CHECK GROUND CONNECTION

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

Is the inspection result normal?

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

2.CHECK 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	
F45	2	F13	67	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	
F45	1	F13	61	Existed

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

Is the inspection result normal?

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

4.CHECK KNOCK SENSOR

Refer to EC-143, "Component Inspection".

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

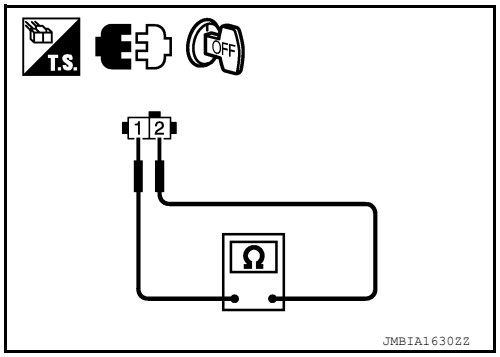
>> INSPECTION END

Component Inspection

INFOID:0000000006391676

1.CHECK KNOCK SENSOR

1. Turn ignition switch OFF.
2. Disconnect knock sensor harness connector.
3. Check resistance between knock sensor terminals as follows.
   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.



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

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

Is the inspection result normal?

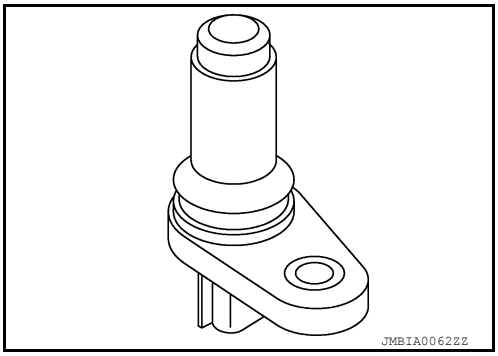
YES >> INSPECTION END
NO >> Replace knock sensor.

P0335 CKP SENSOR (POS)

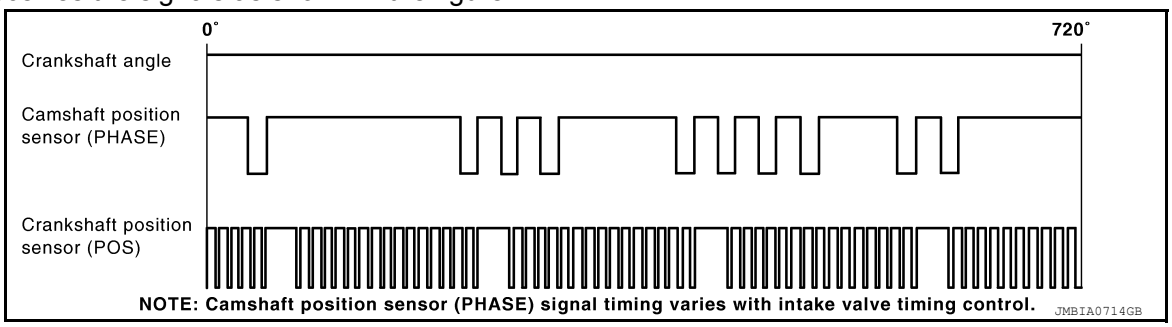
Description

INFOID:0000000006391677

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.



ECM receives the signals as shown in the figure.



DTC Logic

INFOID:0000000006391678

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335	Crankshaft position sensor (POS) circuit	• The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. • The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	• Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] (Refrigerant pressure sensor circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) • Crankshaft position sensor (POS) • Refrigerant pressure sensor • Accelerator pedal position sensor • 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-145, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391679

1. CHECK GROUND CONNECTION

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

Is the inspection result normal?

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

2. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-I

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CKP sensor (POS) harness connector and ground.

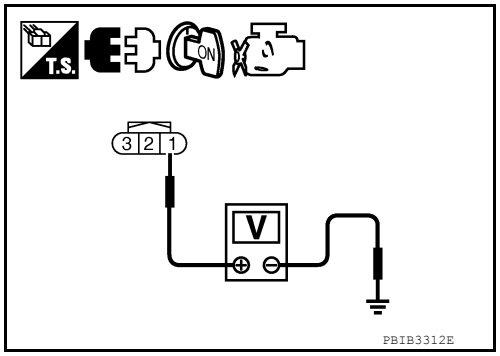
CKP sensor (POS)		Ground	Voltage
Connector	Terminal		
F30	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 3.

3. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-II

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



CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F13	76	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit.

4. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-III

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F13	72	Refrigerant pressure sensor	E219	1
	76	CKP sensor (POS)	F30	1
E10	87	APP sensor	E40	6

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-271, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace malfunctioning components.

6.CHECK APP SENSOR

Refer to EC-210, "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-210, "Special Repair Requirement".

>> INSPECTION END

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

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

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	2	F13	60	Existed

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

Is the inspection result normal?

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

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

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

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	3	F13	65	Existed

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

Is the inspection result normal?

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

10.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-147, "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-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

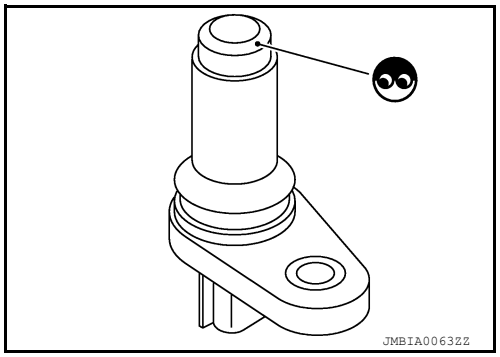
INFOID:0000000006391680

1. CHECK CRANKSHAFT POSITION SENSOR (POS)-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect crankshaft position sensor (POS) harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace crankshaft position sensor (POS).



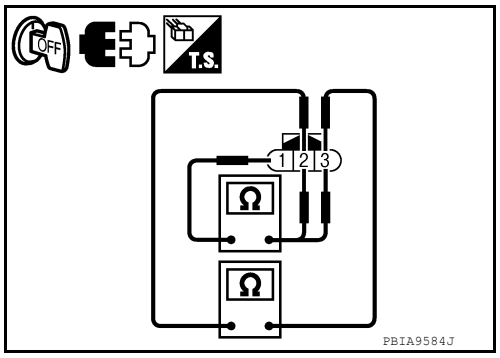
2. CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance between crankshaft position sensor (POS) terminals as follows.

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

Is the inspection result normal?

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

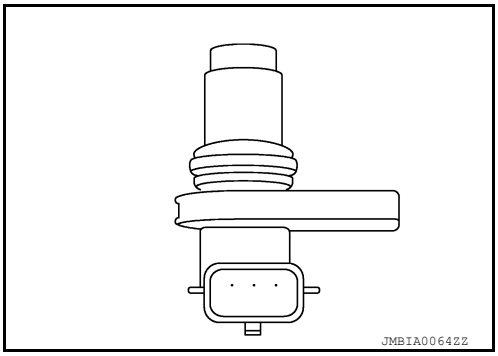


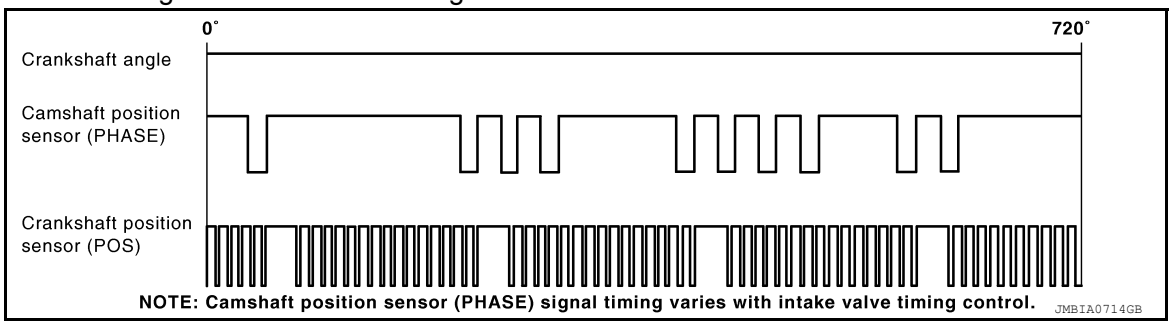
P0340 CMP SENSOR (PHASE)

Description

INFOID:0000000006391681

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:0000000006391682

DTC DETECTION LOGIC

NOTE:
If DTC P0340 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-161, "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 (Refer to STR-9, "System Diagram".) • Starting system circuit (Refer to STR-9, "System Diagram".) • Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-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-149, "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-149, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391683

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

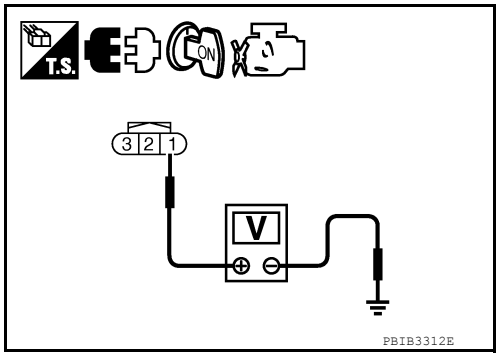
1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

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

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

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



CMP sensor (PHASE)		Ground	Voltage
Connector	Terminal		
F55	1	Ground	Approx. 5V

Is the inspection result normal?

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

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

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

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F55	2	F13	64	Existed

3. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

CMP sensor (PHASE)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F55	3	F13	69	Existed

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 CAMSHAFT POSITION SENSOR (PHASE)

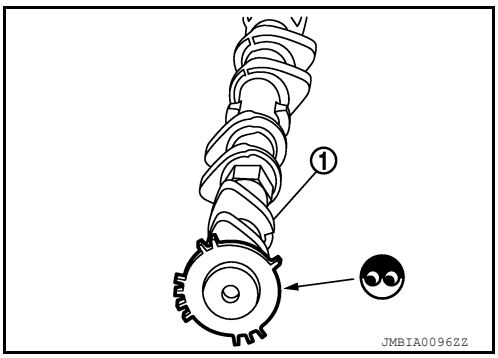
Refer to EC-150, "Component Inspection".

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-42, "Intermittent Incident".

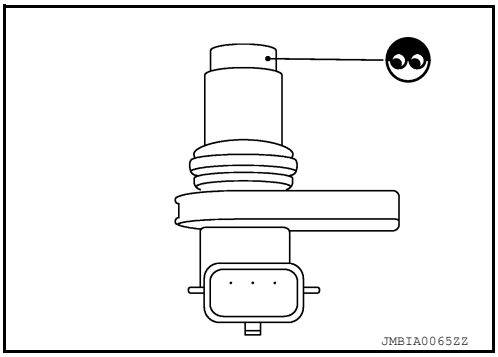
>> INSPECTION END

Component Inspection

INFOID:0000000006391684

1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect camshaft position sensor (PHASE) harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

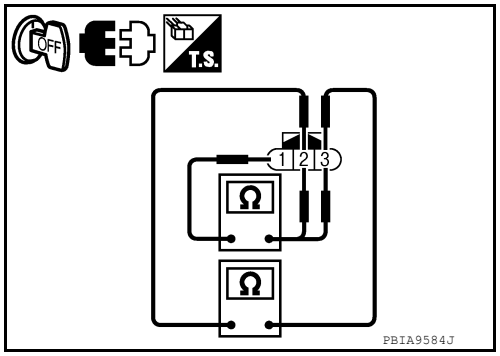


Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace camshaft position sensor (PHASE).

2.CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check resistance camshaft position sensor (PHASE) terminals as follows.



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

Is the inspection result normal?

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

P0500 VSS

Description

INFOID:0000000006391685

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:0000000006391686

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-119, "DTC Logic".
- **If DTC P0500 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-120, "DTC Logic"**.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500	Vehicle speed sensor	The vehicle speed signal to ECM is almost 0 km/h (0 MPH) even when vehicle is being driven.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The vehicle speed signal circuit is open or shorted) • Wheel sensor • Combination meter • ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-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 5 seconds before conducting the next test.

>> GO TO 3.

3.CHECK VEHICLE SPEED SIGNAL

NOTE:

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

With CONSULT-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-153, "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 (CVT models) or 40 (M/T models) consecutive seconds.

CAUTION:

Always drive vehicle at a safe speed.

ENG SPEED	CVT: 1,350 - 6,000 rpm M/T: 1,650 - 6,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	CVT: 5.5 - 31.8 msec M/T: 4.8 - 31.8 msec
Shift lever	Except P or N position (CVT) Except Neutral position (M/T)
PW/ST SIGNAL	OFF

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-153, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-153, "Component Function Check".
Use component function check to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-153, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006391687

1.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed of speedometer.
   The vehicle speed 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-153, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006391688

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

Refer to BRC-15, "CONSULT Function (ABS)" or BRC-81, "CONSULT Function (ABS)".

Is the inspection result normal?

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

2.CHECK COMBINATION METER

Refer to MWI-28, "CONSULT Function (METER/M&A)".

>> INSPECTION END

P0550 PSP SENSOR

Description

INFOID:0000000006391689

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load.
This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.

DTC Logic

INFOID:0000000006391690

DTC DETECTION LOGIC

NOTE:
If DTC P0550 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-161, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0550	Power steering pressure sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted) • Power steering pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:0000000006391691

1.CHECK GROUND CONNECTION

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

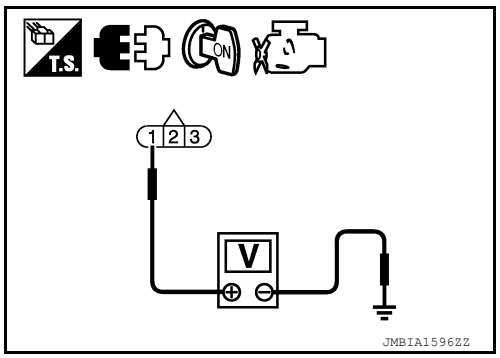
Is the inspection result normal?

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

2.CHECK PSP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect power steering pressure (PSP) sensor harness connector.
2. Turn ignition switch ON.

3. Check the voltage between PSP sensor harness connector and ground.



PSP sensor		Ground	Voltage
Connector	Terminal		
F40	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 PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

PSP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F40	3	F13	48	Existed

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

Is the inspection result normal?

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

4.CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

PSP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F40	2	F13	41	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 PSP SENSOR

Refer to EC-155, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace PSP sensor.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

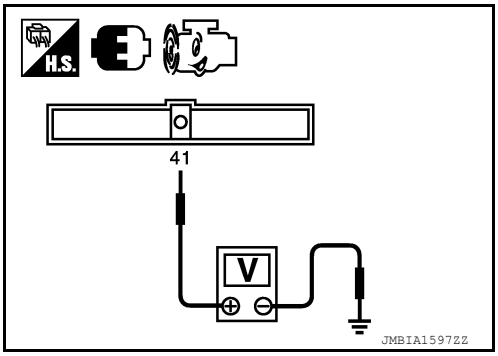
Component Inspection

INFOID:0000000006391692

1.CHECK POWER STEERING PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and let it idle.

4. Check the voltage between ECM harness connector and ground under the following conditions.



ECM		Condition		Voltage
Connector	Terminal			
F13	41 (Power steering pressure sensor signal)	Steering wheel	Being turned	0.5 - 4.5V
			Not being turned	0.4 - 0.8V

Is the inspection result normal?

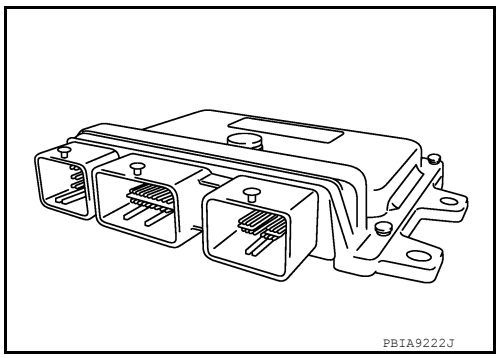
YES >> INSPECTION END
NO >> Replace power steering pressure sensor.

P0603 ECM POWER SUPPLY

Description

INFOID:0000000006391693

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc.



DTC Logic

INFOID:0000000006391694

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0603	ECM power supply circuit	ECM back-up RAM system does not function properly.	• Harness or connectors [ECM power supply (back-up) circuit is open or shorted.] • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always 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 10 seconds.
2. Turn ignition switch OFF and wait at least 5 minutes
3. Turn ignition switch ON and wait at least 10 seconds.
4. Repeat steps 2 and 3 for five times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-157, "Diagnosis Procedure".
NO >> INSPECTION END

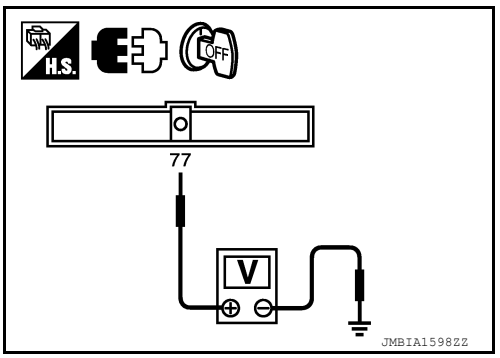
Diagnosis Procedure

INFOID:0000000006391695

1.CHECK ECM POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

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



ECM		Ground	Voltage
Connector	Terminal		
F13	77	Ground	Battery voltage

Is the inspection result normal?

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

2.DETECT MALFUNCTIONING PART

Check the following.
- 15A fuse (No. 42)
- IPDM E/R harness connector F10
- Harness for open or short between ECM and battery

>> Repair or replace harness or connectors.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connectors.

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. **Perform DTC Confirmation Procedure.**
   See EC-157, "DTC Logic".

Is the 1st trip DTC P0603 displayed again?

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

5.REPLACE ECM

1. Replace ECM.
2. Go to EC-18, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

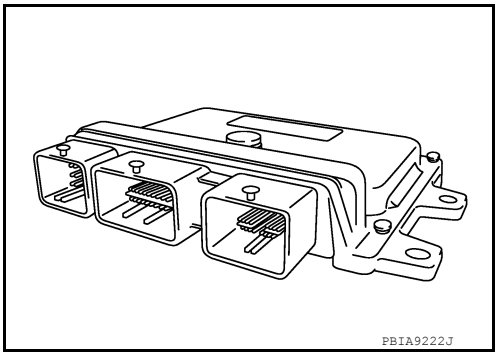
>> INSPECTION END

P0605 ECM

Description

INFOID:0000000006391696

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:0000000006391697

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-160, "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-160, "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-160, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391698

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. **Perform DTC Confirmation Procedure.**
   See EC-159, "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-18, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

P0643 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000006391699

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0643	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	• Harness or connectors (APP sensor 1 circuit is shorted.) (TP sensor circuit is shorted.) (Battery current sensor circuit is shorted.) (PSP sensor circuit is shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] • Accelerator pedal position sensor • Throttle position sensor • Battery current sensor • Power steering pressure sensor • Camshaft position sensor (PHASE)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 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-161, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391700

1.CHECK GROUND CONNECTION

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

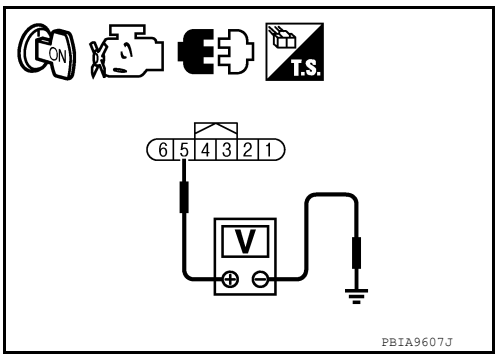
Is the inspection result normal?

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

2.CHECK 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		
E40	5	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUITS

1. Turn ignition switch OFF.
2. Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F13	47	Electric throttle control actuator	F57	1
	51	Battery current sensor	F5	1
	55	PSP sensor	F40	1
	59	CMP sensor (PHASE)	F55	1
E10	83	APP sensor	E40	5

Is the inspection result normal?

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

4.CHECK COMPONENTS

Check the following.
- Power steering pressure sensor (Refer to EC-155, "Component Inspection".)
- Camshaft position sensor (PHASE) (Refer to EC-150, "Component Inspection".)

Is the inspection result normal?

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

5.CHECK BATTERY CURRENT SENSOR

1. Disconnect battery current sensor harness connector.
2. Check the continuity between battery current sensor terminals.

Battery current sensor		Battery current sensor		Continuity
Connector	Terminal	Connector	Terminal	
F5	1	F5	2	Existed
			3	

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace battery negative cable assembly.

6.CHECK TP SENSOR

Refer to EC-138, "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. Go to EC-19, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> INSPECTION END

8.CHECK APP SENSOR

Refer to EC-210, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 10.

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-210, "Special Repair Requirement".

>> INSPECTION END

10.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

P0850 PNP SWITCH

Description

INFOID:0000000006391701

When the shift lever position is P or N (CVT), Neutral position (M/T), park/neutral position (PNP) signal is ON. ECM detects the position because the continuity of the line (the ON signal) exists.

DTC Logic

INFOID:0000000006391702

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0850	Park/neutral position switch	The park/neutral position (PNP) signal is not changed in the process of engine starting and driving.	• Harness or connectors [The park/neutral position (PNP) signal circuit is open or shorted.] • Park/neutral position (PNP) switch (M/T models) Transmission range switch (CVT models)

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 TRANSMISSION RANGE SWITCH (CVT) OR PNP SWITCH (M/T) FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-III. Then check the “P/N POSI SW” signal under the following conditions.

Position (Shift lever)	Known-good signal
N or P position (CVT) Neutral position (M/T)	ON
Except above position	OFF

Is the inspection result normal?

YES >> GO TO 4.
NO >> Go to EC-165, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

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

CAUTION:
Always drive vehicle at a safe speed.

ENG SPEED	CVT: 1,300 - 6,375 rpm M/T: 1,500 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)

B/FUEL SCHDL	CVT: 3.0 - 31.8 msec M/T: 2.1 - 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-165, "Diagnosis Procedure".
NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

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

NOTE:
Use component function check the overall function of the park/neutral position (PNP) signal circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-165, "Diagnosis Procedure".

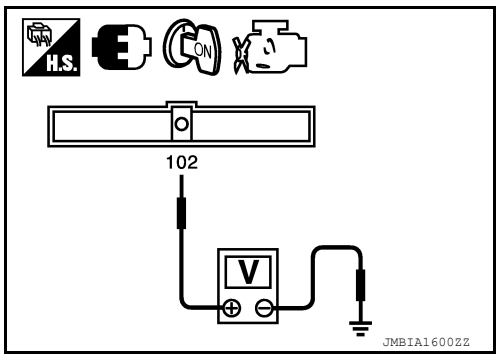
Component Function Check

INFOID:0000000006391703

1. PERFORM COMPONENT FUNCTION CHECK

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

ECM		Ground	Condition		Voltage
Connector	Terminal				
E10	102 (PNP signal)	Ground	Shift lever	P or N (CVT) Neutral (M/T)	Approx. 0V
				Except above	BATTERY VOLTAGE



Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-165, "Diagnosis Procedure".

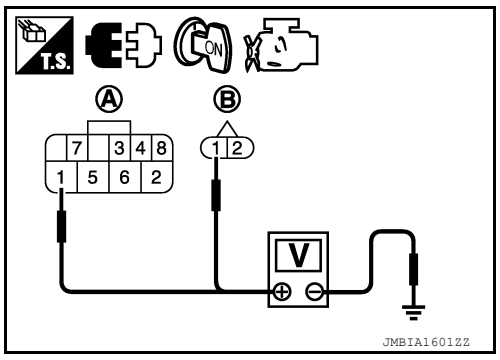
Diagnosis Procedure

INFOID:0000000006391704

1. CHECK TRANSMISSION RANGE SWITCH (CVT) OR PNP SWITCH (M/T) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect transmission range switch (CVT) or PNP switch (M/T) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between transmission range switch (CVT) or PNP switch (M/T) harness connector and ground.

Transmission range switch (CVT) PNP switch (M/T)		Ground	Voltage
Connector	Terminal		
F25 (CVT) (A) F32 (M/T) (B)	1	Ground	Battery voltage



Is the inspection result normal?

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

2. DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R harness connector F10
- 10A fuse (No. 33)
- Harness for open and short between transmission range switch (CVT) or PNP switch (M/T) and IPDM E/R

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

3.CHECK PNP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between transmission range switch (CVT) or PNP switch (M/T) harness connector and ECM harness connector.

Transmission range switch (CVT) PNP switch (M/T)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F25 (CVT) F32 (M/T)	2	E10	102	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.
- IPDM E/R harness connectors E18, F10
- Harness for open and short between transmission range switch (CVT) or PNP switch (M/T) and IPDM E/R
- Harness for open and short between transmission range switch (CVT) or PNP switch (M/T) and ECM

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

5.CHECK TRANSMISSION RANGE SWITCH (CVT) OR PNP SWITCH (M/T)

Refer to TM-297, "Component Inspection (Transmission Range Switch)" (CVT) or TM-22, "Inspection" (M/T).

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace transmission range switch (CVT) or PNP switch (M/T).

6.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

P1212 TCS COMMUNICATION LINE

Description

INFOID:0000000006391705

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:0000000006391706

DTC DETECTION LOGIC

NOTE:
- **If DTC P1212 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to EC-119, "DTC Logic".**
- **If DTC P1212 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-120, "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 cannot receive the information from “ABS actuator and electric unit (control unit)” continuously.	• Harness or connectors (The CAN communication line is open or shorted.) • ABS actuator and electric unit (control unit) • Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:0000000006391707

Go to GI-38, "Work Flow".

P1217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000006391708

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-119, "DTC Logic".**
- **If DTC P1217 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-120, "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) • Cooling fan relays-2 and -3 • Cooling fan motor • Radiator hose • Radiator • Radiator cap • Reservoir tank • Water pump • Thermostat • Water control valve

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to CO-12, "Changing Engine Coolant". Also, replace the engine oil. Refer to LU-10, "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-12, "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-168, "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-169, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006391709

1.PERFORM COMPONENT FUNCTION CHECK-I

WARNING:

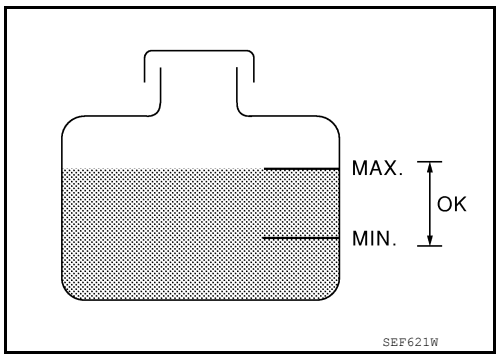
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

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-169, "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-169, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

With CONSULT-III
1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that cooling fan motors-1 and -2 operate at each speed (LOW/MID/HI).

Without CONSULT-III
1. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PCS-11, "Diagnosis Description".
2. Make sure that cooling fan motors-1 and -2 operate at each speed (Low/Middle/High).

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-169, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006391710

1.CHECK COOLING FAN OPERATION

With CONSULT-III
1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that cooling fan motors-1 and -2 operate at each speed (LOW/MID/HI).

Without CONSULT-III
1. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PCS-11, "Diagnosis Description".
2. Make sure that cooling fan motors-1 and -2 operate at each speed (Low/Middle/High).

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-234, "Diagnosis Procedure".

2.CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-11, "System Inspection".

Is leakage detected?

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

3.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak. Refer to CO-11, "System Inspection".
- Hose
- Radiator
- Water pump

>> Repair or replace malfunctioning part.

4. CHECK RADIATOR CAP

Check radiator cap. Refer to CO-15, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace radiator cap.

5. CHECK THERMOSTAT

Check thermostat. Refer to CO-20, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace thermostat.

6. CHECK WATER CONTROL VALVE

Check water control valve. Refer to CO-22, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace water control valve

7. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-134, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace engine coolant temperature sensor.

8. CHECK MAIN 13 CAUSES

If the cause cannot be isolated, check the following.

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	MA-12, "SAE Viscosity Number"	
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-12, "Changing Engine Coolant"
	4	• Radiator cap	• Pressure tester	CO-15, "Removal and Installation"	
ON*2	5	• Coolant leaks	• Visual	No leaks	CO-11, "System Inspection"
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	CO-20, "Removal and Installation"
ON*1	7	• Cooling fan motor	• CONSULT-III	Operating	EC-234, "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, "System Inspection"
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	CO-11, "System Inspection"
OFF	11	• Water control valve	• Remove and inspect the valve	Within the specified value	CO-22, "Removal and Installation"

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	12	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-68, "Inspection After Disassembly"
	13	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	EM-85, "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 (56 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to CO-9, "Troubleshooting Chart".

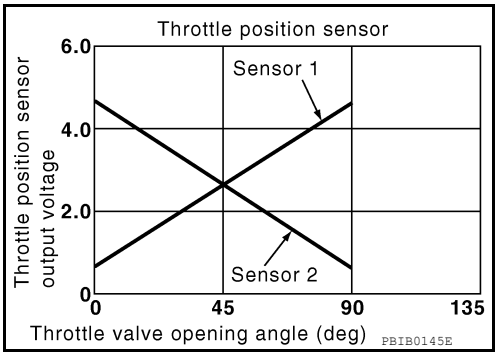
>> INSPECTION END

P1225 TP SENSOR

Description

INFOID:0000000006391711

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:0000000006391712

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-172, "Diagnosis Procedure".
NO >> INSPECTION END

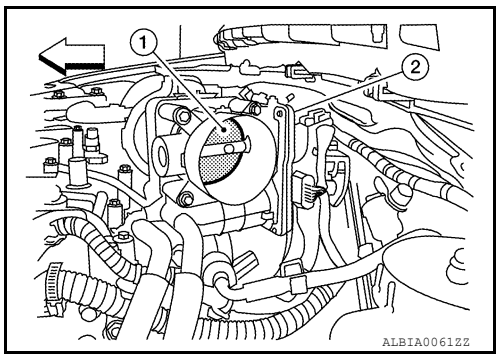
Diagnosis Procedure

INFOID:0000000006391713

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

3. Check if foreign matter is caught between the throttle valve (1) and the housing.



2. Electric throttle control actuator

⇦ : Vehicle front

Is the inspection result normal?

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

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-173, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006391714

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

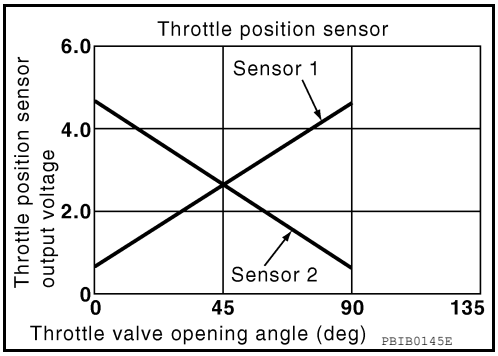
>> END

P1226 TP SENSOR

Description

INFOID:0000000006391715

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:0000000006391716

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-174, "Diagnosis Procedure".
NO >> INSPECTION END

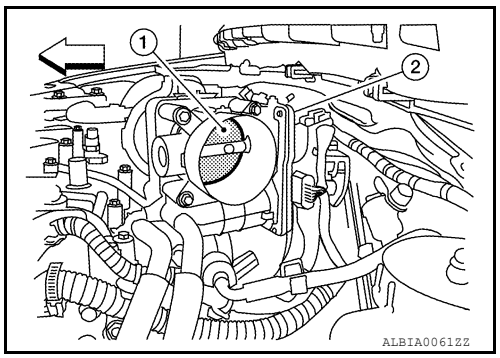
Diagnosis Procedure

INFOID:0000000006391717

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.

3. Check if foreign matter is caught between the throttle valve (1) and the housing.



2. Electric throttle control actuator

⇦ : Vehicle front

Is the inspection result normal?

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

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-173, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006391718

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

P1564 ASCD STEERING SWITCH

Description

INFOID:0000000006391719

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-57, "System Description" for the ASCD function.

DTC Logic

INFOID:0000000006391720

DTC DETECTION LOGIC

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-159, "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-176, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391721

1.CHECK GROUND CONNECTION

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

Is the inspection result normal?

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

2.CHECK ASCD STEERING SWITCH CIRCUIT

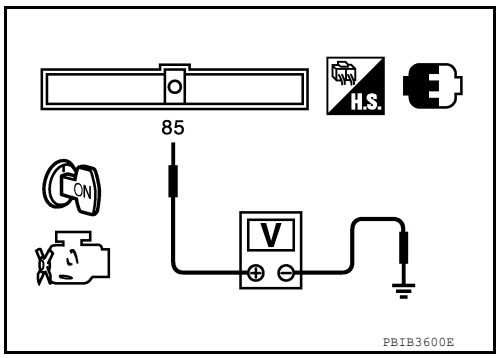
With CONSULT-III
1. Turn ignition switch ON.

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 and ground.



ECM		Ground	Condition	Voltage
Connector	Terminal			
E10	85 (ASCD steering switch signal)	Ground	MAIN switch: Pressed	Approx. 0V
			CANCEL 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 M88.
4. Check the continuity between combination switch and ECM harness connector.

Combination switch	ECM		Continuity
Terminal	Connector	Terminal	
16	E10	92	Existed

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

Is the inspection result normal?

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

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M1, E30
- Combination switch (spiral cable)
- 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	
13	E10	85	Existed

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

Is the inspection result normal?

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

6.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M1, E30
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

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

7.CHECK ASCD STEERING SWITCH

Refer to EC-178, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace ASCD steering switch.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

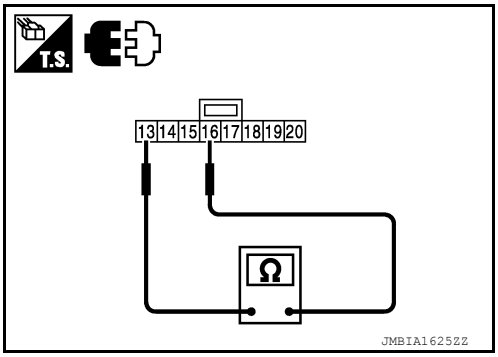
>> INSPECTION END

Component Inspection

INFOID:0000000006391722

1.CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector M88.
2. Check the continuity between combination switch harness connector terminals under following conditions.



Combination switch		Condition	Resistance
Connector	Terminals		
M88	13 and 16	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:0000000006391723

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-57, "System Description" for the ASCD function.

DTC Logic

INFOID:0000000006391724

DTC DETECTION LOGIC

NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-159, "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

1. Start engine.
2. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

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

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-181, "Diagnosis Procedure".
NO >> GO TO 4.

4. 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.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than 5 seconds so as not to come off from the above-mentioned vehicle speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

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

5. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-180, "Component Function Check".

NOTE:
Use component function check to check the overall function of ASCD brake switch. During this check, a DTC might not be confirmed.

Is the inspection result normal?

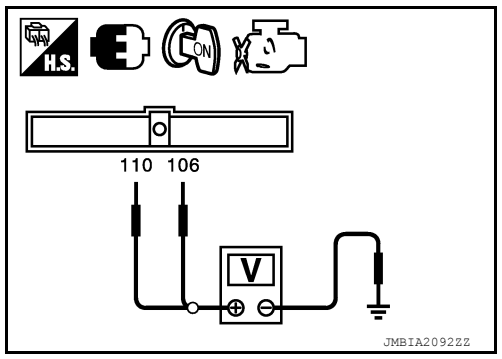
YES >> INSPECTION END
NO >> Go to EC-181, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006391725

1. PERFORM COMPONENT FUNCTION CHECK

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



ECM		Ground	Condition		Voltage
Connector	Terminal				
E10	110 (ASCD brake switch signal)	Ground	Brake pedal	Slightly depressed	Approx. 0V
				Fully released	Battery voltage
	106 (Stop lamp switch signal)			Slightly depressed	Battery voltage
				Fully released	Approx. 0V

Is the inspection result normal?

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

Diagnosis Procedure

INFOID:0000000006916545

1.CHECK OVERALL FUNCTION-I

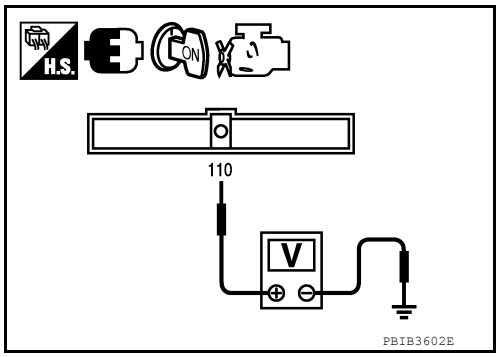
With CONSULT-III

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 (CVT) Brake pedal and clutch pedal (M/T)	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				
E10	110 (ASCD brake switch signal)	Ground	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	Approx. 0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO-1 >> CVT models: GO TO 3.
NO-1 >> M/T models: GO TO 7.

2.CHECK OVERALL FUNCTION-II

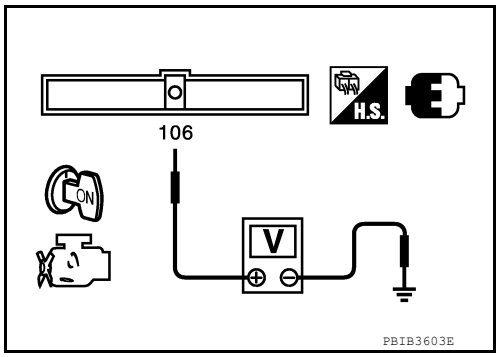
With CONSULT-III

Select “BRAKE SW2” and check indication in “DATA MONITOR” mode.

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	ON
		Fully released	OFF

Without CONSULT-III

Check the voltage between ECM harness connector and ground.



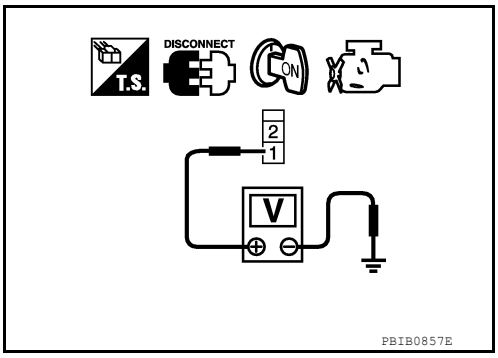
ECM		Ground	Condition		Voltage
Connector	Terminal				
E10	106 (Stop lamp switch signal)	Ground	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	Battery voltage
				Fully released	Approx. 0 V

Is the inspection result normal?

YES >> GO TO 25.
NO >> GO TO 14.

3.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.



ASCD brake switch		Ground	Voltage
Connector	Terminal		
E37	1	Ground	Battery voltage

Is the inspection result normal?

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

4. DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector E6
- Junction block connector E44, E46
- 10 A fuse (No.3)
- Harness for open or short between ASCD brake switch and fuse

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

5. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and ASCD brake switch 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	
E37	2	E10	110	Existed

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

Is the inspection result normal?

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

6. CHECK ASCD BRAKE SWITCH

Refer to EC-186, "Component Inspection (ASCD Brake Switch)".

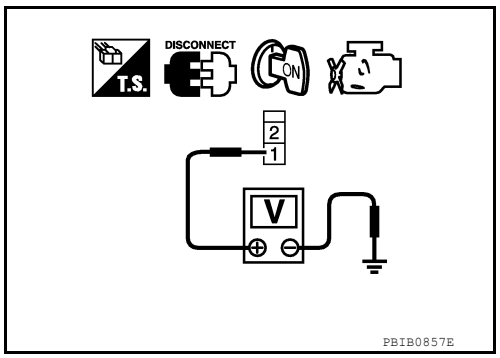
Is the inspection result normal?

YES >> GO TO 19.
NO >> Replace ASCD brake switch. Refer to BR-17, "Removal and Installation".

7. CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.

4. Check the voltage between ASCD clutch switch harness connector and ground.



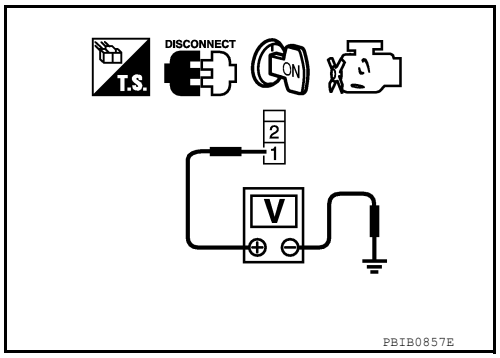
ASCD clutch switch		Ground	Condition		Voltage (V)
Connector	Terminal				
E39	1	Ground	Brake pedal	Slightly depressed	Approx. 0
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 8.

8. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.



ASCD brake switch		Ground	Voltage
Connector	Terminal		
E37	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector E6
- Junction block connector E44, E46
- 10 A fuse (No.3)
- Harness for open or short between ASCD brake switch and fuse

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

10. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

ASCD brake switch		ASCD clutch switch		Continuity
Connector	Terminal	Connector	Terminal	
E37	2	E39	1	Existed

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

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK ASCD BRAKE SWITCH

Refer to EC-186, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 19.
NO >> Replace ASCD brake switch. Refer to BR-17, "Removal and Installation".

12. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

ECM		ASCD clutch switch		Continuity
Connector	Terminal	Connector	Terminal	
E10	110	E39	2	Existed

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

Is the inspection result normal?

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

13. CHECK ASCD CLUTCH SWITCH

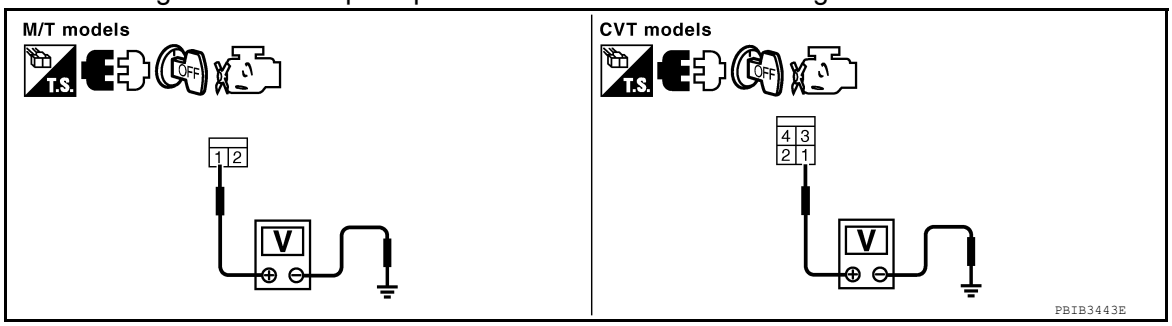
Refer to EC-187, "Component Inspection (ASCD Clutch Switch)".

Is the inspection result normal?

YES >> GO TO 19.
NO >> Replace ASCD clutch switch. Refer to CL-9, "Removal and Installation".

14. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.



Stop lamp switch		Ground	Voltage
Connector	Terminal		
E38	1	Ground	Battery voltage

Is the inspection result normal?

YES-1 >> M/T models: GO TO 16.
YES-2 >> CVT models: GO TO 18.
NO >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector E6
- 10 A 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.

16. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

ECM		Stop lamp switch		Continuity
Connector	Terminal	Connector	Terminal	
E10	106	E38	2	Existed

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

Is the inspection result normal?

YES >> GO TO 23.
NO >> GO TO 17.

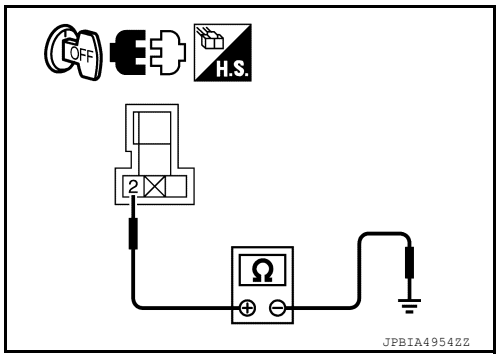
17. DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector E6
- Junction block connector E44, E45
- Harness for open or short between ECM and stop lamp switch

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

18. CHECK STOP LAMP RELAY-1 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp relay-1 harness connector.
3. Check the continuity between stop lamp relay-1 harness connector and and ground.



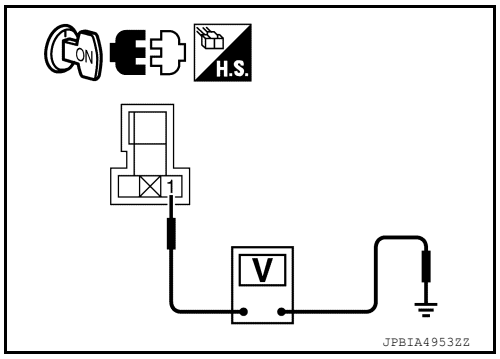
Stop lamp relay-1		Ground	Continuity
Connector	Terminal		
E57	2	Ground	Existed

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 STOP LAMP SWITCH INPUT SIGNAL CIRCUIT

1. Connect stop lamp switch harness connector.
2. Turn ignition switch ON.
3. Check the voltage between stop lamp relay-1 harness connector and ground.



Stop lamp relay-1		Ground	Condition		Voltage (V)
Connector	Terminal				
E57	1	Ground	Brake pedal	Slightly depressed	Battery voltage
				Fully released	Approx. 0

Is the inspection result normal?

YES >> GO TO 21.
NO >> GO TO 20.

20. DETECT MALFUNCTIONING PART

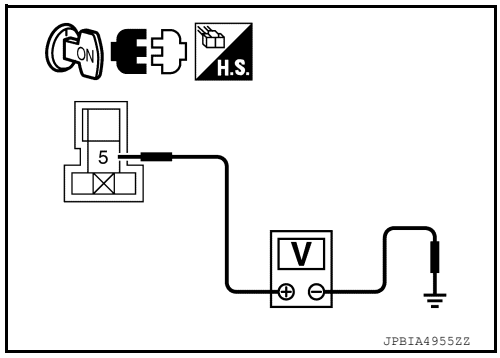
Check the following.
- Joint connector E-14 E56
- Harness for open or short between stop lamp switch and stop lamp relay-1

Is the inspection result normal?

YES >> GO TO 23.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

21.CHECK STOP LAMP RELAY-1 POWER SUPPLY CIRCUIT

1. Check the voltage between stop lamp relay-1 harness connector and ground.
2. Check the voltage between stop lamp relay-1 harness connector and ground.



Stop lamp relay-1		Ground	Voltage (V)
Connector	Terminal		
E57	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 22.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

22.CHECK STOP LAMP RELAY-1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

ECM		Stop lamp relay-1		Continuity
Connector	Terminal	Connector	Terminal	
E10	106	E57	3	Existed

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

Is the inspection result normal?

YES >> GO TO 24.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

23.CHECK STOP LAMP SWITCH

Refer to EC-188, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 25.
NO >> Replace stop lamp switch. Refer to BR-17, "Removal and Installation".

24.CHECK STOP LAMP RELAY-1

Refer to EC-188, "Component Inspection (Stop Lamp Relay-1)".

Is the inspection result normal?

YES >> GO TO 25.
NO >> Replace stop lamp relay-1. For the relay number, refer to EC-288, "Wiring Diagram — ENGINE CONTROL SYSTEM —". For the relay arrangement, refer to PG-34, "Harness Layout" (coupe models) or PG-103, "Harness Layout" (sedan models).

25.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

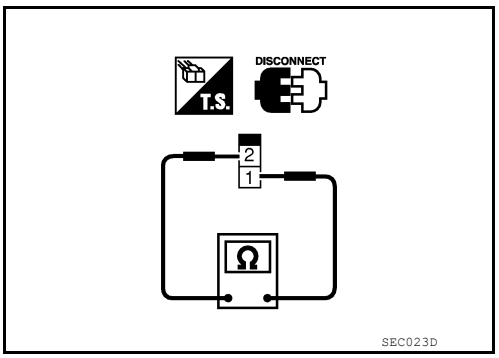
INFOID:0000000006391727

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



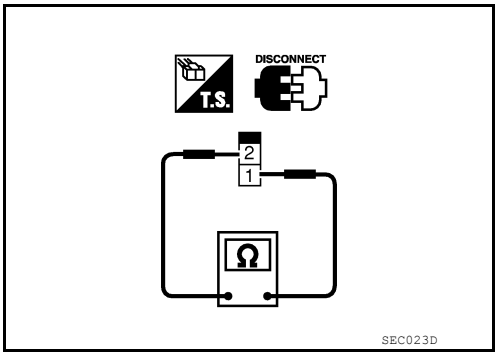
Is the inspection result normal?

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

2.CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-13, "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.

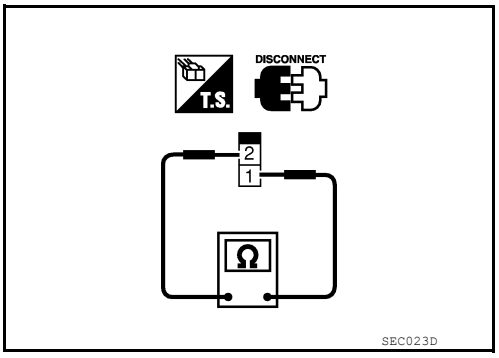
Component Inspection (ASCD Clutch Switch)

INFOID:0000000006391728

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



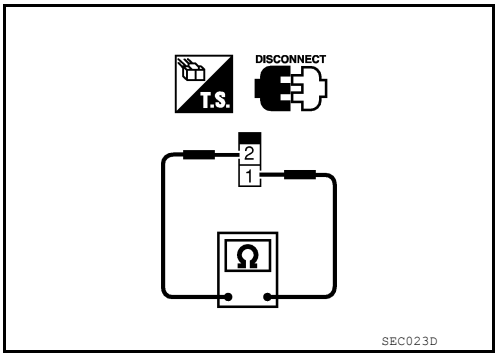
Is the inspection result normal?

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

2.CHECK ASCD CLUTCH SWITCH-II

1. Adjust ASCD clutch switch installation. Refer to CL-6, "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?

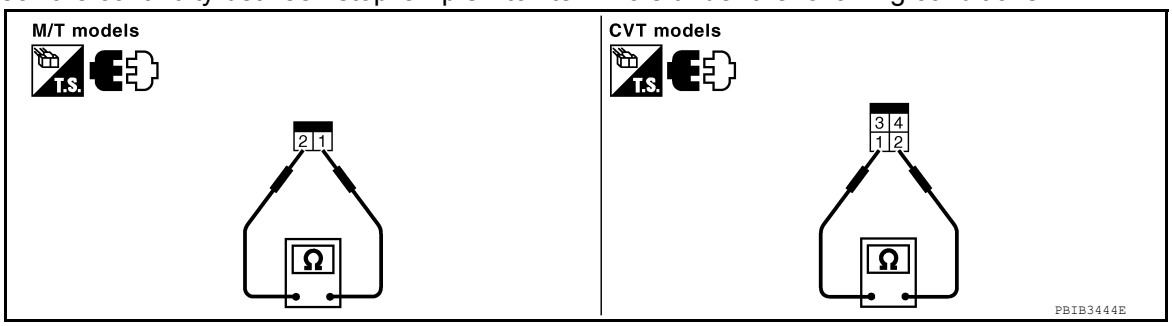
YES >> INSPECTION END
NO >> Replace ASCD clutch switch.

Component Inspection (Stop Lamp Switch)

INFOID:0000000006391729

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.



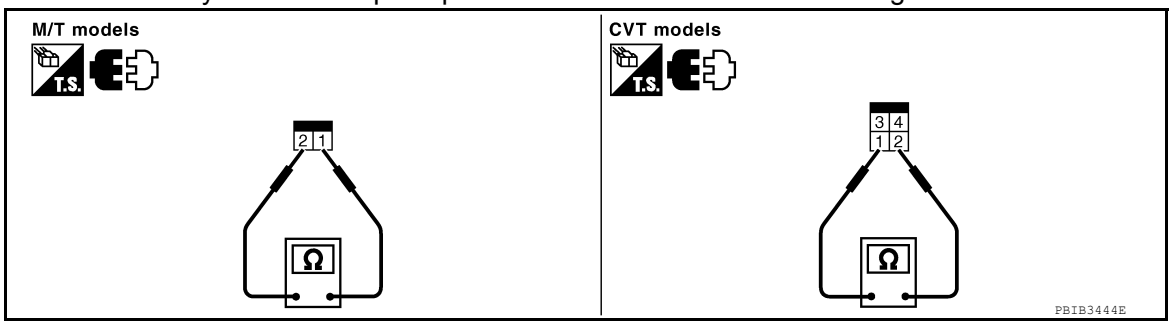
Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

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-13, "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.

Component Inspection (Stop Lamp Relay-1)

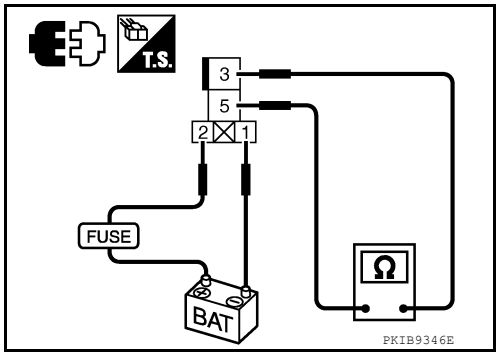
INFOID:0000000006916546

1. STOP LAMP RELAY-1

1. Turn ignition switch OFF.
2. Remove stop lamp relay-1. For the relay number, refer to EC-288, "Wiring Diagram — ENGINE CONTROL SYSTEM —". For the relay arrangement, refer to PG-34, "Harness Layout" (coupe models) or PG-103, "Harness Layout" (sedan models).

3. Check continuity between stop lamp relay-1 terminals under the following conditions.

Stop lamp relay-1 Terminal		Conditions	Continuity
3	5	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp relay-1.

P1574 ASCD VEHICLE SPEED SENSOR

Description

INFOID:0000000006391730

The ECM receives two vehicle speed 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-57, "System Description" for ASCD functions.

DTC Logic

INFOID:0000000006391731

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-119, "DTC Logic".**
- **If DTC P1574 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-120, "DTC Logic".**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-152, "DTC Logic"**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-159, "DTC Logic"**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	• Harness or connectors (The CAN communication line is open or shorted.) (Combination meter circuit is open or shorted.) • Combination meter • ABS actuator and electric unit (control unit) • Wheel sensor • TCM (CVT models) • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> 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-190, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391732

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-286, "CONSULT-III Function (TRANSMISSION)".

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-15, "CONSULT Function (ABS)" or BRC-81, "CONSULT Function (ABS)".

Is the inspection result normal?

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

3. CHECK COMBINATION METER

Check combination meter function.
Refer to MWI-28, "CONSULT Function (METER/M&A)".

>> INSPECTION END

P1715 INPUT SPEED SENSOR

Description

INFOID:0000000006391733

ECM receives input shaft revolution signal from TCM through CAN communication line. ECM uses this signal for engine control.

DTC Logic

INFOID:0000000006391734

DTC DETECTION LOGIC

NOTE:

- **If DTC P1715 is displayed with DTC U1000, U1001 first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-119, "DTC Logic".**
- **If DTC P1715 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-120, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-159, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to EC-144, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0340, P0345, first perform the trouble diagnosis for DTC P0340, P0345. Refer to EC-148, "DTC Logic".**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715	Input speed sensor (TCM output)	Input shaft revolution signal is different from the theoretical value calculated by ECM from output shaft revolution signal and engine rpm signal.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (Input speed sensor circuit is open or shorted) • TCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. Drive vehicle at a speed of more than 50 km/h (31 MPH) for at least 5 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-192, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391735

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-286, "CONSULT-III Function (TRANSMISSION)".

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM. Refer to TM-414, "Removal and Installation".

>> INSPECTION END

P1805 BRAKE SWITCH

Description

INFOID:0000000006391736

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:0000000006391737

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.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-193, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006916779

1.CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

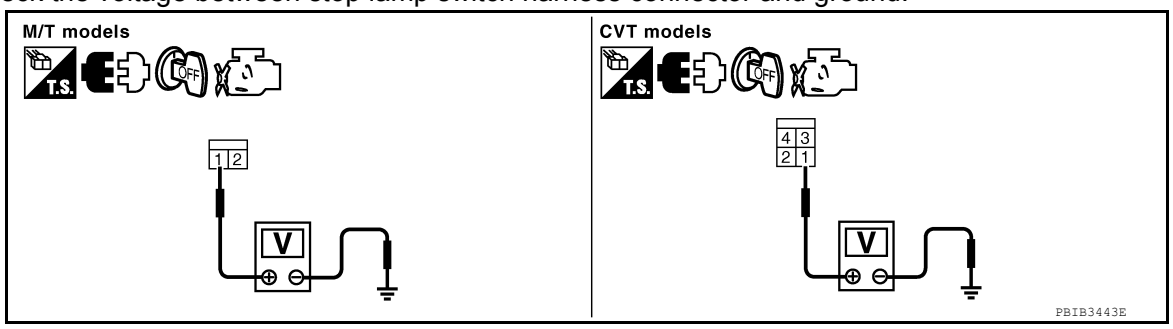
Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

YES-1 >> M/T models: GO TO 4.
YES-2 >> CVT models: GO TO 6.
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		
E38	1	Ground	Battery voltage

Is the inspection result normal?

YES-1 >> M/T models: GO TO 4.
YES-2 >> CVT models: GO TO 6.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector E6
- 10 A fuse (No. 7)
- Harness for open or short between stop lamp switch and battery

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

4.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and stop lamp switch harness connector.

ECM		Stop lamp switch		Continuity
Connector	Terminal	Connector	Terminal	
E10	106	E38	2	Existed

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

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 5.

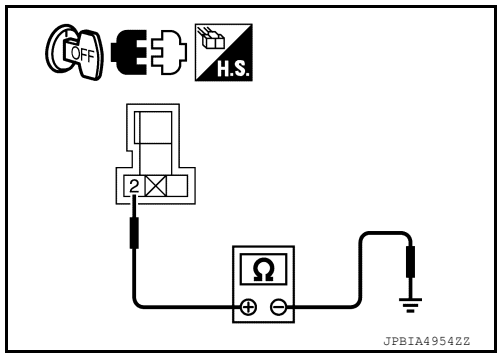
5.DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector E6
- Junction block connector E44, E45
- 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 RELAY-1 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp relay-1 harness connector.
3. Check the continuity between stop lamp relay-1 harness connector and ground.



Stop lamp relay-1		Ground	Continuity
Connector	Terminal		
E57	2	Ground	Existed

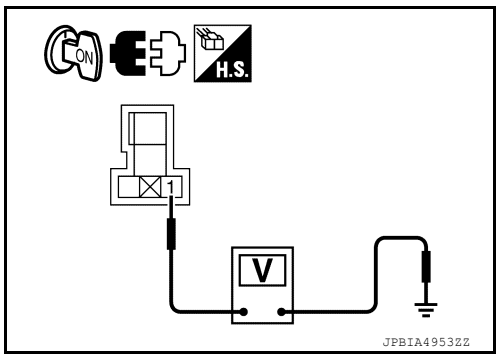
Is the inspection result normal?

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

7.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT

1. Connect stop lamp switch harness connector.
2. Turn ignition switch ON.

3. Check the voltage between stop lamp relay-1 harness connector and ground.



Stop lamp relay-1		Ground	Condition		Voltage (V)
Connector	Terminal				
E57	1	Ground	Brake pedal	Slightly de-pressed	Battery voltage
				Fully released	Approx. 0

Is the inspection result normal?

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

8. DETECT MALFUNCTIONING PART

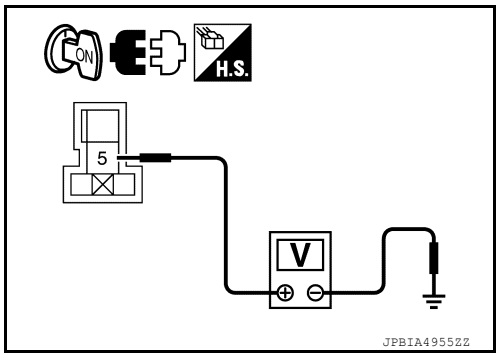
Check the following.
- Joint connector E-14 E56
- Harness for open or short between stop lamp switch and stop lamp relay-1

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.

9. CHECK STOP LAMP RELAY-1 POWER SUPPLY CIRCUIT

1. Check the voltage between stop lamp relay-1 harness connector and ground.



Stop lamp relay-1		Ground	Voltage (V)
Connector	Terminal		
E57	5	Ground	Battery voltage

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 STOP LAMP RELAY-1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

ECM		Stop lamp relay-1		Continuity
Connector	Terminal	Connector	Terminal	
E10	106	E57	3	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.

11. CHECK STOP LAMP SWITCH

Refer to EC-196, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace stop lamp switch. Refer to BR-17, "Removal and Installation".

12. CHECK STOP LAMP RELAY-1

Refer to EC-197, "Component Inspection (Stop Lamp Relay-1)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace stop lamp relay-1. For the relay number, refer to EC-288, "Wiring Diagram — ENGINE CONTROL SYSTEM —". For the relay arrangement, refer to PG-34, "Harness Layout" (coupe models) or PG-103, "Harness Layout" (sedan models).

13. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

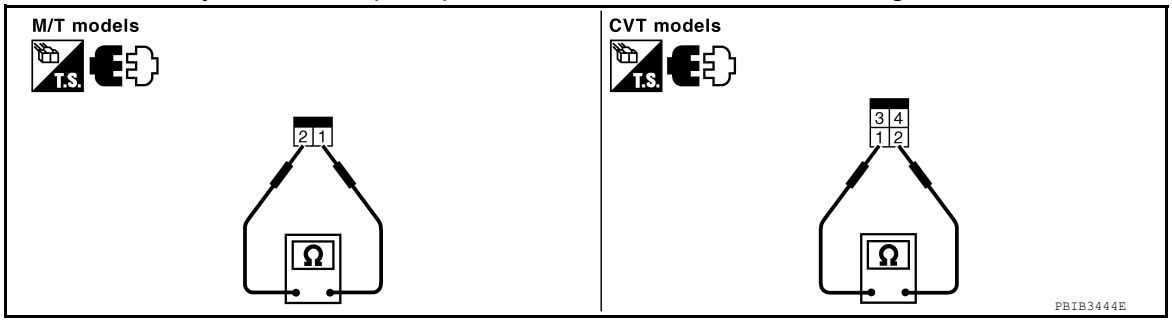
>> INSPECTION END

Component Inspection (Stop Lamp Switch)

INFOID:0000000006391739

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.



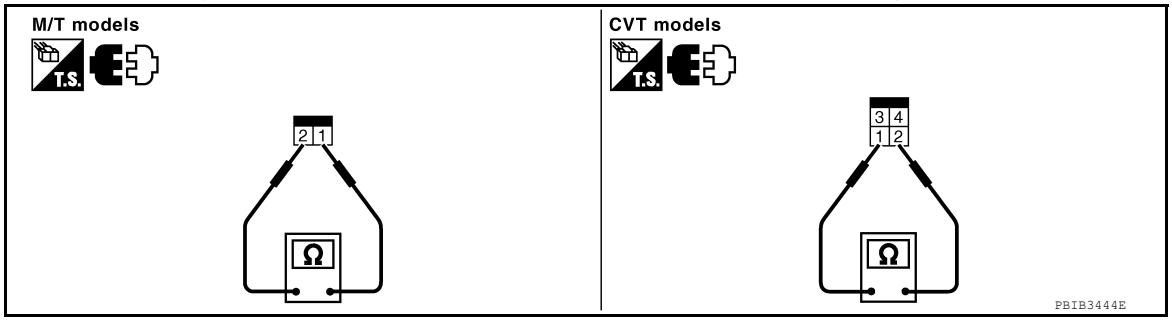
Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

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-13, "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.

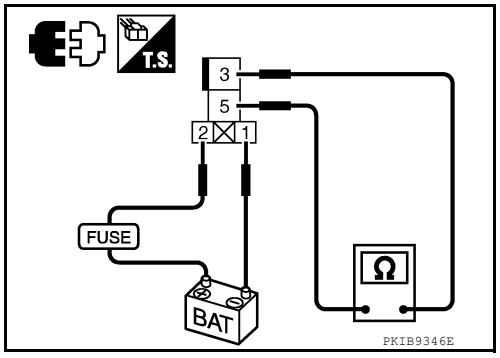
Component Inspection (Stop Lamp Relay-1)

INFOID:0000000006916778

1. STOP LAMP RELAY-1

1. Turn ignition switch OFF.
2. Remove stop lamp relay-1. For the relay number, refer to EC-288, "Wiring Diagram — ENGINE CONTROL SYSTEM —". For the relay arrangement, refer to PG-34, "Harness Layout" (coupe models) or PG-103, "Harness Layout" (sedan models).
3. Check continuity between stop lamp relay-1 terminals under the following conditions.

Stop lamp relay-1 Terminal		Conditions	Continuity
3	5	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp relay-1.

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

Description

INFOID:0000000006391740

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:0000000006391741

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2100	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	• Harness or connectors (Throttle control motor relay circuit is open) • Throttle control motor relay
P2103	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	• Harness or connectors (Throttle control motor relay circuit is shorted) • Throttle control motor relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8V.

Witch DTC is detected?

P2100 >> GO TO 2.
P2103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100

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

Is DTC detected?

YES >> Go to EC-198, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

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

Is DTC detected?

YES >> Go to EC-198, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391742

1.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector F10.
4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F14	15	F10	70	Existed

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

Is the inspection result normal?

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

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

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

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F14	2	F10	54	Existed

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

Is the inspection result normal?

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

3.CHECK FUSE

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

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace 15A fuse.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

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

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:0000000006391743

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:0000000006391744

DTC DETECTION LOGIC

NOTE:
If DTC P2101 is displayed with DTC P2100 or P2119, first perform the trouble diagnosis for DTC P2100 or P2119. Refer to EC-198, "DTC Logic" or EC-206, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2101	Electric throttle control performance	Electric throttle control function does not operate properly.	• Harness or connectors (Throttle control motor circuit is open or shorted) • Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 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-200, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391745

1.CHECK GROUND CONNECTION

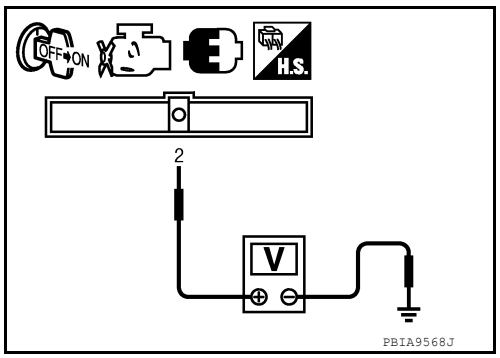
1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

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

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

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



ECM		Ground	Condition	Voltage
Connector	Terminal			
F14	2	Ground	Ignition switch OFF	Approx. 0V
			Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 3.

3. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector F10.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F10	70	F14	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 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	
F10	54	F14	2	Existed

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

Is the inspection result normal?

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

5. CHECK FUSE

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace 15A fuse.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

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

7. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F57	5	F14	5	Not existed
			6	Existed
	6		5	Existed
			6	Not existed

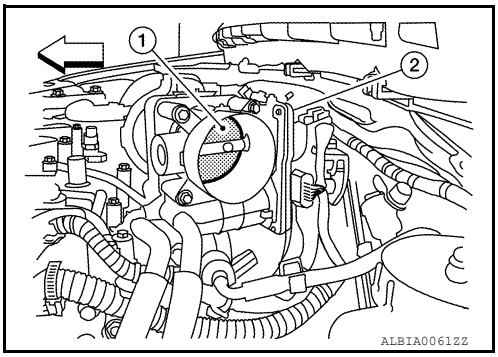
5. Also check harness for short to ground and short to power.

Is the inspection result normal?

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

8.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve (1) and the housing.



2. Electric throttle control actuator
⇦ : Vehicle front

Is the inspection result normal?

YES >> GO TO 9.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

9.CHECK THROTTLE CONTROL MOTOR

Refer to EC-202, "Component Inspection".

Is the inspection result normal?

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

10.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

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

11.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunction electric throttle control actuator.
2. Go to EC-203, "Special Repair Requirement".

>> INSPECTION END

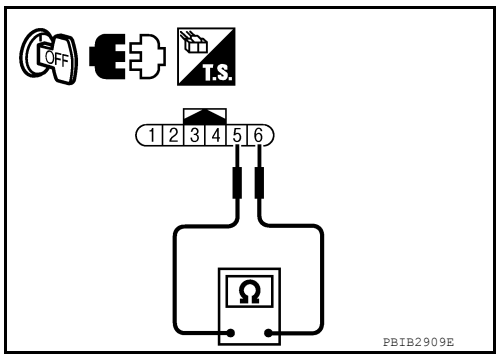
Component Inspection

INFOID:0000000006391746

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-203, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006391747

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

P2118 THROTTLE CONTROL MOTOR

Description

INFOID:0000000006391748

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:0000000006391749

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2118	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	• Harness or connectors (Throttle control motor circuit is shorted.) • Electric throttle control actuator (Throttle control motor)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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-204, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391750

1.CHECK GROUND CONNECTION

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

Is the inspection result normal?

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

2.CHECK THROTTLE CONTROL MOTOR 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	
F57	5	F14	5	Not existed
			6	Existed
	6		5	Existed
			6	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-205, "Component Inspection".

Is the inspection result normal?

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

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "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-205, "Special Repair Requirement".

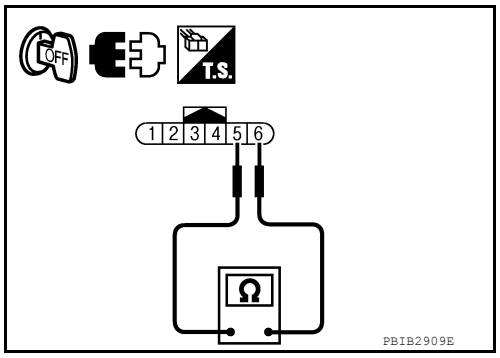
>> INSPECTION END

Component Inspection

INFOID:0000000006391751

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-203, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006391752

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

Description

INFOID:0000000006391753

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:0000000006391754

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P2119	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	• Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> 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 (CVT) or 1st (M/T) position and wait at least 3 seconds.
3. Set shift lever to P (CVT) or 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 (CVT) or 1st (M/T) position and wait at least 3 seconds.
7. Set shift lever to P (CVT) or 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-206, "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 (CVT) or 1st (M/T) position and wait at least 3 seconds.
3. Set shift lever to N, P (CVT) or Neutral (M/T) position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.

Is DTC detected?

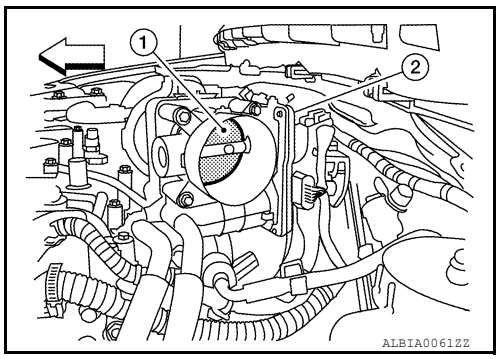
YES >> Go to EC-206, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391755

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve (1) and the housing.



2. Electric throttle control actuator
⇦ : Vehicle front

Is the inspection result normal?

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

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Go to EC-173, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006391756

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

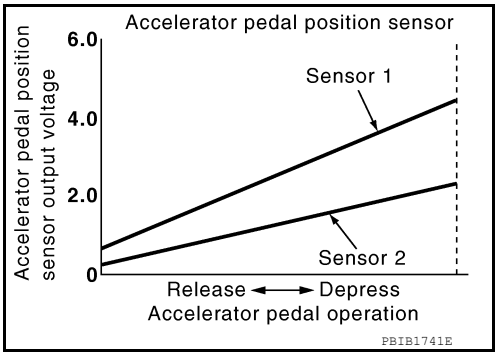
>> END

P2122, P2123 APP SENSOR

Description

INFOID:0000000006391757

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:0000000006391758

DTC DETECTION LOGIC

NOTE:
If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-161, "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-208, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391759

1.CHECK GROUND CONNECTION

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

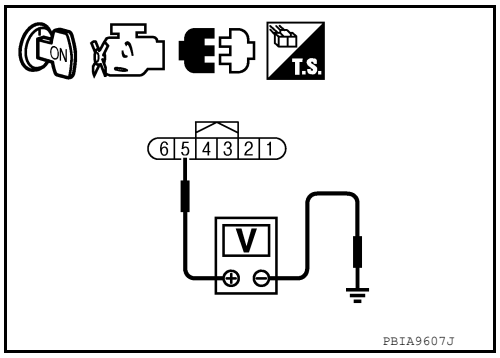
Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK 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		
E40	5	Ground	Approx. 5V

Is the inspection result normal?

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

3.CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E40	4	E10	84	Existed

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

Is the inspection result normal?

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

4.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E40	3	E10	81	Existed

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

Is the inspection result normal?

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

5.CHECK APP SENSOR

Refer to EC-210, "Component Inspection".

Is the inspection result normal?

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

6.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-210, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

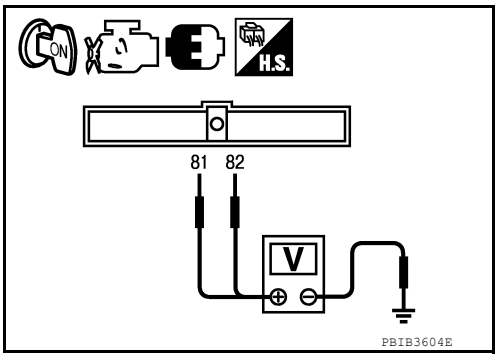
>> INSPECTION END

Component Inspection

INFOID:0000000006391760

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

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



ECM		Ground	Condition		Voltage
Connector	Terminal				
E10	81 (APP sensor 1 signal)	Ground	Accelerator pedal	Fully released	0.5 - 1.0V
				Fully depressed	4.2 - 4.8V
	82 (APP sensor 2 signal)			Fully released	0.25 - 0.5V
				Fully depressed	2.0 - 2.5V

Is the inspection result normal?

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

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-210, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006391761

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

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

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

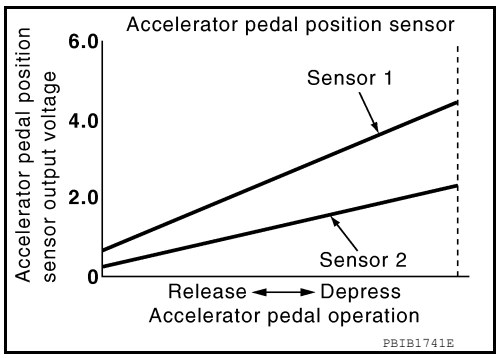
>> END

P2127, P2128 APP SENSOR

Description

INFOID:0000000006391762

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:0000000006391763

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-211, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391764

1.CHECK GROUND CONNECTION

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

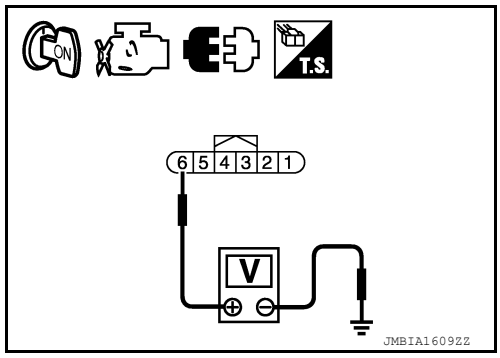
Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK 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		
E40	6	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	
E40	6	E10	87	Existed

Is the inspection result normal?

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

4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F13	72	Refrigerant pressure sensor	E219	1
	76	CKP sensor (POS)	F30	1
E10	87	APP sensor	E40	6

Is the inspection result normal?

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

5.CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-147, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-271, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace malfunctioning component.

6.CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E40	2	E10	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 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	
E40	1	E10	82	Existed

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

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK APP SENSOR

Refer to EC-213, "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-214, "Special Repair Requirement".

>> INSPECTION END

10.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

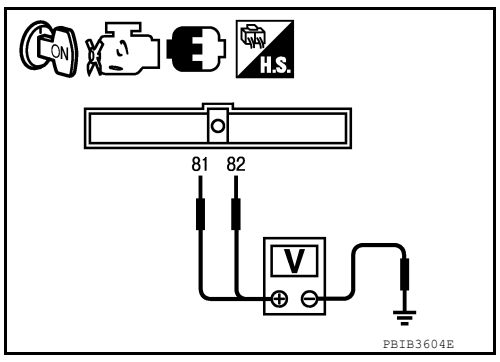
>> INSPECTION END

Component Inspection

INFOID:0000000006391765

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

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



ECM		Ground	Condition		Voltage
Connector	Terminal				
E10	81 (APP sensor 1 signal)	Ground	Accelerator pedal	Fully released	0.5 - 1.0V
				Fully depressed	4.2 - 4.8V
	82 (APP sensor 2 signal)			Fully released	0.25 - 0.5V
				Fully depressed	2.0 - 2.5V

Is the inspection result normal?

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

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-214, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006391766

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

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

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

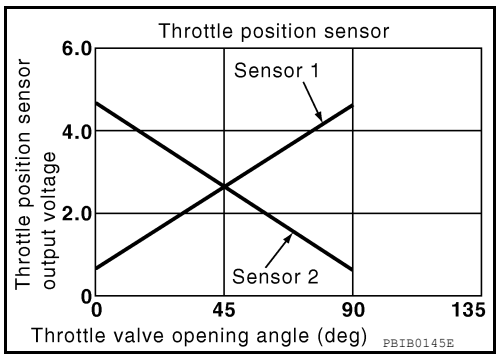
>> END

P2135 TP SENSOR

Description

INFOID:0000000006391767

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:0000000006391768

DTC DETECTION LOGIC

NOTE:
If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-161, "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-215, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391769

1.CHECK GROUND CONNECTION

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

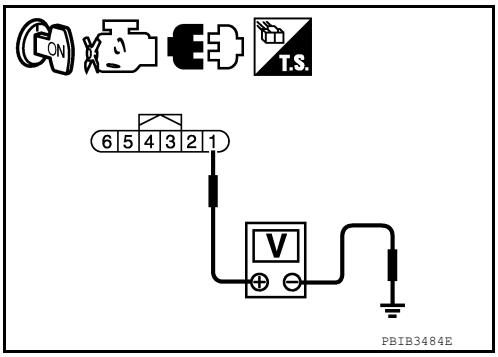
Is the inspection result normal?

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

2.CHECK THROTTLE POSITION SENSOR 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		
F57	1	Ground	Approx. 5V

Is the inspection result normal?

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

3. CHECK THROTTLE POSITION SENSOR 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	
F57	4	F13	36	Existed

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

Is the inspection result normal?

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

4. CHECK THROTTLE POSITION SENSOR 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	
F57	2	F13	37	Existed
	3		38	

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-217, "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. EC-217, "Special Repair Requirement"

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

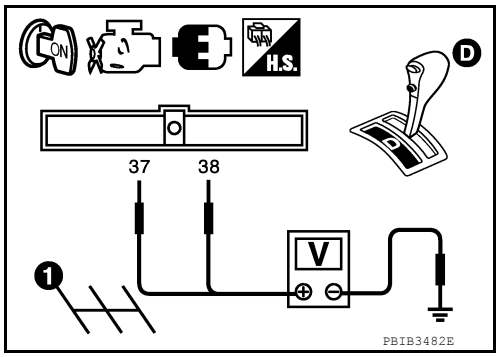
>> INSPECTION END

Component Inspection

INFOID:0000000006391770

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set shift lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector and ground.



ECM		Ground	Condition		Voltage
Connector	Terminal				
F13	37 (TP sensor 1 signal)	Ground	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	38 (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-217, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006391771

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

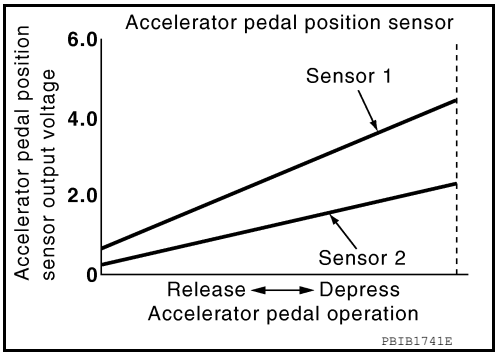
>> END

P2138 APP SENSOR

Description

INFOID:0000000006391772

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:0000000006391773

DTC DETECTION LOGIC

NOTE:
If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-161, "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 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-218, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391774

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

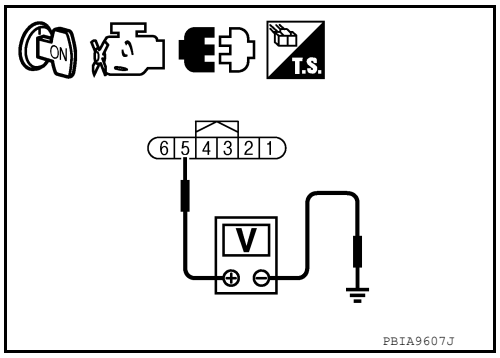
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK 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.



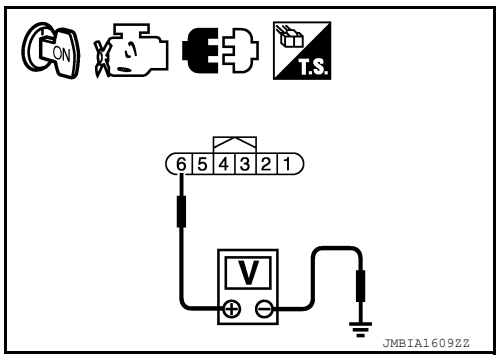
APP sensor		Ground	Voltage
Connector	Terminal		
E40	5	Ground	Approx. 5V

Is the inspection result normal?

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

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check the voltage between APP sensor harness connector and ground.



APP sensor		Ground	Voltage
Connector	Terminal		
E40	6	Ground	Approx. 5V

Is the inspection result normal?

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

4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E40	6	E10	87	Existed

Is the inspection result normal?

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

5.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F13	72	Refrigerant pressure sensor	E219	1
	76	CKP sensor (POS)	F30	1
E10	87	APP sensor	E40	6

Is the inspection result normal?

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

6.CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-147, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-271, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace malfunctioning component.

7.CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E40	2	E10	100	Existed
	4		84	

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

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

8.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector as follows.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E40	1	E10	82	Existed
	3		81	

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

Is the inspection result normal?

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

9.CHECK APP SENSOR

Refer to EC-221, "Component Inspection".

Is the inspection result normal?

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

10.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-221, "Special Repair Requirement".

>> INSPECTION END

11.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

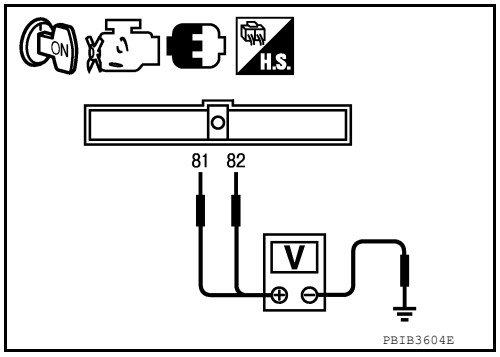
>> INSPECTION END

Component Inspection

INFOID:0000000006391775

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

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



ECM		Ground	Condition		Voltage
Connector	Terminal				
E10	81 (APP sensor 1 signal)	Ground	Accelerator pedal	Fully released	0.5 - 1.0V
				Fully depressed	4.2 - 4.8V
	82 (APP sensor 2 signal)			Fully released	0.25 - 0.5V
				Fully depressed	2.0 - 2.5V

Is the inspection result normal?

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

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Go to EC-221, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006391776

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

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

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-20, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-20, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

ASCD BRAKE SWITCH

Description

INFOID:0000000006391777

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-57, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000006391778

1.CHECK FOR ASCD BRAKE SWITCH FUNCTION

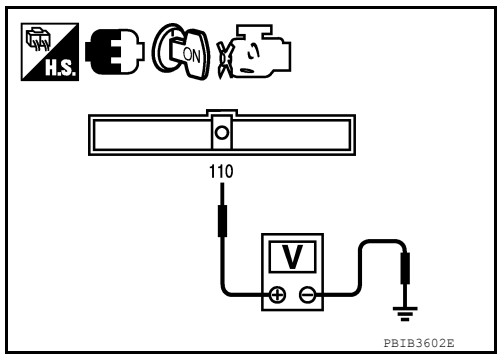
With CONSULT-III

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 (CVT) Brake pedal and clutch pedal (M/T)	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				
E10	110 (ASCD brake switch signal)	Ground	Brake pedal (CVT) Brake pedal and clutch pedal (M/T)	Slightly depressed	Approx. 0V
				Fully released	Battery voltage

Is the inspection result normal?

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

Diagnosis Procedure

INFOID:0000000006391779

1.CHECK OVERALL FUNCTION-I

Check which type of transmission the vehicle is equipped with.

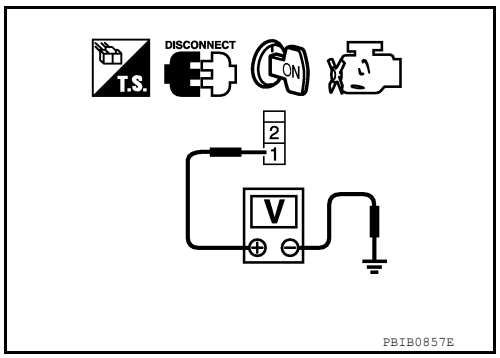
CVT or M/T?

CVT >> GO TO 2.
M/T >> GO TO 6.

2.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.

4. Check the voltage between ASCD brake switch harness connector and ground.



ASCD brake switch		Ground	Voltage
Connector	Terminal		
E37	1	Ground	Battery voltage

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector E6
- 10A fuse (No. 3)
- Harness for open or short between ASCD brake switch and fuse

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

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	
E37	2	E10	110	Existed

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

Is the inspection result normal?

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

5. CHECK ASCD BRAKE SWITCH

Refer to EC-225, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace ASCD brake switch.

6. CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.
4. Check the continuity between ASCD clutch switch harness connector and ground.

ASCD clutch switch		Ground	Condition		Voltage (V)
Connector	Terminal				
E39	1	Ground	Brake pedal	Slightly depressed	Approx. 0
				Fully released	Battery voltage

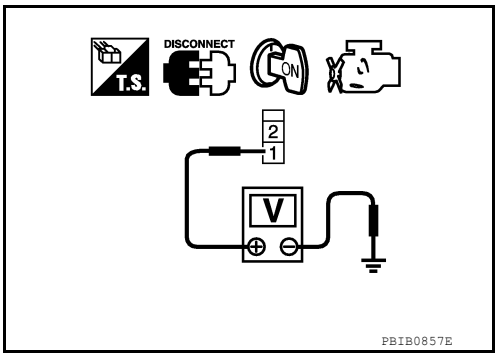
5. Also check harness for short to ground and short to power.

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		
E37	1	Ground	Battery voltage

Is the inspection result normal?

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

8. DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector E6
- 10A fuse (No. 3)
- Harness for open or short between ASCD brake switch and fuse

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

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	
E37	2	E39	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-225, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace ASCD brake switch.

11. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

ASCD clutch switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E39	2	E10	110	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-225, "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-42, "Intermittent Incident".

>> INSPECTION END

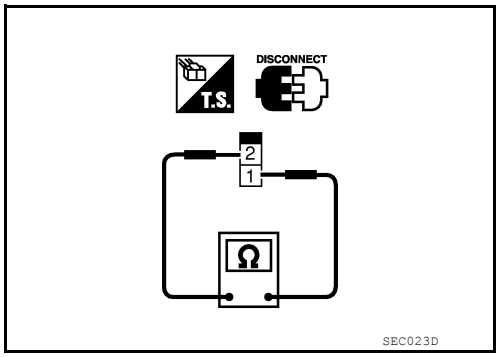
Component Inspection (ASCD Brake Switch)

INFOID:0000000006391780

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



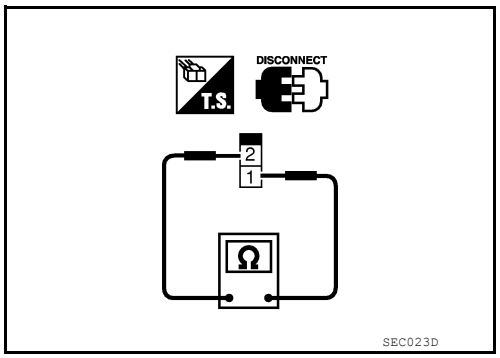
Is the inspection result normal?

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

2. CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-13, "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.

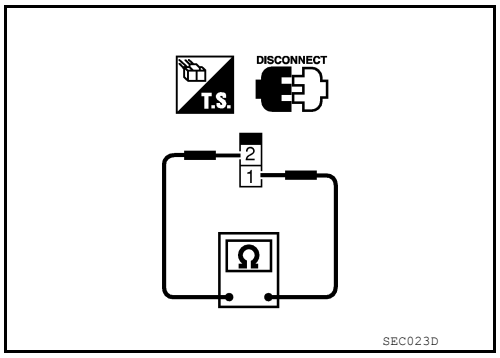
Component Inspection (ASCD Clutch Switch)

INFOID:0000000006391781

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



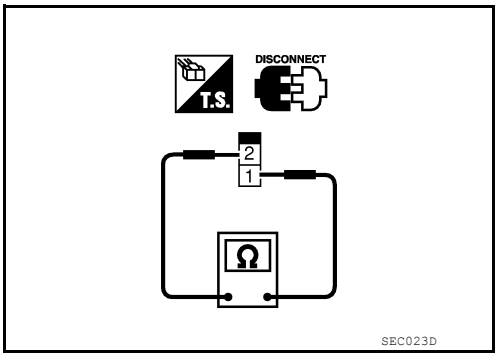
Is the inspection result normal?

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

2.CHECK ASCD CLUTCH SWITCH-II

1. Adjust ASCD clutch switch installation. Refer to CL-6, "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:0000000006391782

The ASCD operation status is indicated by two indicators, (CRUISE and SET on the information display) on the combination meter.
CRUISE indicator is displayed to indicate that ASCD system is ready for operation when MAIN switch on ASCD steering switch is turned ON.
SET indicator is displayed when the following conditions are met.
- CRUISE indicator is displayed.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET indicator is displayed during ASCD control.
Refer to EC-57, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000006391783

1.ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE	• Ignition switch: ON	• MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET	• 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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-227, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006391784

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-119, "DTC Logic".

2.CHECK COMBINATION METER OPERATION

Refer to MWI-28, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check combination meter circuit. Refer to MWI-5, "METER SYSTEM : System Diagram".

3.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

A/F SENSOR 1

Description

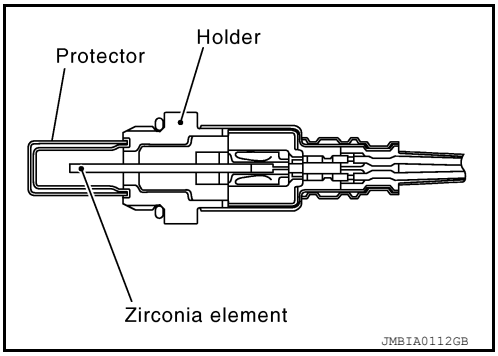
INFOID:0000000006391785

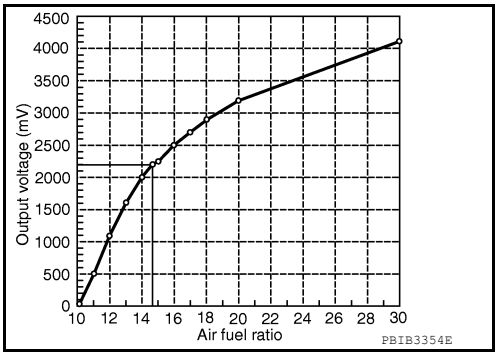
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.

Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).





Component Function Check

INFOID:0000000006391786

1.PERFORM COMPONENT FUNCTION CHECK-I

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

A/F ALPHA-B1 indication: Remain between 75 - 125 %

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-228, "Diagnosis Procedure".

2.PERFORM COMPONENT FUNCTION CHECK-II

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

A/F SEN1(B1) indication: Fluctuates between 2.0 - 2.3 V

Is the inspection result normal?

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

Diagnosis Procedure

INFOID:0000000006391787

1.CHECK GROUND CONNECTION

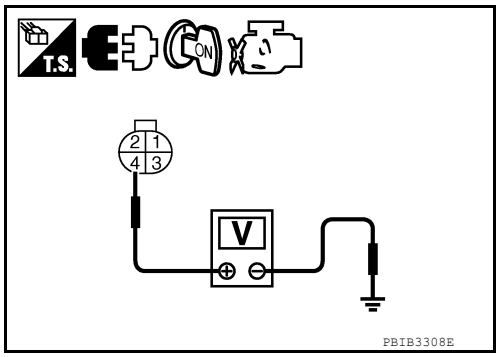
1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

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

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

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.



A/F sensor 1		Ground	Voltage
Connector	Terminal		
F44	4	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

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

>> Repair or replace harness or connectors.

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

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F44	1	F13	45	Existed
	2		49	

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

A/F sensor 1		ECM		Ground	Continuity
Connector	Terminal	Connector	Terminal		
F44	1	F13	45	Ground	Not existed
	2		49		

5. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

Is the inspection result normal?

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

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

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

CAUTION:
- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

- **Before installing new A/F sensor, clean exhaust system threads using oxygen sensor thread cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

A/F SENSOR 1 HEATER

Description

INFOID:0000000006391788

SYSTEM DESCRIPTION

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

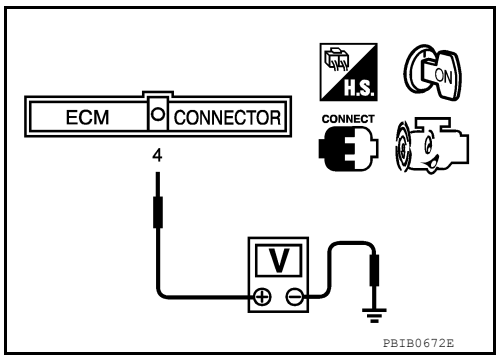
The ECM performs ON/OFF duty control of the A/F sensor 1 heater corresponding to the engine operating condition to keep the temperature of A/F sensor 1 element at the specified range.

Component Function Check

INFOID:0000000006391789

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

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



ECM		Ground	Condition	Voltage signal
Connector	Terminal			
F14	4 (A/F sensor 1 heater signal)	Ground	At idle	2.9 - 8.8 V★ 50mSec/div 5V/div JMBIA0082GB

★: 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-231, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006391790

1.CHECK GROUND CONNECTION

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

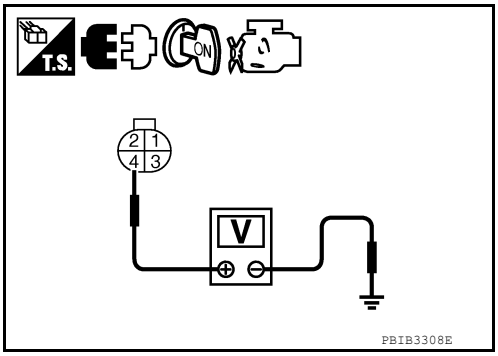
Is the inspection result normal?

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

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

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

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



A/F sensor 1		Ground	Voltage
Connector	Terminal		
F44	4	Ground	Battery voltage

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

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

>> Repair or replace harness or connectors.

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

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F44	3	F14	4	Existed

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

Is the inspection result normal?

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

5. CHECK A/F SENSOR 1 HEATER

Refer to EC-233, "Component Inspection".

Is the inspection result normal?

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

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

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

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

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

>> Repair or replace.

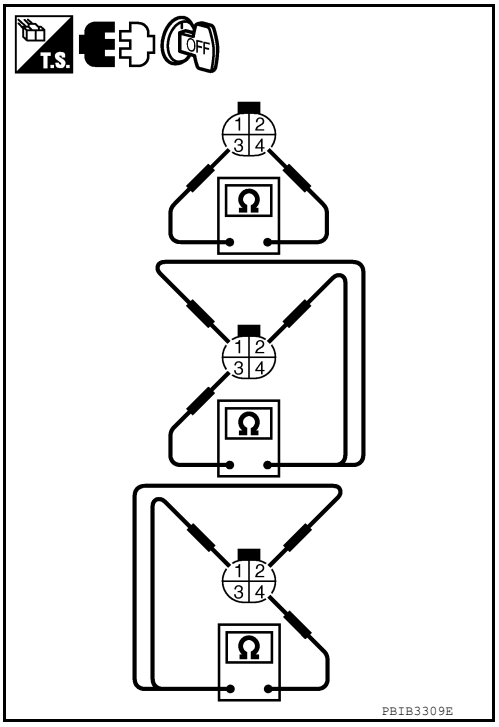
Component Inspection

INFOID:0000000006391791

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

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

Terminals	Resistance
3 and 4	1.8 - 2.44 Ω [at 25°C (77°F)]
3 and 1, 2	∞Ω (Continuity should not exist)
4 and 1, 2	



Is the inspection result normal?

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

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

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

CAUTION:

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

>> INSPECTION END

COOLING FAN

Description

INFOID:0000000006391792

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

COOLING FAN MOTOR

The cooling fan operates at each speed when the current flows in the cooling fan motor as follows.

Cooling fan speed	Cooling fan motor terminals	
	(+)	(-)
Middle (MID)	1	3 and 4
	2	3 and 4
	1 and 2	3
	1 and 2	4
High (HI)	1 and 2	3 and 4

The cooling fan operates at low (LOW) speed when cooling fan motors-1 and -2 are circuited in series under middle speed condition.
Refer to EC-67, "System Diagram".

Component Function Check

INFOID:0000000006391793

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” “MID” “HI” on the CONSULT-III screen.
3. Check that cooling fan operates.

Without CONSULT-III

1. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PCS-11, "Diagnosis Description".

Is the inspection result normal?

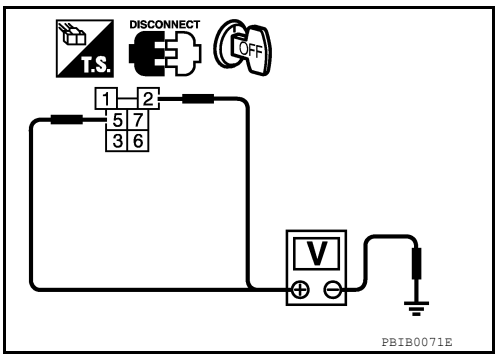
YES >> INSPECTION END.
NO >> Go to EC-234, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006391794

1.CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relays-2, -3.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan relays-2, -3 harness connectors and ground.



Cooling fan relay		Ground	Voltage
Connector	Terminal		
E42 (cooling fan relay-2)	2	Ground	Battery voltage
	5		
E43 (cooling fan relay-3)	2		
	5		

Is the inspection result normal?

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

2. DETECT MALFUNCTIONING PART

Check the following.
- 10 A fuse (No. 33)
- 40 A fusible link (letter K)
- IPDM E/R harness connector E18
- Harness for open or short between cooling fan relay-2 and battery
- Harness for open or short between cooling fan relay-3 and battery
- Harness for open or short between cooling fan relay-2 and IPDM E/R
- Harness for open or short between cooling fan relay-3 and IPDM E/R

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

3. CHECK COOLING FAN RELAY OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connectors.
3. Check the continuity between cooling fan relay-2, -3 harness connectors and IPDM E/R harness connector.

Cooling fan relay		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E42 (cooling fan relay-2)	1	E17	42	Existed
E43 (cooling fan relay-3)	1	E18	34	

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.

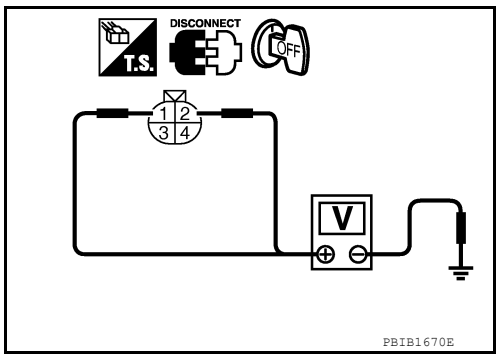
4. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan relay-2 and IPDM E/R
- Harness for open or short between cooling fan relay-3 and IPDM E/R

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

5. CHECK COOLING FAN MOTOR POWER SUPPLY CIRCUIT

1. Disconnect cooling fan motor-1 harness connector.
2. Check the voltage between cooling fan motor-1 harness connector and ground.



Cooling fan motor-1		Ground	Voltage
Connector	Terminal		
E220	1	Ground	Battery voltage
	2		

Is the inspection result normal?

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

6. DETECT MALFUNCTIONING PART

Check the following.
- 40 A fusible link (letter M)
- Harness connector E12, E203

• Harness for open or short between cooling fan motor-1 and battery

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

7.CHECK COOLING FAN MOTOR CIRCUIT-I

1. Disconnect cooling fan motor-2 harness connector.
2. Check the continuity between cooling fan relay-2, -3 harness connectors and cooling fan motor-1, -2 harness connectors.

Cooling fan relay		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E42 (cooling fan relay-2)	3	E221 (Cooling fan motor-2)	2	Existed
	7	E220 (Cooling fan motor-1)	3	
E43 (cooling fan relay-3)	3	E221 (Cooling fan motor-2)	1	
	7	E220 (Cooling fan motor-1)	4	

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

Is the inspection result normal?

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

8.DETECT MALFUNCTIONING PART

Check the following.
• Harness connector E12, E203
• Harness for open or short between cooling fan motor-1 and cooling fan relay-2
• Harness for open or short between cooling fan motor-1 and cooling fan relay-3
• Harness for open or short between cooling fan motor-2 and cooling fan relay-2
• Harness for open or short between cooling fan motor-2 and cooling fan relay-3

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

9.CHECK COOLING FAN MOTOR CIRCUIT-II

1. Check the continuity between IPDM E/R harness connector and cooling fan motor-1, -2 harness connector.

IPDM E/R		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E18	35	E220 (Cooling fan motor-1)	4	Existed
	38	E221 (Cooling fan motor-2)	1	

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

Is the inspection result normal?

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

10.DETECT MALFUNCTIONING PART

Check the following.
• Harness connector E12, E203
• Harness for open or short between cooling fan motor-1 and IPDM E/R
• Harness for open or short between cooling fan motor-2 and IPDM E/R

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

11. CHECK COOLING FAN MOTOR CIRCUIT-III

1. Check the continuity between cooling fan relay-2, -3 harness connectors and ground.

Cooling fan motor		Ground	Continuity
Connector	Terminal		
E42 (cooling fan relay-2)	6	Ground	Existed
E43 (cooling fan relay-3)	6		

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

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

12. CHECK COOLING FAN MOTOR CIRCUIT-IV

1. Check the continuity between cooling fan motor-2 harness connector and ground.

Cooling fan motor-2		Ground	Continuity
Connector	Terminal		
E221	3	Ground	Existed
	4		

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

Is the inspection result normal?

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

13. CHECK COOLING FAN RELAY-2 AND -3

Refer to EC-238, "Component Inspection (Cooling Fan Relay)".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Replace malfunctioning cooling fan relay.

14. CHECK COOLING FAN MOTORS-1 AND -2

Refer to EC-238, "Component Inspection (Cooling Fan Relay)".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace malfunctioning cooling fan motor.

15. CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

Is the inspection result normal?

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

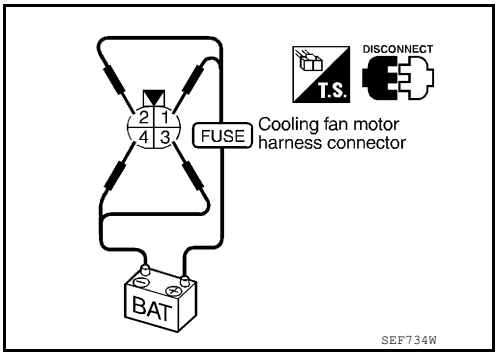
Component Inspection (Cooling Fan Motor)

INFOID:0000000006391795

1. CHECK COOLING FAN MOTORS

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-1 and -2 harness connectors.

3. Supply cooling fan motor terminals with battery voltage and check operation.



	Condition	Terminals	
		(+)	(–)
Cooling fan motor	A	1	3 and 4
		2	3 and 4
		1 and 2	3
		1 and 2	4
	B	1 and 2	3 and 4

Check that cooling fan speed of condition B is higher than that of A.

Is the inspection result normal?

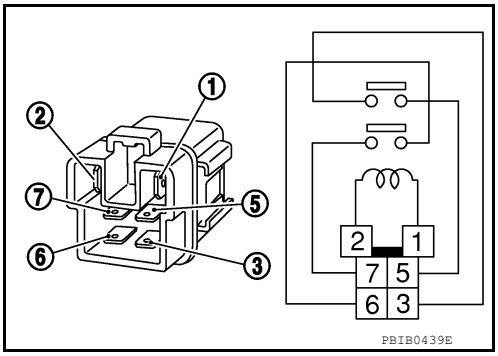
YES >> INSPECTION END
NO >> Replace cooling fan motor.

Component Inspection (Cooling Fan Relay)

INFOID:0000000006391796

1. CHECK COOLING FAN RELAYS

1. Turn ignition switch OFF.
2. Remove cooling fan relay -2, -3.
3. Check the continuity between cooling fan relay terminals under the following conditions.



Terminals	Conditions	Continuity
3 and 5	12V direct current supply between terminals 1 and 2	Existed
	No current supply	Not existed
6 and 7	12V direct current supply between terminals 1 and 2	Existed
	No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan relay.

ELECTRICAL LOAD SIGNAL

Description

INFOID:0000000006391797

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred through the CAN communication line.

Component Function Check

INFOID:0000000006391798

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-239, "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-239, "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-239, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006391799

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to EC-239, "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 BCS-17, "REAR WINDOW DEFOGGER : CONSULT Function (BCM - REAR DEFOGGER)".

>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Refer to EXL-7, "System Diagram" (XENON TYPE) or EXL-9, "System Diagram" (HALOGEN TYPE).

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Refer to HAC-4, "Work Flow" (AUTO A/C) or HAC-107, "Work Flow" (MANUAL A/C).

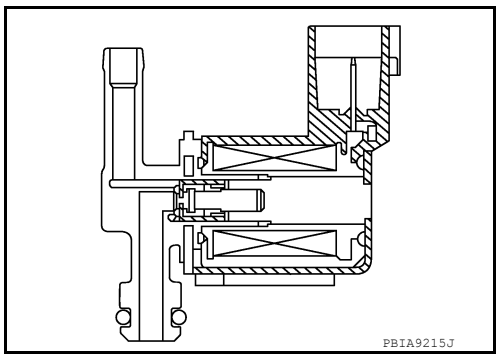
>> INSPECTION END

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:0000000006391800

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:0000000006391801

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-241, "Diagnosis Procedure".

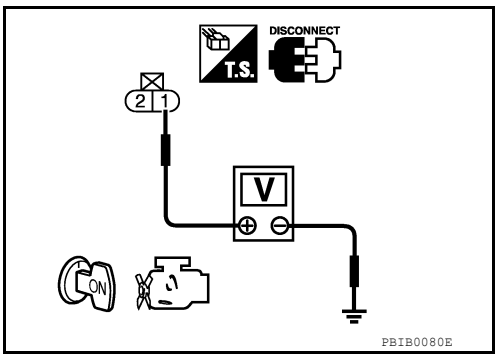
Diagnosis Procedure

INFOID:0000000006391802

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		
F29	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 E11, F2
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

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

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F29	2	F14	25	Existed

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

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 4.
YES-2 >> Without CONSULT-III: GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

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

Is the inspection result normal?

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

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-243, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP canister purge volume control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

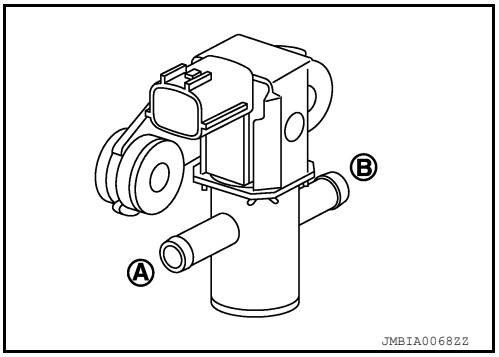
Component Inspection

INFOID:0000000006391803

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

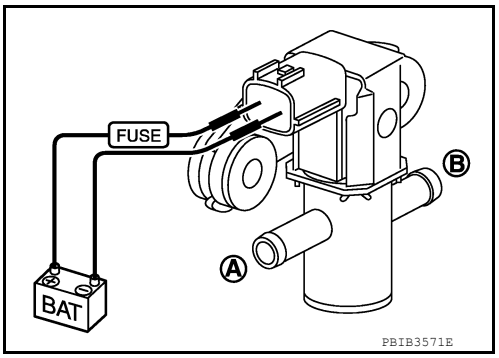
1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Turn ignition switch ON.
5. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III.
6. Touch “Qd” and “Qu” on CONSULT-III 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

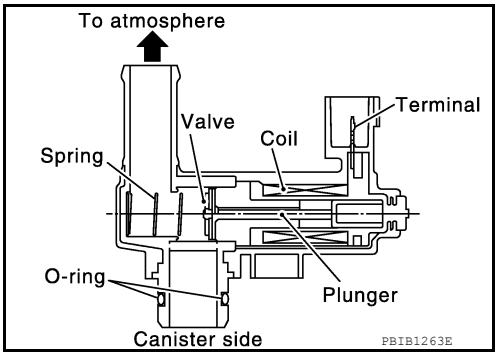
NO >> Replace EVAP canister purge volume control solenoid valve

EVAP CANISTER VENT CONTROL VALVE

Description

INFOID:0000000006391804

The EVAP canister vent control valve is located on the EVAP canister.
This solenoid valve is not used for engine control, and always remains open.
If the vent is closed by any reason under EVAP purge conditions, the evaporative emission control system is depressurized and EVAP canister may be damaged.



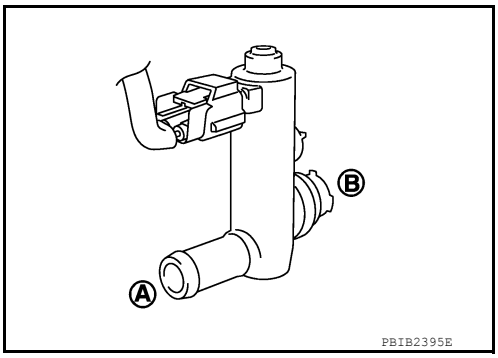
Component Function Check

INFOID:0000000006391805

1. CHECK EVAP CANISTER VENT CONTROL VALVE FUNCTION

1. Turn ignition switch OFF.
2. Remove EVAP canister vent control valve with its harness connector connected from EVAP canister.
3. Start engine.
4. Blow air into port (A) and check that it flows freely out of port (B).

YES >> INSPECTION END
NO >> Go to EC-244, "Diagnosis Procedure".



Diagnosis Procedure

INFOID:0000000006391806

1. CHECK VACUUM LINE

1. Turn ignition switch OFF.
2. Check vacuum line between EVAP canister purge volume control solenoid valve and intake manifold collector for crack, clogging, improper connection or disconnection. Refer to EC-23, "System Diagram".

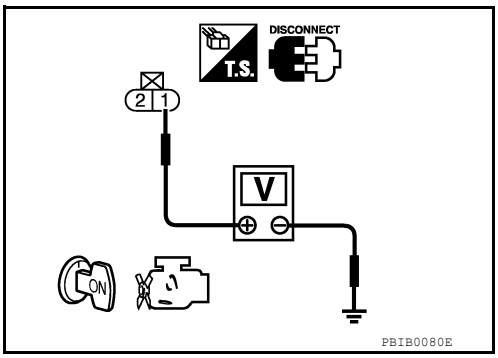
Is the inspection result normal?

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

2. CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect EVAP canister vent control valve harness connector.
2. Turn ignition switch ON.
3. Check voltage between EVAP canister vent control valve harness connector and ground.

EVAP canister vent control valve		Ground	Voltage
Connector	Terminal		
B39	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 E29, B10
- Harness connectors F2, E11
- Harness for open or short between EVAP canister vent control valve and IPDM E/R

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

4. CHECK EVAP CANISTER VENT CONTROL 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 vent control valve harness connector and ECM harness connector.

EVAP canister vent control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B39	2	E10	109	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 E29, B10
- Harness for open or short between EVAP canister vent control valve and ECM

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

6. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-245, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace EVAP canister vent control valve.

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

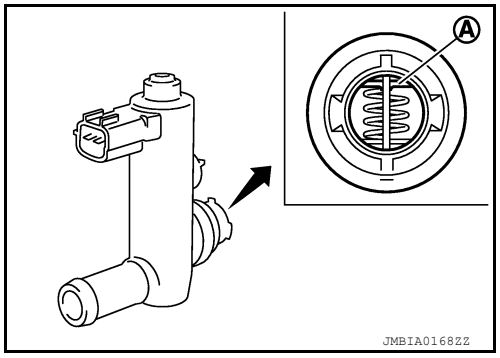
>> INSPECTION END

Component Inspection

INFOID:0000000006391807

1. CHECK EVAP CANISTER VENT CONTROL VALVE

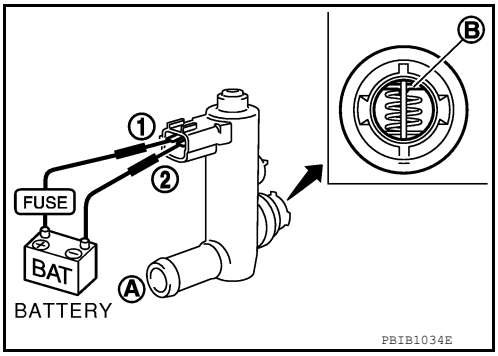
1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion (A) of EVAP canister vent control valve for being rusted.



3. Check air passage continuity and operation delay time under the following conditions.
Make sure new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals (1) and (2)	No
OFF	Yes

Operation takes less than 1 second.



If NG, replace EVAP canister vent control valve.
If OK, go to next step.

4. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
5. Perform step 3 again.

Is the inspection result normal?

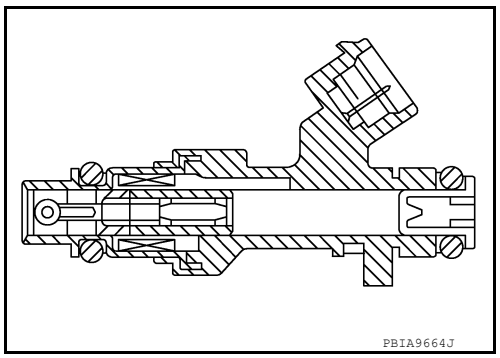
YES >> INSPECTION END
NO >> Replace EVAP canister purge volume control solenoid valve

FUEL INJECTOR

Description

INFOID:0000000006391808

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



Component Function Check

INFOID:0000000006391809

1.INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.
NO >> Go to EC-247, "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.

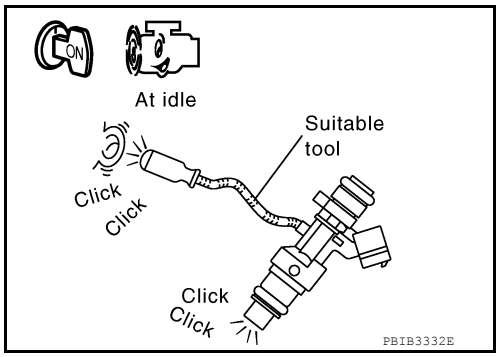
Without CONSULT-III

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-247, "Diagnosis Procedure".



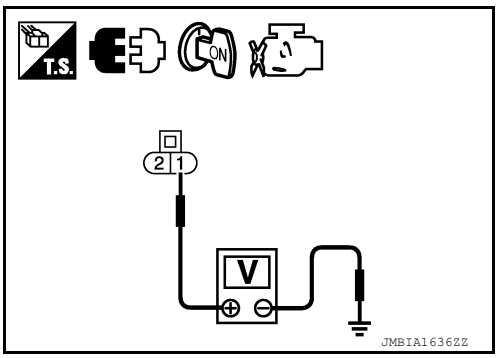
Diagnosis Procedure

INFOID:0000000006391810

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.
- IPDM E/R harness connector F10
- 10A fuse (No. 35)
- Harness for open or short between fuel injector and fuse

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

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	F14	32	Existed
2	F18	2		31	
3	F19	2		30	
4	F20	2		29	

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-248, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning fuel injector.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

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

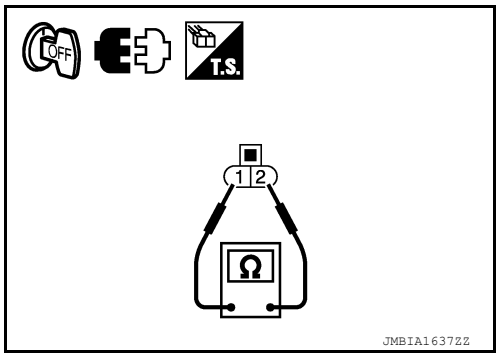
Component Inspection

INFOID:0000000006391811

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	10.4 - 15.3Ω [at 10 -60°C (50 - 140°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector.

FUEL PUMP

Description

INFOID:0000000006391812

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 start ability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.

Component Function Check

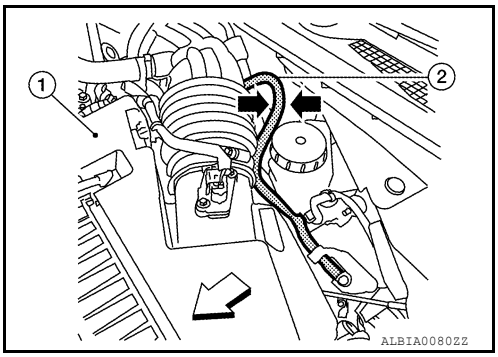
INFOID:0000000006391813

1.CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose (2) with two fingers.

1 : Air cleaner assembly

⇦ : Vehicle front



Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

Is the inspection result normal?

YES >> INSPECTION END

NO >> EC-250, "Diagnosis Procedure".

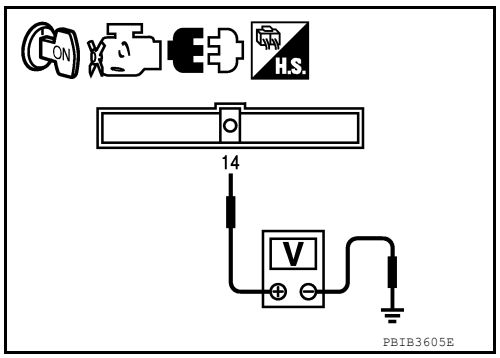
Diagnosis Procedure

INFOID:0000000006391814

1.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.

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



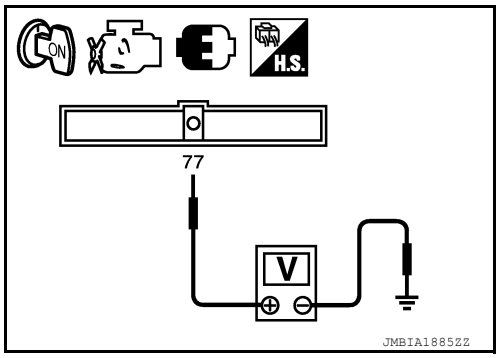
ECM		Ground	Voltage
Connector	Terminal		
F14	14	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

Check the voltage between IPDM E/R harness connector and ground.



IPDM E/R		Ground	Voltage
Connector	Terminal		
F10	77	Ground	Battery voltage

Is the inspection result normal?

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

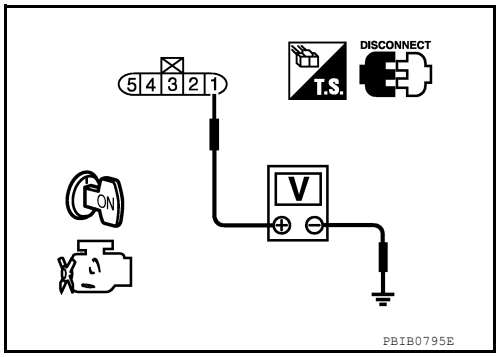
3.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R connector F10
- Harness for open or short between IPDM E/R and ECM

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

4.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect “fuel level sensor unit and fuel pump” harness connector.
4. Turn ignition switch ON.
5. Check the voltage between “fuel level sensor unit and fuel pump” harness connector and ground.



Fuel level sensor unit and fuel pump		Ground	Voltage
Connector	Terminal		
B42	1	Ground	Battery voltage should exist 1 second after ignition switch is turn ON.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 5.

5.CHECK 15A FUSE

1. Turn ignition switch OFF.
2. Disconnect 15 A fuse (No. 32) from IPDM E/R.
3. Check 15 A fuse.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace15 A fuse.

6.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

1. Disconnect IPDM E/R harness connector E18.
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	
E18	13	B42	1	Existed

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

Is the inspection result normal?

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

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E29, B10
- IPDM E/R connectors E18
- Harness for open or short between IPDM E/R and “fuel level sensor unit and fuel pump”

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

8. CHECK FUEL PUMP GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between “fuel level sensor unit and fuel pump” and ground.

Fuel level sensor unit and fuel pump		Ground	Continuity
Connector	Terminal		
B42	3	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E29 (with rear view monitor), B10 (with rear view monitor)
- IPDM E/R connector E18
- Harness for open or short between IPDM E/R and “fuel level sensor unit and fuel pump”

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

10. CHECK FUEL PUMP

Refer to EC-253, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace “fuel level sensor unit and fuel pump”.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

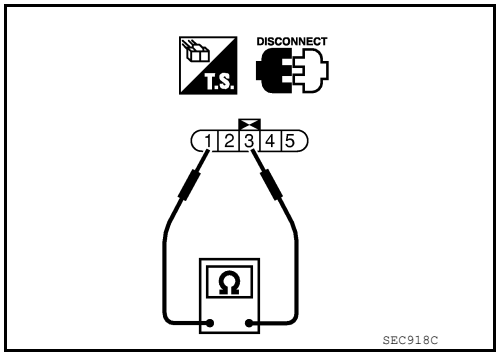
YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

Component Inspection

INFOID:0000000006391815

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?

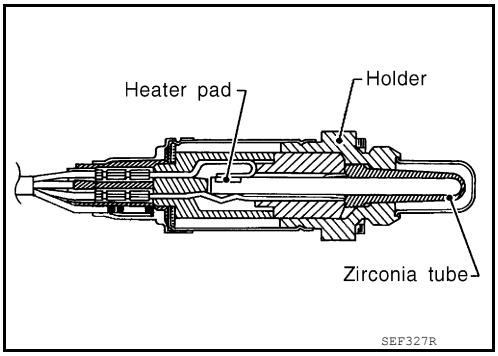
YES >> INSPECTION END
NO >> Replace “fuel level sensor unit and fuel pump”.

HO2S2

Description

INFOID:0000000006391816

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristic of the air fuel ratio (A/F) sensor 1 is 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.

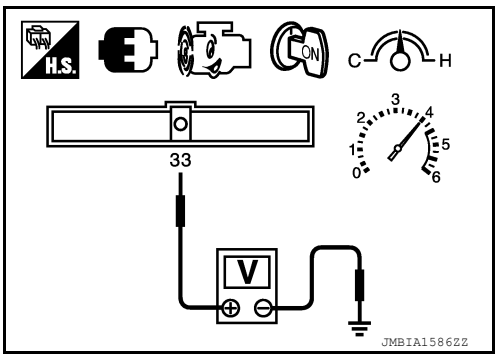


Component Function Check

INFOID:0000000006391817

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.



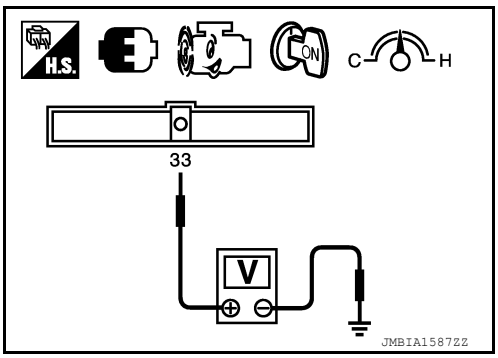
ECM		Ground	Condition	Voltage
Connector	Terminal			
F13	33 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage does not remain in the range of 0.2 - 0.4V.

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.



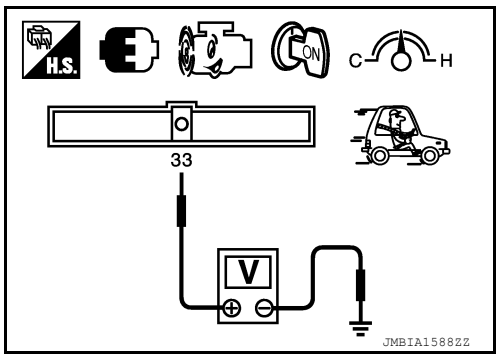
ECM		Ground	Condition	Voltage
Connector	Terminal			
F13	33 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage does not remain in the range of 0.2 - 0.4V.

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			
F13	33 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	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-255, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006391818

1.CHECK GROUND CONNECTION

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

Is the inspection result normal?

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

2.CHECK HO2S2 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 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	
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 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-256, "Component Inspection".

Is the inspection result normal?

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

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

>> INSPECTION END

6. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006391819

1. INSPECTION START

Do you have CONSULT-III?

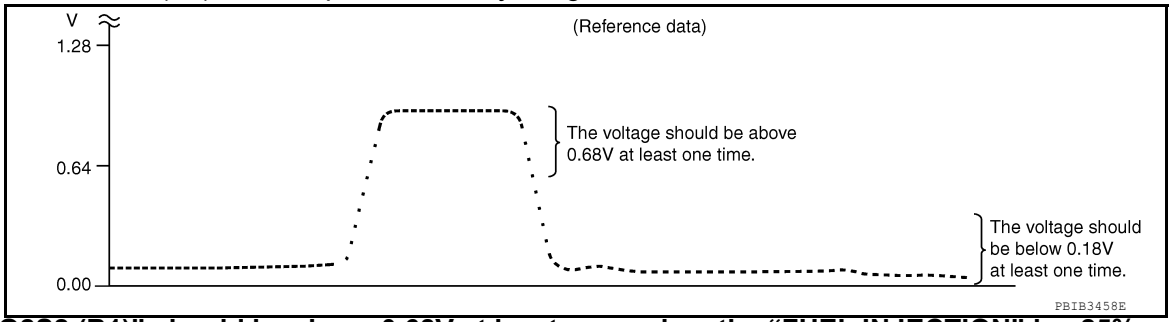
Do you have CONSULT-III?

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

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT-III

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



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

Is the inspection result normal?

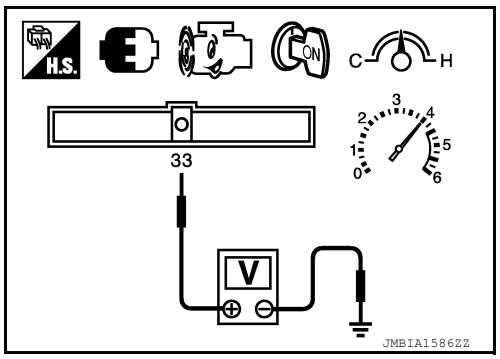
YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

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

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



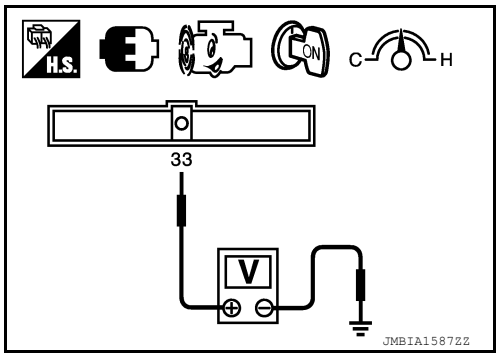
ECM		Ground	Condition	Voltage
Connector	Terminal			
F13	33 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.18V at least once during this procedure.

Is the inspection result normal?

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

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground under the following condition.



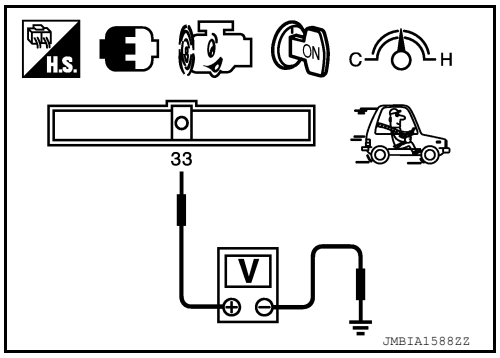
ECM		Ground	Condition	Voltage
Connector	Terminal			
F13	33 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.18V at least once during this procedure.

Is the inspection result normal?

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

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground under the following condition.



ECM		Ground	Condition	Voltage
Connector	Terminal			
F13	33 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68V at least once during this procedure. The voltage should be below 0.18V at least once during this procedure.

Is the inspection result normal?

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

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new heated oxygen sensor, clean exhaust system threads using oxygen sensor thread cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

HO2S2 HEATER

Description

INFOID:0000000006391820

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

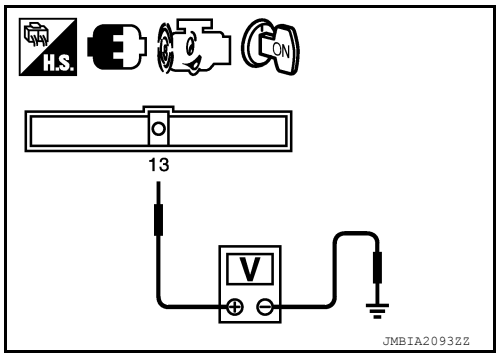
Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,600	OFF
Below 3,600 rpm after the following conditions are met. • Engine: After warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

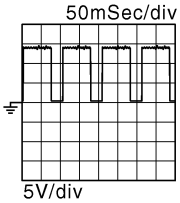
Component Function Check

INFOID:0000000006391821

1.CHECK HEATED OXYGEN SENSOR 2 HEATER 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 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 signal
Connector	Terminal			
F14	13 (HO2S2 heater signal)	Ground	At idle	Approx. 10V★ 50mSec/div  5V/div JMBIA0037GB
			Engine speed: 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-259, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006391822

1.CHECK GROUND CONNECTION

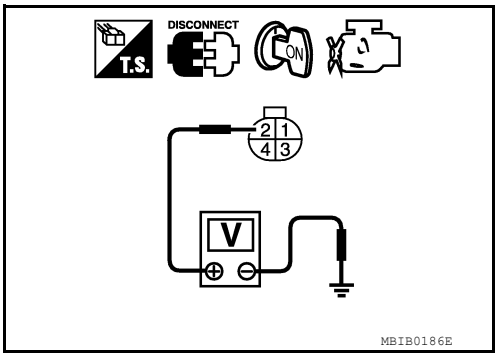
1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

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

2.CHECK HO2S2 POWER SUPPLY CIRCUIT

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



HO2S2		Ground	Voltage
Connector	Terminal		
F42	2	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

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

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

4.CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F42	3	F14	13	Existed

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

Is the inspection result normal?

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

5.CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-261, "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-42, "Intermittent Incident".

>> INSPECTION END

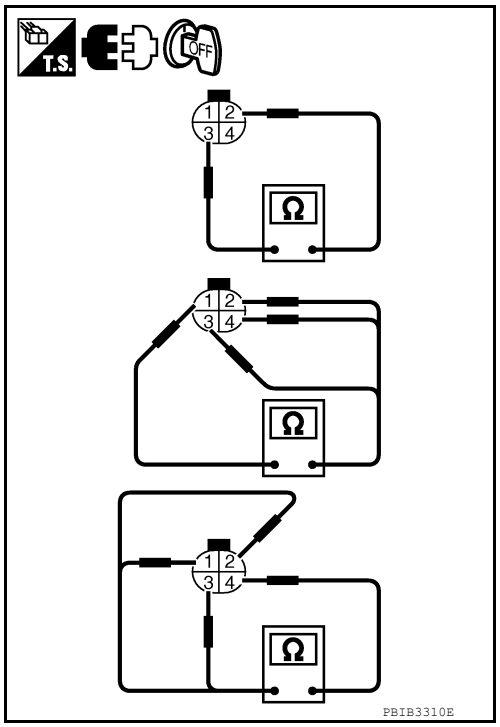
Component Inspection

INFOID:0000000006391823

1.CHECK HEATED OXYGEN SENSOR 2 HEATER

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

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



Is the inspection result normal?

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

2.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

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

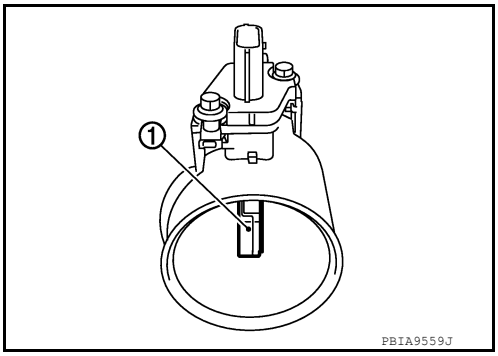
>> INSPECTION END

IAT SENSOR

Description

INFOID:0000000006391824

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.



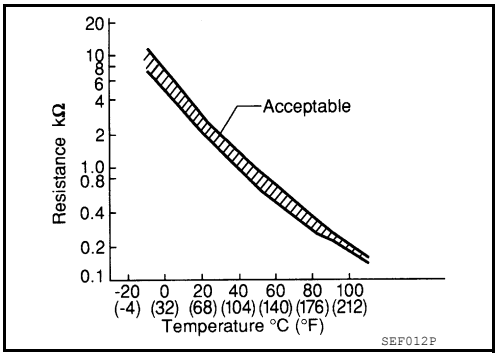
<Reference data>

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 50 (Intake air temperature sensor) and ground.

CAUTION:

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



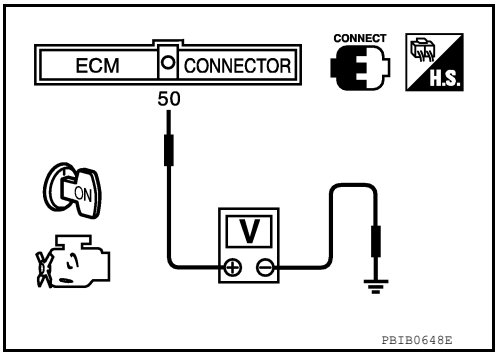
Component Function Check

INFOID:0000000006391825

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		
F13	50	Ground	Approx. 0 - 4.8V



Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-262, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006391826

1. CHECK GROUND CONNECTION

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

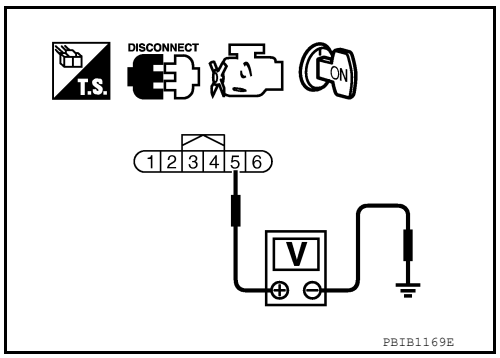
Is the inspection result normal?

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

2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (with intake air temperature sensor) harness connector.
2. Turn ignition switch ON.

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 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	
F31	6	F13	56	Existed

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

Is the inspection result normal?

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

4. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-263, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace mass air flow sensor (with intake air temperature sensor).

5. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

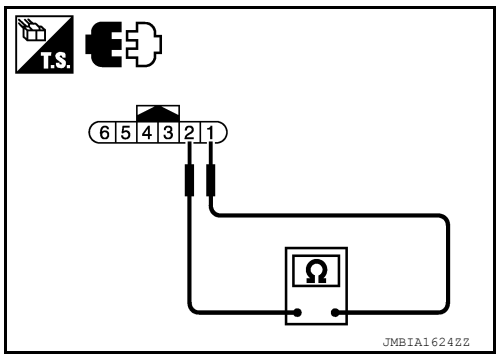
>> INSPECTION END

Component Inspection

INFOID:0000000006391827

1. CHECK INTAKE AIR TEMPERATURE SENSOR

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



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

Is the inspection result normal?

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

IGNITION SIGNAL

Description

INFOID:0000000006391828

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:0000000006391829

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-264, "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.

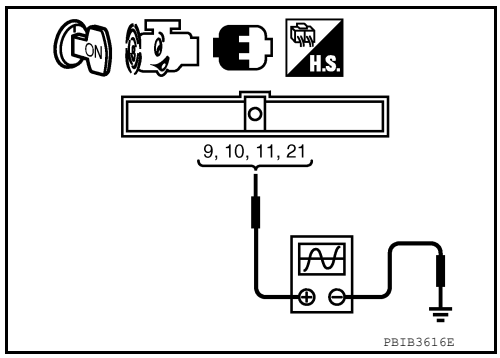
Is the inspection result normal?

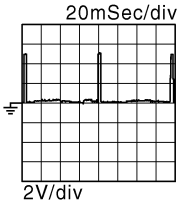
YES >> INSPECTION END
NO >> Go to EC-264, "Diagnosis Procedure".

3.IGNITION SIGNAL FUNCTION

Without CONSULT-III

1. Let engine idle.
2. Read the voltage signal between ECM harness connector and ground.



ECM		Ground	Voltage signal
Connector	Terminal		
F14	9	Ground	
	10		
	11		
	21		

NOTE:
The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-264, "Diagnosis Procedure".

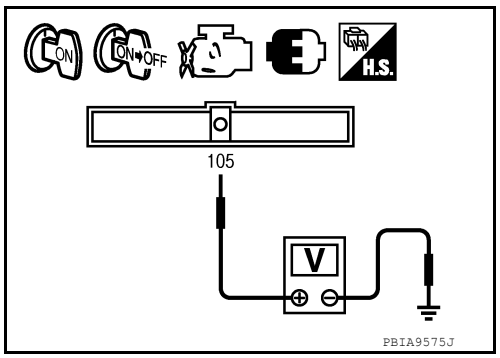
Diagnosis Procedure

INFOID:0000000006391830

1.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.

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



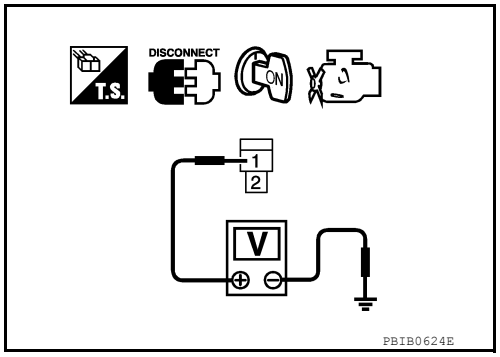
ECM		Ground	Voltage
Connector	Terminal		
E10	105	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-115, "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 F10.
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	
F10	53	F24	1	Existed

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

Is the inspection result normal?

YES >> Go to EC-115, "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		
F24	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-2

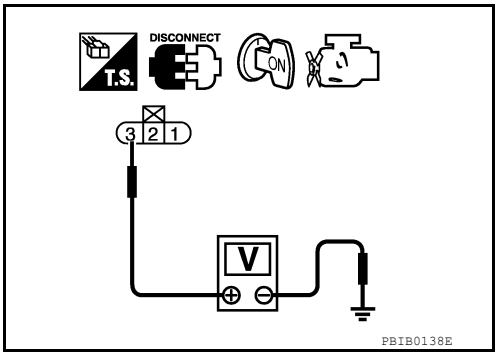
Refer to EC-268, "Component Inspection (Condenser-2)"

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace condenser.

6.CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

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	F14	11	Existed
2	F35	1		10	
3	F36	1		9	
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-267, "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-42, "Intermittent Incident".

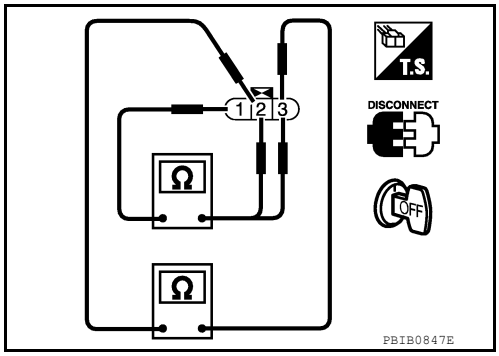
>> INSPECTION END

Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000006391831

1. CHECK IGNITION COIL WITH POWER TRANSISTOR-I

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



Terminals	Resistance Ω [at 25°C (77°F)]
1 and 2	Except 0 or ∞
1 and 3	Except 0
2 and 3	

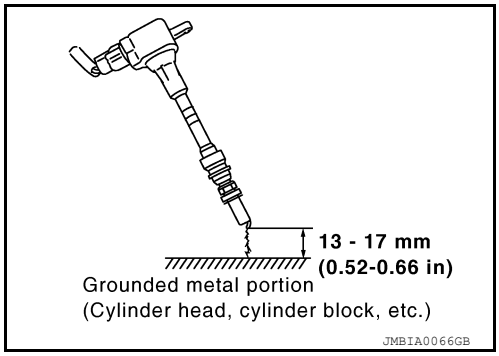
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning ignition coil with power transistor.

2. CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
4. Start engine.
5. After engine stalls, crank it two or three times to release all fuel pressure.
6. Turn ignition switch OFF.
7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
8. Remove ignition coil and spark plug of the cylinder to be checked.
9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
10. Connect spark plug and harness connector to ignition coil.
11. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm 0.66 in) is taken.**

NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning ignition coil with power transistor.

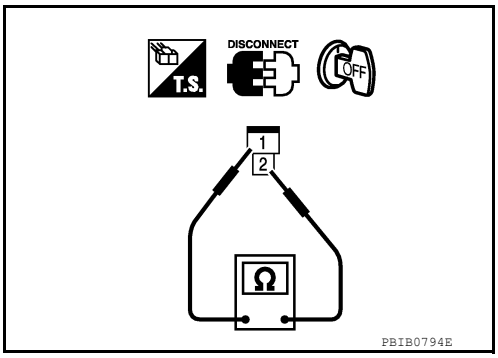
Component Inspection (Condenser-2)

INFOID:0000000006391832

1.CHECK CONDENSER-2

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

Terminals	Resistance
1 and 2	Above 1 MΩ [at 25°C (77°F)]



Is the inspection result normal?

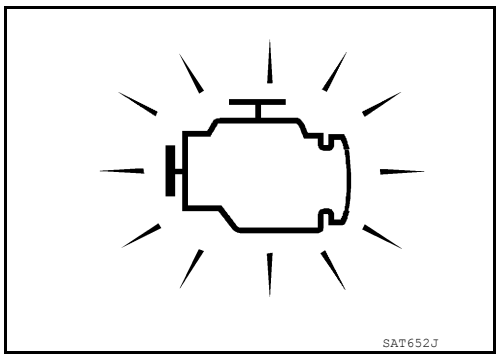
YES >> INSPECTION END
NO >> Replace condenser-2.

MALFUNCTION INDICATOR LAMP

Description

INFOID:0000000006391833

The Malfunction Indicator Lamp (MIL) is located on the combination meter.
The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
When the engine is started, the MIL should go off. If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.
For details, refer to EC-269, "Diagnosis Procedure".



Component Function Check

INFOID:0000000006391834

1.CHECK MIL FUNCTION

1. Turn ignition switch ON.
2. Make sure that MIL lights up.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-269, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006391835

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-119, "Diagnosis Procedure".

2.CHECK DTC WITH METER

Refer to MWI-28, "CONSULT Function (METER/M&A)".

Is the inspection result normal?

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

3.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

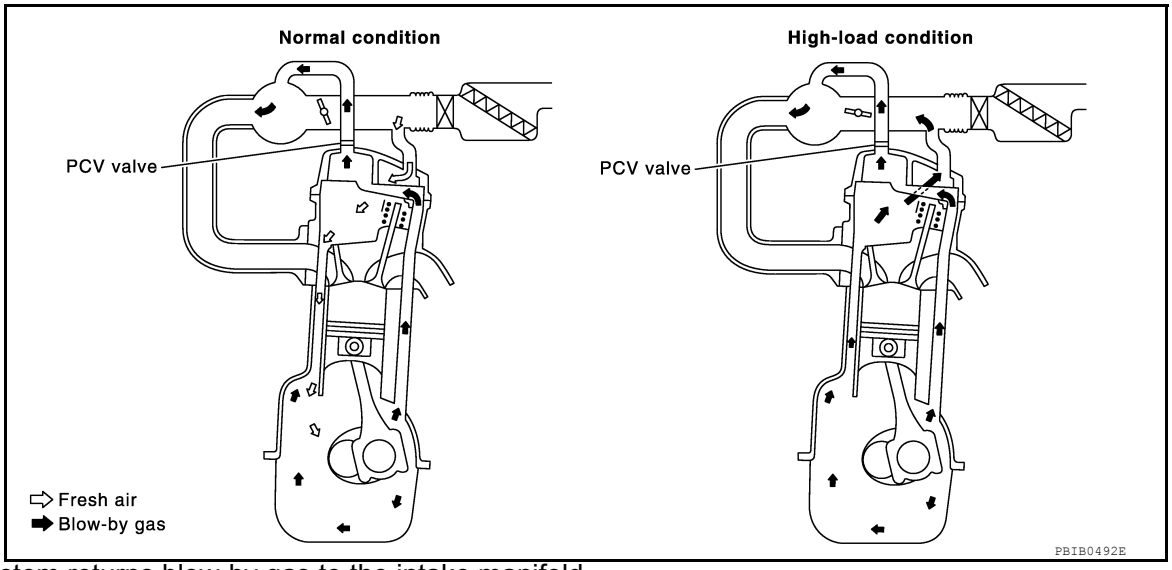
Is the inspection result normal?

YES >> Replace combination meter.
NO >> Repair or replace.

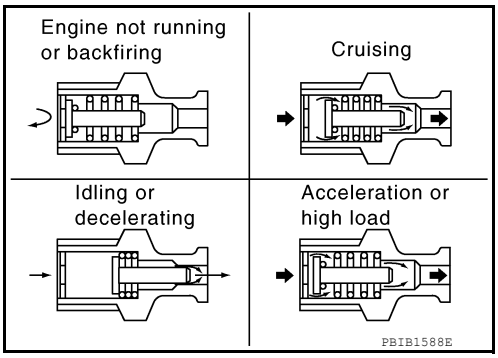
POSITIVE CRANKCASE VENTILATION

Description

INFOID:0000000006391836



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.

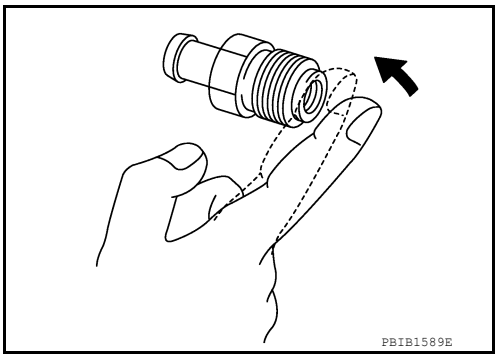


Component Inspection

INFOID:0000000006391837

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?

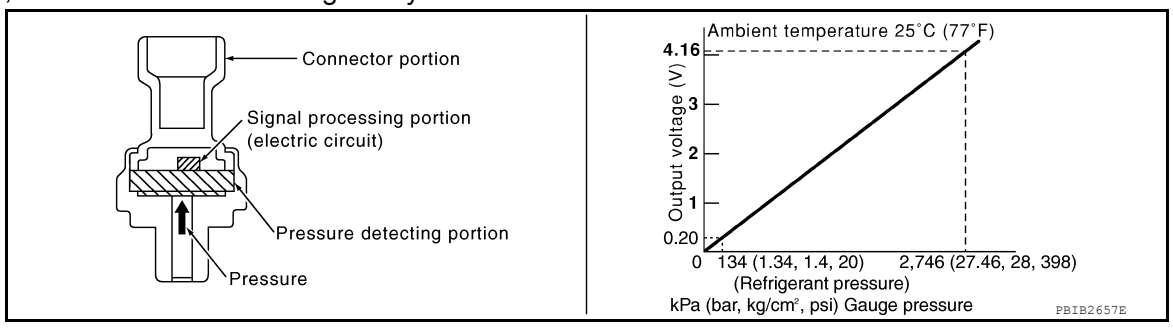
YES >> INSPECTION END
NO >> Replace PCV valve.

REFRIGERANT PRESSURE SENSOR

Description

INFOID:0000000006391838

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.

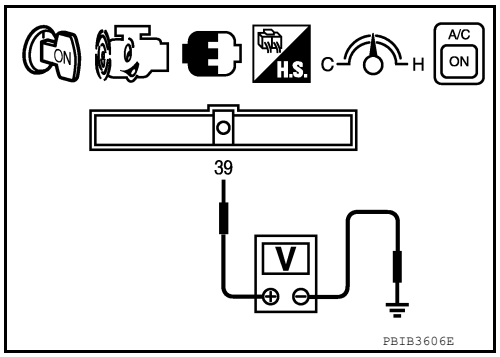


Component Function Check

INFOID:0000000006391839

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 and ground.



ECM		Ground	Voltage
Connector	Terminal		
E219	39 (Refrigerant pressure sensor signal)	Ground	1.0 - 4.0V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-271, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006391840

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 E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

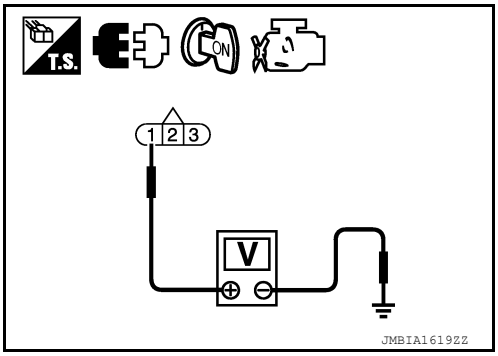
Is the inspection result normal?

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

2. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.

3. Check the voltage between refrigerant pressure sensor harness connector and ground.



Refrigerant pressure sensor		Ground	Voltage
Connector	Terminal		
E219	1	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 F1, E3
- Harness for open or short between ECM and refrigerant pressure sensor

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

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	
E219	3	F13	40	Existed

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

Is the inspection result normal?

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

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F1, E3
- Harness for open or short between ECM and refrigerant pressure sensor

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

6. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and refrigerant pressure sensor harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E219	2	F13	39	Existed

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

Is the inspection result normal?

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

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F1, E3
- Harness for open or short between ECM and refrigerant pressure sensor

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

8. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.
NO >> Repair or replace.

ECU DIAGNOSIS INFORMATION

ECM

Reference Value

INFOID:0000000006391841

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-108, "Diagnosis Procedure".		
B/FUEL SCHDL	See EC-108, "Diagnosis Procedure".		
A/F ALPHA-B1	See EC-108, "Diagnosis Procedure".		
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
HO2S2 (B1)	• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		0 - 0.3V ←→ Approx. 0.6 - 1.0V
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	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.2 - 4.8V
ACCEL SEN 2*1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.2 - 4.8V
TP SEN 1-B1	• Ignition switch: ON (Engine stopped) • Shift lever: D (CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
TP SEN 2-B1*1	• Ignition switch: ON (Engine stopped) • Shift lever: D (CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
INT/A TEMP SE	• Ignition switch: ON		Indicates intake air temperature
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON

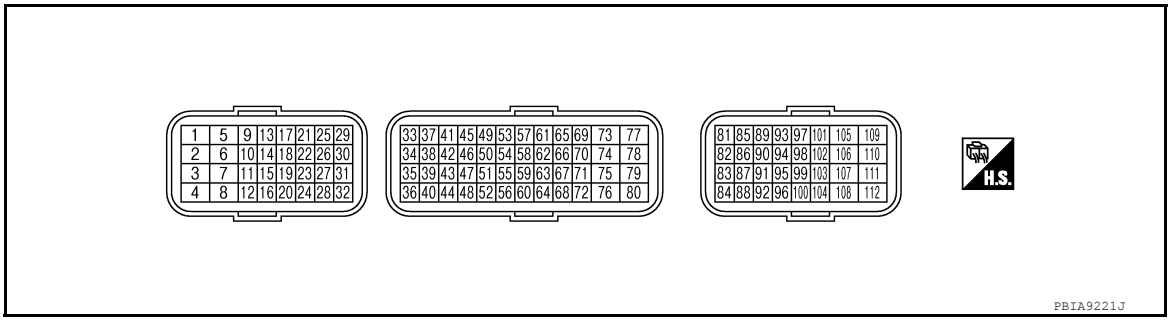
Monitor Item	Condition		Values/Status
P/N POSI SW	• Ignition switch: ON	Shift lever: P or N (CVT), Neutral (M/T)	ON
		Selector lever: Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON
LOAD SIGNAL	• Ignition 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: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	• Engine: After warming up • Shift lever: P or N (CVT), 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 (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0%
		2,000 rpm	20% - 90%
INT/V TIM(B1)	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	−5° - 5°CA
		2,000 rpm	Approx. 0° - 20°CA
INT/V SOL(B1)	• Engine: After warming up • Shift lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0%
		2,000 rpm	Approx. 0% - 60%
AIR COND RLY	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	• For 1 seconds after turning ignition switch: ON • Engine running or cranking		ON
	• Except above		OFF
VENT CONT/V	• Ignition switch: ON		OFF
THRTL RELAY	• Ignition switch: ON		ON

Monitor Item	Condition		Values/Status
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 between 98°C (208°F) and 99°C (210°F) or more	LOW
		Engine coolant temperature between 100°C (212°F) or more	HIGH
	• Engine: After warming up, idle the engine • Air conditioner switch: ON • Refrigerant pressure is less than 1,280 kPa (12.80 bar, 13.05 kg/cm^2, 185.6 psi)	Engine coolant temperature is 97°C (207°F) or less	ON
		Engine coolant temperature between 97°C (207°F) and 99°C (210°F) or more	MID
		Engine coolant temperature between 100°C (212°F) or more	HIGH
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
I/P PULLY SPD	• Vehicle speed: More than 20 km/h (12 MPH)		Almost the same speed as the tachometer indication
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 MIL has turned ON.	0 - 65,535 km (0 - 40,723 miles)
A/F S1 HTR (B1)	• Engine: After warming up, idle the engine (More than 140 seconds after starting engine.)		4 - 100%
AC PRESS SEN	• Engine: Idle • Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0V
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication
SET VHCL SPD	• Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
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 (CVT) • Brake pedal and clutch pedal: Fully released (M/T)	ON
		• Brake pedal: Slightly depressed (CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	OFF

Monitor Item	Condition		Values/Status
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
A/F ADJ B1	• Engine: running		–0.330 - 0.330

*1: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

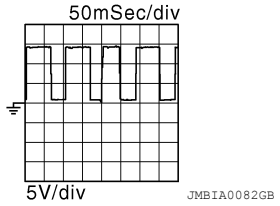
TERMINAL LAYOUT

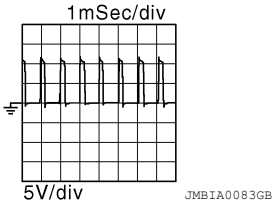
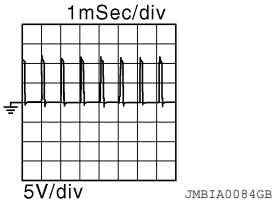
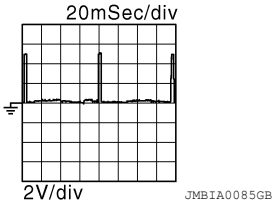
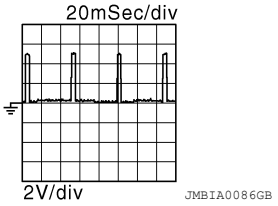
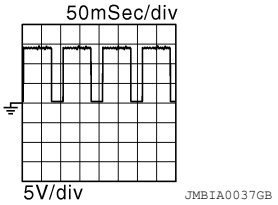


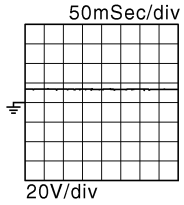
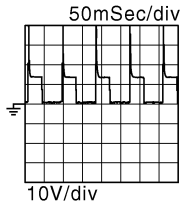
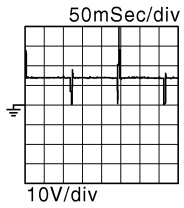
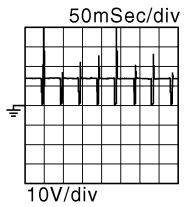
PHYSICAL VALUES

NOTE:
- ECM is located 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.

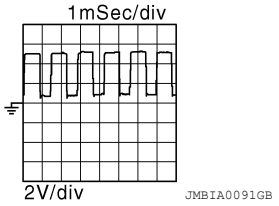
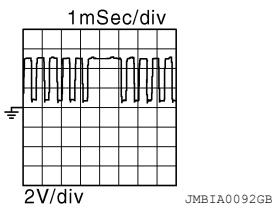
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

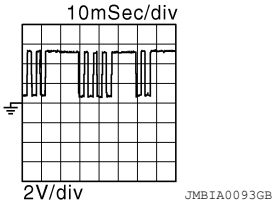
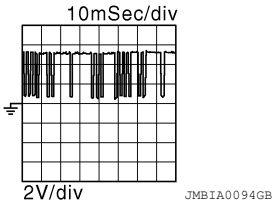
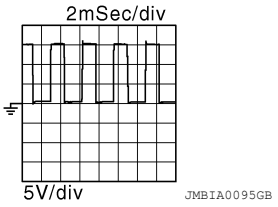
Terminal No. +	Terminal No. –	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
2	Ground	L	Throttle control motor power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
4	Ground	LG	A/F sensor 1 heater	Output	[Engine is running] • Warm-up condition • Idle speed	2.9 - 8.8V★ 

Terminal No. +	Terminal No. –	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
5	Ground	GR	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	0 - 14V★ 
6	Ground	BR	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	0 - 14V★ 
9 10 11 21	Ground	O LG Y BR	Ignition signal No. 3 Ignition signal No. 2 Ignition signal No. 1 Ignition signal No. 4	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.1V★ 
					[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 - 0.2V★ 
12 16	Ground	GR B	ECM ground	—	[Engine is running] • Idle speed	Body ground
13	Ground	Y	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★ 
					[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
14	Ground	B/R	Fuel pump relay	Output	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.0V
					[Engine is running] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)

Terminal No. +	Terminal No. –	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
15	Ground	R	Throttle control motor relay	Output	[Ignition switch: ON → OFF]	0 - 1.0V ↓ BATTERY VOLTAGE (11 - 14V) ↓ 0V
					[Ignition switch: ON]	0 - 1.0V
24	Ground	SB	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)
25	Ground	P	EVAP canister purge volume control solenoid valve	Output	[Engine is running] • Idle speed	BATTERY VOLTAGE (11 - 14V)★ 
					[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.)	BATTERY VOLTAGE (11 - 14V)★ 
29 30 31 32	Ground	LG W O V	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)★ 
					[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★ 

Terminal No.		Wire color	Description		Condition	Value (Approx.)
+	–		Signal name	Input/ Output		
33	Ground	BR	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
35	Ground	B	Sensor ground (Heated oxygen sensor 2)	—	[Engine is running] • Warm-up condition • Idle speed	0V
36	Ground	G	Sensor ground (Throttle position sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
37	Ground	B	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
					[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
38	Ground	R	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
					[Ignition switch: ON] • Engine stopped • Shift lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
39	Ground	L	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
40	Ground	GR	Sensor ground (Refrigerant pressure sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
41	Ground	SB	Power steering pressure sensor	Output	[Engine is running] • Steering wheel: Being turned	0.5 - 4.0V
					[Engine is running] • Steering wheel: Not being turned	0.4 - 0.8V
42	Ground	Y	Battery current sensor	Input	[Engine is running]	0 - 4.8V
44	Ground	B	Sensor ground (Battery current sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
45	Ground	G	A/F sensor 1	Input	[Ignition switch: ON]	2.2V
46	Ground	P	Engine coolant temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with engine coolant temperature.
47	Ground	W	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5V

Terminal No. +	Terminal No. –	Wire color	Description Signal name	Description Input/ Output	Condition	Value (Approx.)
48	Ground	LG	Sensor ground (Power steering pressure sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
49	Ground	L	A/F sensor 1	Input	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	1.8V Output voltage varies with air fuel ratio.
50	Ground	O	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with intake air temperature.
51	Ground	BR	Sensor power supply (Battery current sensor)	—	[Ignition switch: ON]	5V
52	Ground	SB	Sensor ground (Engine coolant temperature sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
55	Ground	Y	Sensor power supply (Power steering pressure sensor)	—	[Ignition switch: ON]	5V
56	Ground	R	Sensor ground (Mass air flow sensor, Intake air temperature sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
58	Ground	GR	Mass air flow sensor	Input	[Engine is running] • Warm-up condition • Idle speed	0.9 - 1.1V
					[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	1.4 - 1.7V
59	Ground	O	Sensor power supply [Camshaft position sensor (PHASE)]	—	[Ignition switch: ON]	5V
60	Ground	W	Sensor ground [Crankshaft position sensor (POS)]	—	[Engine is running] • Warm-up condition • Idle speed	0V
61	Ground	W	Knock sensor	Input	[Engine is running] • Idle speed	2.5V
64	Ground	L	Sensor ground [Camshaft position sensor (PHASE)]	—	[Engine is running] • Warm-up condition • Idle speed	0V
65	Ground	R	Crankshaft position sensor (POS)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	3.0V★ 
					[Engine is running] • Engine speed: 2,000 rpm	3.0V★ 

Terminal No. +	Terminal No. –	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
67	Ground	—	Sensor ground (Knock sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
69	Ground	Y	Camshaft position sensor (PHASE)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 4.0★ 
					[Engine is running] • Engine speed is 2,000 rpm	1.0 - 4.0★ 
72	Ground	V	Sensor power supply (Refrigerant pressure sensor)	—	[Ignition switch: ON]	5V
76	Ground	L	Sensor power supply [Crankshaft position sensor (POS)]	—	[Ignition switch: ON]	5V
77	Ground	LG	Power supply for ECM (Back-up)	Input	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14V)
78	Ground	P	Intake valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	0V
					[Engine is running] • Warm-up condition • Engine speed: 2,000rpm	7 - 10V★ 
81	Ground	W	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.5 - 1.0V
					[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	4.2 - 4.8V
82	Ground	O	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.25 - 0.5V
					[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	2.0 - 2.5V

Terminal No. +	Terminal No. –	Wire color	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
83	Ground	GR	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5V
84	Ground	B	Sensor ground (Accelerator pedal position sensor 1)	—	[Engine is running] • Warm-up condition • Idle speed	0V
85	Ground	G/Y	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
87	Ground	BR	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5V
88	—	O	Data link connector	Input/ Output	—	—
92	Ground	R	Sensor ground (ASCD steering switch)	—	[Engine is running] • Warm-up condition • Idle speed	0V
93	Ground	Y	Ignition switch	Input	[Ignition switch: OFF]	0V
					[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
94	—	GR	Engine speed signal output	Output	—	—
95	Ground	Y	Fuel tank temperature sensor	Input	[Engine is running]	0 - 4.8V Output voltage varies with fuel tank temperature.
97	—	P	CAN communication line	Input/ Output	—	—
98	—	L	CAN communication line	Input/ Output	—	—
100	Ground	G	Sensor ground (Accelerator pedal position sensor 2)	—	[Engine is running] • Warm-up condition • Idle speed	0V
102	Ground	R/B	PNP signal	Input	[Ignition switch: ON] • Shift lever: P or N (CVT), Neutral (M/T)	BATTERY VOLTAGE (11 - 14V)
					[Ignition switch: ON] • Shift lever: Except above	0V
104	Ground	P	Sensor ground (Fuel tank temperature sensor)	—	[Engine is running] • Warm-up condition • Idle speed	0V
105	Ground	V	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

Terminal No.		Wire color	Description		Condition	Value (Approx.)
+	–		Signal name	Input/ Output		
106	Ground	SB	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0V
					[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
107 108	Ground	B B	ECM ground	—	[Engine is running] • Idle speed	Body ground
109	Ground	W	EVAP canister vent control valve	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
110	Ground	G/B	ASCD brake switch	Input	[Ignition switch: ON] • Brake pedal: Slightly depressed (CVT) • Brake pedal and clutch pedal: Slightly depressed (M/T)	0V
					[Ignition switch: ON] • Brake pedal: Fully released (CVT) • Brake pedal and/or clutch pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)
111 112	Ground	B B	ECM ground	—	[Engine is running] • Idle speed	Body ground

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Fail Safe

INFOID:0000000006391843

NON DTC RELATED ITEM

Engine operating condition in fail-safe mode	Detected items	Remarks	Reference page
Engine speed will not rise more than 2,500 rpm due to the fuel cut	Malfunction indicator lamp circuit	When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system. Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function. The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.	EC-269

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.

DTC No.	Detected items	Engine operating condition in fail-safe mode
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the following condition. CONSULT-III displays the engine coolant temperature decided by ECM.
		Condition: Just as ignition switch is turned ON or START — Engine coolant temperature decided (CONSULT-III display): 40°C (104°F)
		Condition: Approx. 4 minutes or more after engine starting — Engine coolant temperature decided (CONSULT-III display): 80°C (176°F)
		Condition: Except as shown above — Engine coolant temperature decided (CONSULT-III display): 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	The cooling fan operates (High) while engine is running.
P0643	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P0605	ECM	(When ECM calculation function is malfunctioning:) ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. ECM deactivates ASCD operation.
P1805	Brake switch	ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.
		Vehicle condition: When engine is idling — Driving condition: Normal
		Vehicle condition: When accelerating — Driving condition: Poor acceleration
P2100 P2103	Throttle control motor relay	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P2101	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P2118	Throttle control motor	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P2119	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
		(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P (CVT), Neutral (M/T) position, and engine speed will not exceed 1,000 rpm or more.
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Inspection Priority Chart

INFOID:0000000006391844

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) • P0500 Vehicle speed sensor • P0643 Sensor power supply • P0605 ECM • P0850 Park/neutral position (PNP) switch • P1610 - P1615 NATS • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	• P0075 Intake valve timing control solenoid valve • P0550 Power steering pressure sensor • P0603 ECM power supply • P1217 Engine over temperature (OVERHEAT) • P1805 Brake switch • P2101 Electric throttle control function • P2118 Throttle control motor • P2100 P2103 Throttle control motor relay
3	• P0011 Intake valve timing control • P1564 ASCD steering switch • P1572 ASCD brake switch • P1574 ASCD vehicle speed sensor • P1715 Input speed sensor • P2119 Electric throttle control actuator

DTC Index

INFOID:0000000006391845

×:Applicable —: Not applicable

DTC*1		Items (CONSULT-III screen terms)	Trip	MIL	Reference page
CONSULT-III	ECM*2				
U1000	1000*3	CAN COMM CIRCUIT	2	—	EC-119
U1001	1001*3	CAN COMM CIRCUIT	2	—	EC-119
U1010	1010	CONTROL UNIT(CAN)	2	—	EC-120
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	**—**	**—**	**—**
P0011	0011	INT/V TIM CONT-B1	2	—	EC-121
P0075	0075	INT/V TIM V/CIR-B1	2	×	EC-125
P0102	0102	MAF SEN/CIRCUIT-B1	1	×	EC-128
P0103	0103	MAF SEN/CIRCUIT-B1	1	×	EC-128
P0117	0117	ECT SEN/CIRC	2	×	EC-133
P0118	0118	ECT SEN/CIRC	2	×	EC-133
P0122	0122	TP SEN 2/CIRC-B1	1	×	EC-136
P0123	0123	TP SEN 2/CIRC-B1	1	×	EC-136
P0222	0222	TP SEN 1/CIRC-B1	1	×	EC-139
P0223	0223	TP SEN 1/CIRC-B1	1	×	EC-139

DTC*1		Items (CONSULT-III screen terms)	Trip	MIL	Reference page
CONSULT-III	ECM*2				
P0327	0327	KNOCK SEN/CIRC-B1	2	—	EC-142
P0328	0328	KNOCK SEN/CIRC-B1	2	—	EC-142
P0335	0335	CKP SEN/CIRCUIT	2	×	EC-144
P0340	0340	CMP SEN/CIRC-B1	2	×	EC-148
P0500	0500	VEH SPEED SEN A	2	×	EC-152
P0550	0550	PW ST P SEN/CIRC	2	—	EC-154
P0603	0603	ECM BACK UP/CIRCUIT	2	×	EC-157
P0605	0605	ECM	1 or 2	× or —	EC-159
P0643	0643	SENSOR POWER/CIRC	1	×	EC-161
P0850	0850	P-N POS SW/CIRCUIT	2	×	EC-164
P1212	1212	TCS/CIRC	2	—	EC-167
P1217	1217	ENG OVER TEMP	1	×	EC-168
P1225	1225	CTP LEARNING-B1	2	—	EC-172
P1226	1226	CTP LEARNING-B1	2	—	EC-174
P1564	1564	ASCD SW	1	—	EC-176
P1572	1572	ASCD BRAKE SW	1	—	EC-179
P1574	1574	ASCD VHL SPD SEN	1	—	EC-190
P1610	1610	LOCK MODE	2	—	SEC-281
P1611	1611	ID DISCORD, IMMU-ECM	2	—	SEC-286
P1612	1612	CHAIN OF ECM-IMMU	2	—	SEC-287
P1615	1615	DIFFERENCE OF KEY	2	—	SEC-285
P1715	1715	IN PULY SPEED	2	—	EC-192
P1805	1805	BRAKE SW/CIRCUIT	1	×	EC-193
P2100	2100	ETC MOT PWR-B1	1	×	EC-198
P2101	2101	ETC FNCTN/CIRC-B1	1	×	EC-200
P2103	2103	ETC MOT PWR	1	×	EC-198
P2118	2118	ETC MOT-B1	1	×	EC-204
P2119	2119	ETC ACTR-B1	1	×	EC-206
P2122	2122	APP SEN 1/CIRC	1	×	EC-208
P2123	2123	APP SEN 1/CIRC	1	×	EC-208
P2127	2127	APP SEN 2/CIRC	1	×	EC-211
P2128	2128	APP SEN 2/CIRC	1	×	EC-211
P2135	2135	TP SENSOR-B1	1	×	EC-215
P2138	2138	APP SENSOR	1	×	EC-218

*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.

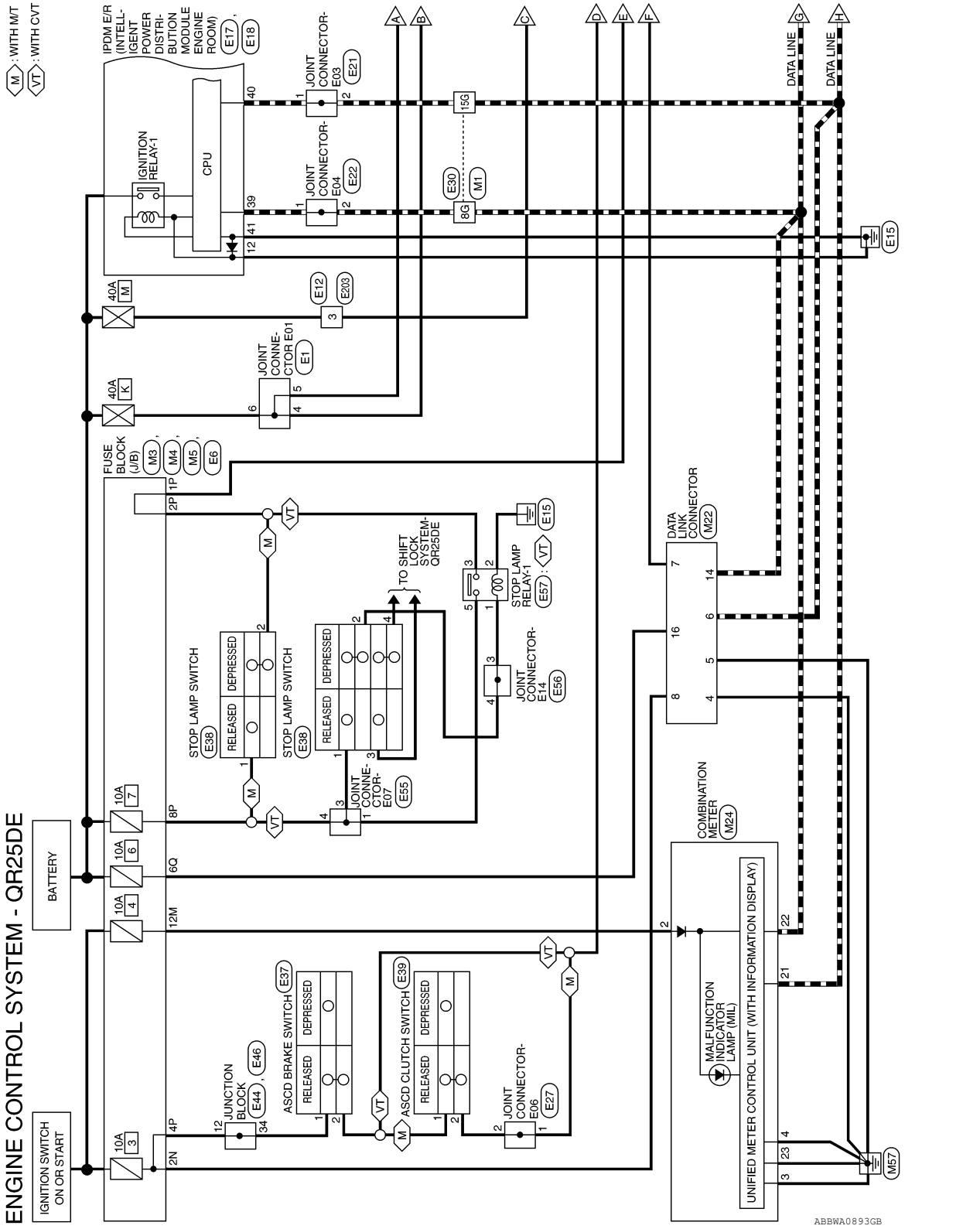
*3: The troubleshooting for this DTC needs CONSULT-III.

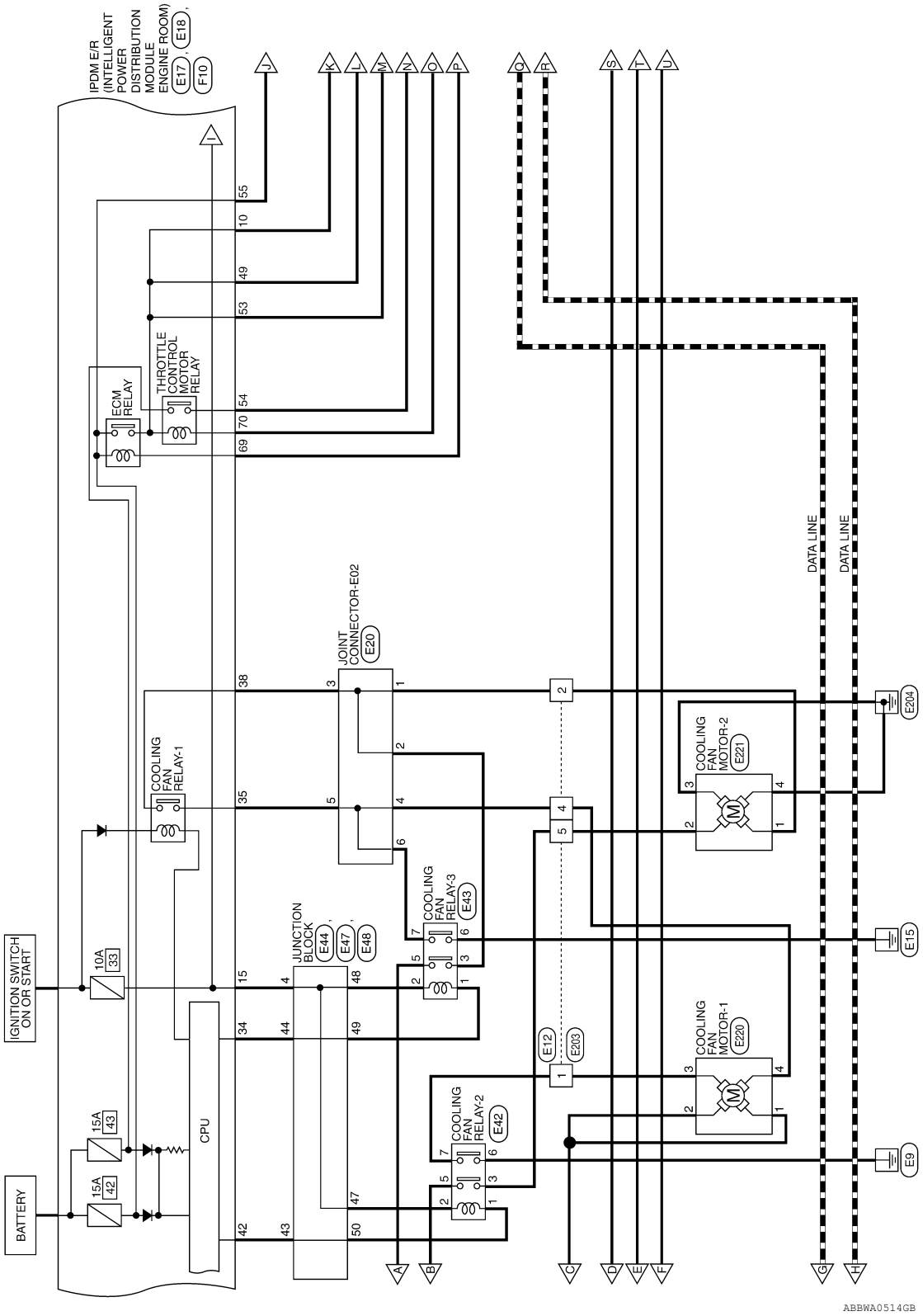
WIRING DIAGRAM

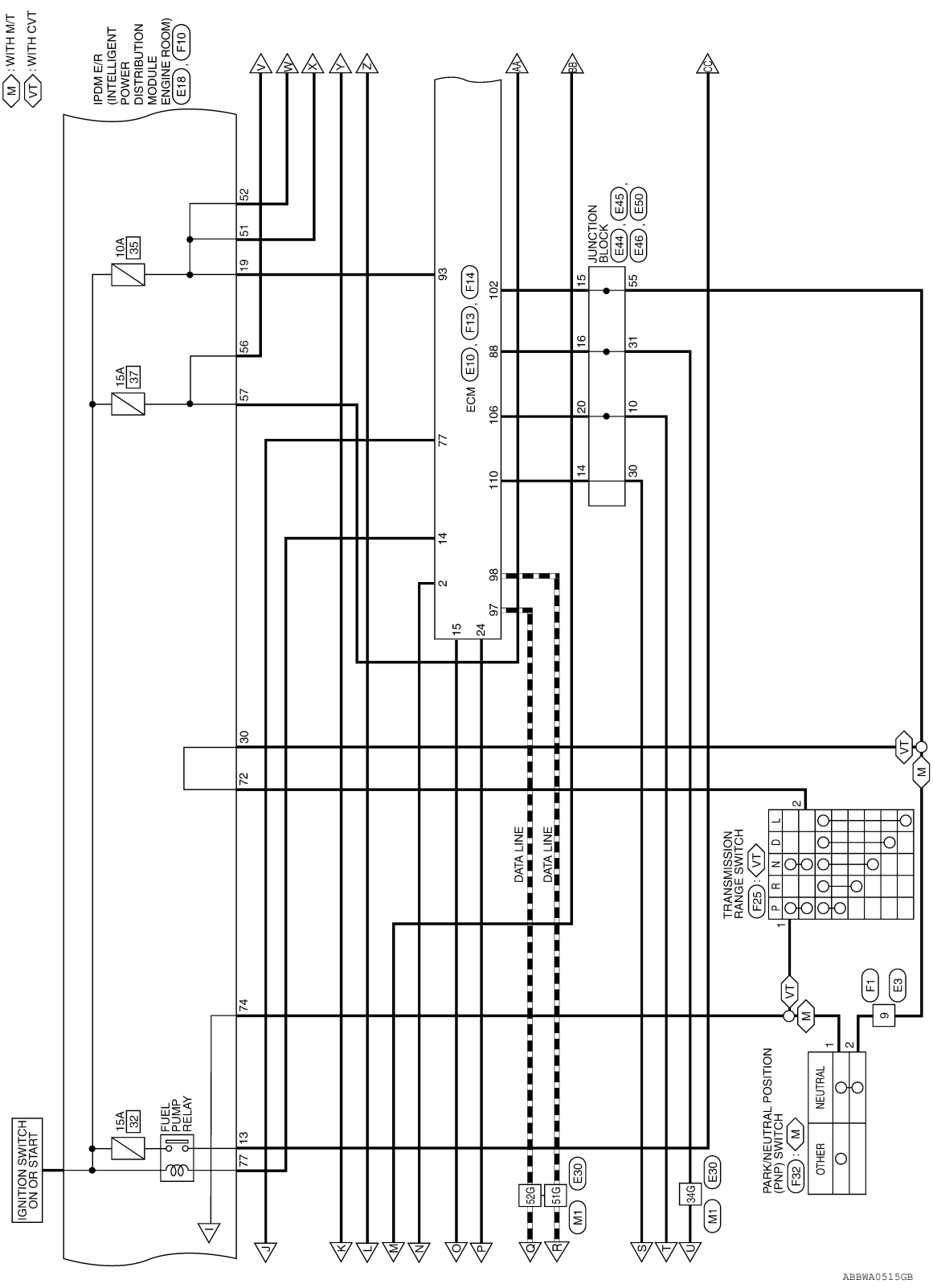
ENGINE CONTROL SYSTEM

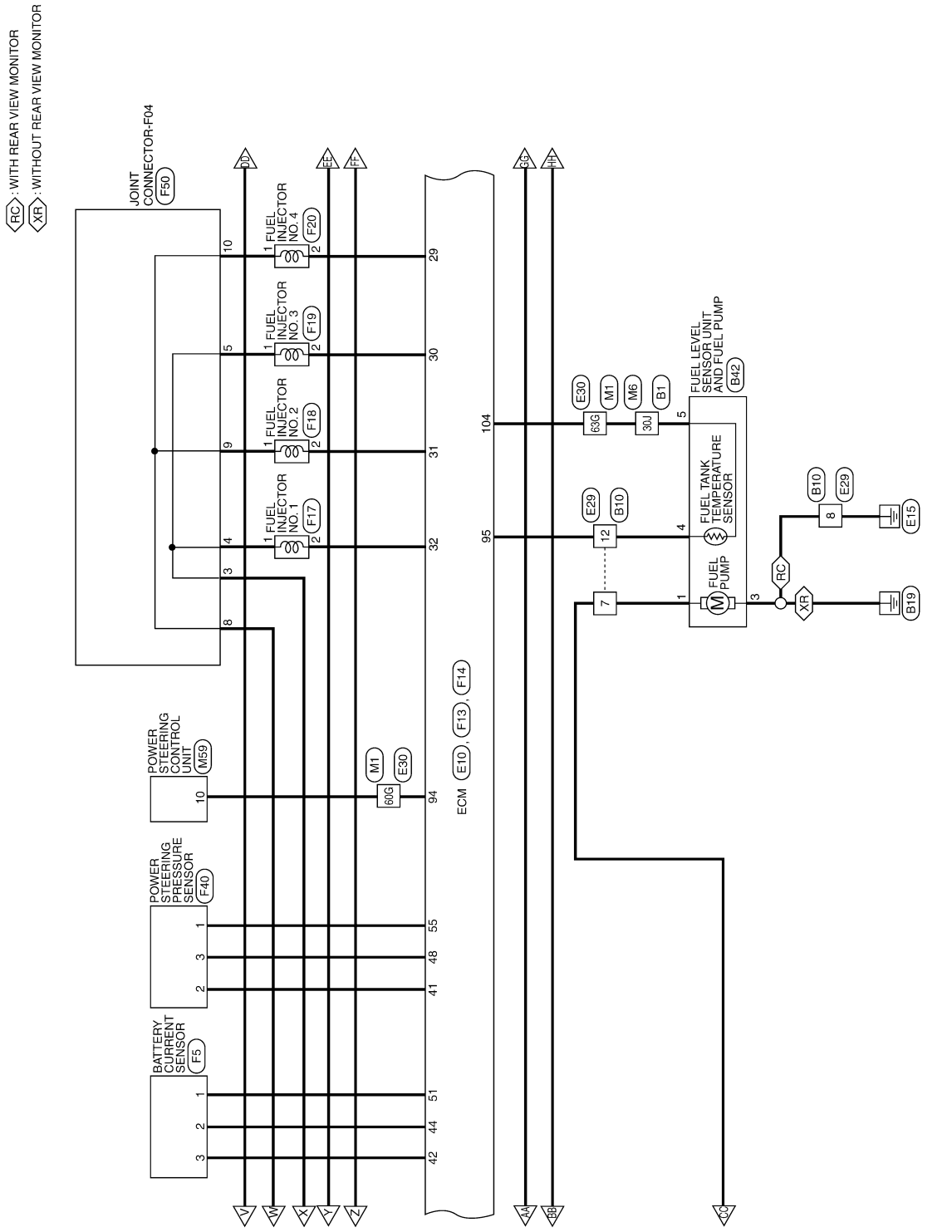
Wiring Diagram — ENGINE CONTROL SYSTEM —

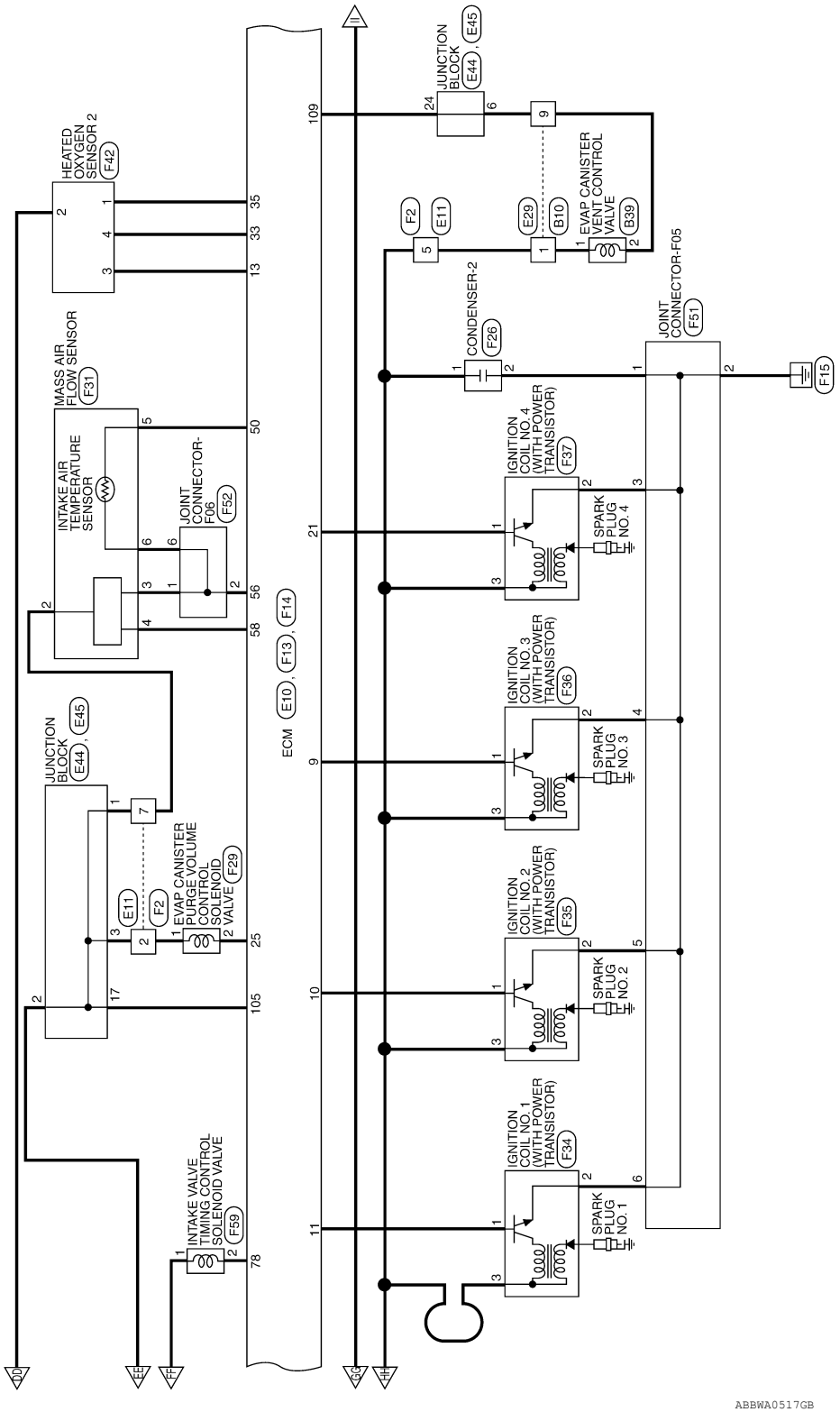
INFOID:0000000006391842

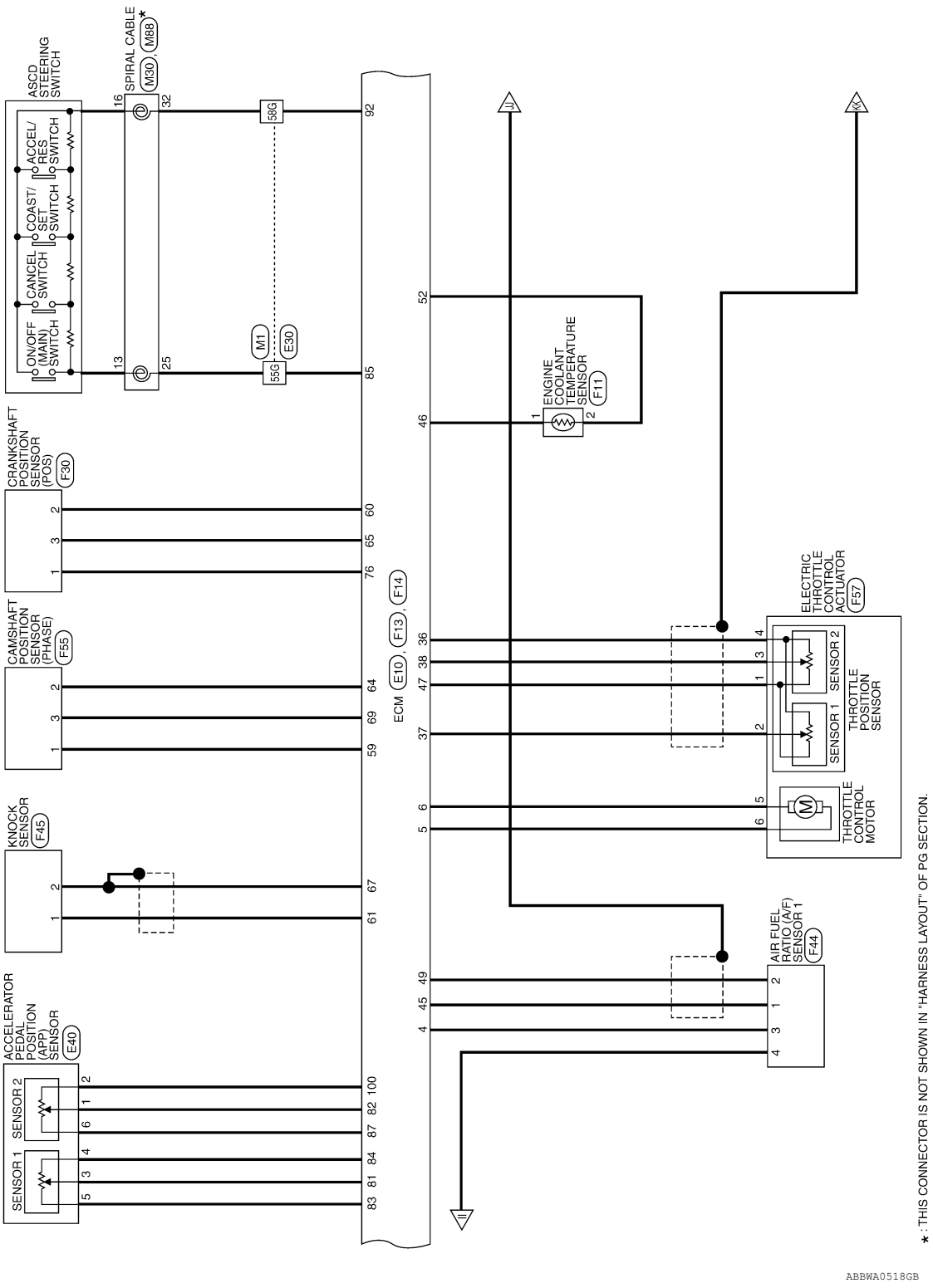


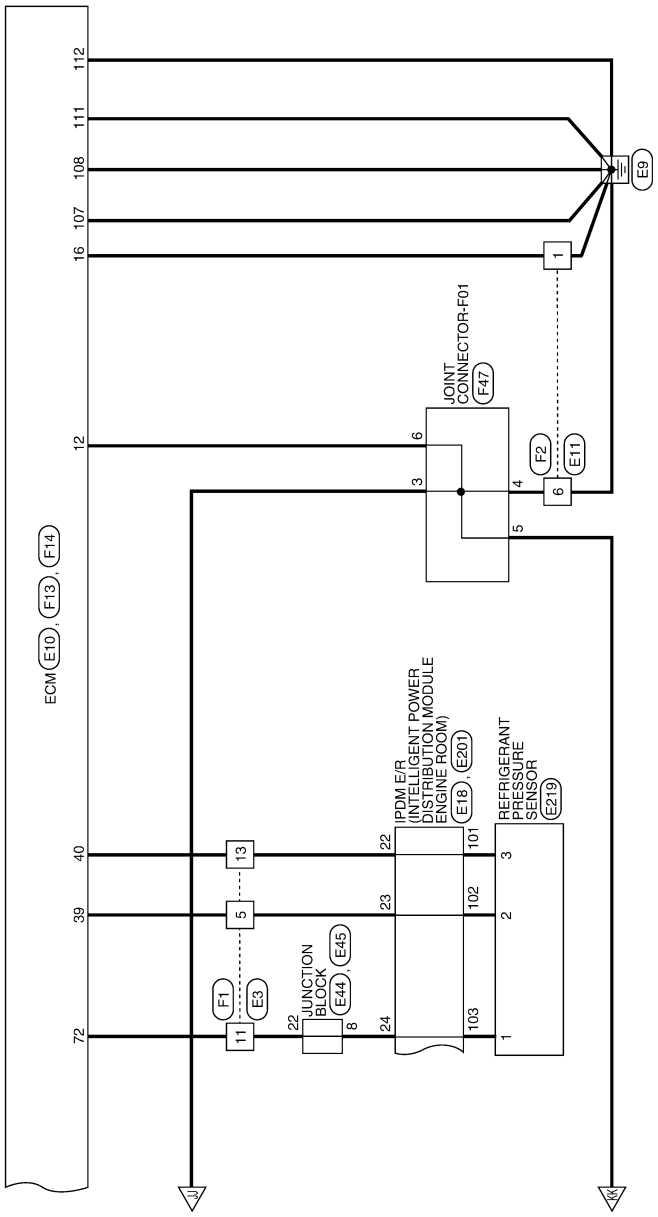

IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) E17, E18, F10
ECM RELAY
THROTTLE CONTROL MOTOR RELAY
JOINT CONNECTOR-E02 E20
COOLING FAN RELAY-1
COOLING FAN RELAY-2 E42
COOLING FAN RELAY-3 E43
JUNCTION BLOCK E44, E47, E48
COOLING FAN MOTOR-1 E220
COOLING FAN MOTOR-2 E221
DATA LINE
DATA LINE
IGNITION SWITCH ON OR START
BATTERY
10A 33
15A 43
15A 42
CPU
E12
E203
E204
E15
E9
ABBWA0514GB


M : WITH M/T
VT : WITH CVT
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) E18, F10
10A 35
15A 37
15A 32
FUEL PUMP RELAY
IGNITION SWITCH ON OR START
ECM E10, F13, F14
JUNCTION BLOCK E44, E46, E45, E50
DATA LINE
DATA LINE
TRANSMISSION RANGE SWITCH F25 : VT
P R N D L
PARK/NEUTRAL POSITION (PNP) SWITCH F32 : M
NEUTRAL
OTHER
F1
E3
52G
51G
34G
M1
E30
ABBWA0515GB


RC : WITH REAR VIEW MONITOR
XR : WITHOUT REAR VIEW MONITOR
JOINT CONNECTOR-F04 F50
FUEL INJECTOR NO.4 F20
FUEL INJECTOR NO.3 F19
FUEL INJECTOR NO.2 F18
FUEL INJECTOR NO.1 F17
FUEL LEVEL SENSOR UNIT AND FUEL PUMP B42
FUEL TANK TEMPERATURE SENSOR
FUEL PUMP
POWER STEERING CONTROL UNIT M59
POWER STEERING PRESSURE SENSOR F40
BATTERY CURRENT SENSOR F5
ECM E10, F13, F14
M1 60G E30
E30 63G M1 M6 B1
E29 B10
B10 E29
E15
B19
ABBWA0516GB


HEATED OXYGEN SENSOR 2 F42
MASS AIR FLOW SENSOR F31
INTAKE AIR TEMPERATURE SENSOR
JOINT CONNECTOR-F06 F52
JUNCTION BLOCK E44, E45
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE F29
INTAKE VALVE TIMING CONTROL SOLENOID VALVE F59
ECM E10, F13, F14
JUNCTION BLOCK E44, E45
EVAP CANISTER VENT CONTROL VALVE B39
CONDENSER-2 F26
JOINT CONNECTOR-F05 F51
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
F15
ABBWA0517GB


ASCD STEERING SWITCH
ON/OFF (MAIN) SWITCH
CANCEL SWITCH
COAST/ SET SWITCH
ACCEL/ RES SWITCH
SPIRAL CABLE
M88
M30
16
32
13
25
58G
M1
E30
55G
92
85
52
46
ENGINE COOLANT TEMPERATURE SENSOR
F11
CRANKSHAFT POSITION SENSOR (POS)
F30
60
65
76
CAMSHAFT POSITION SENSOR (PHASE)
F55
64
69
59
KNOCK SENSOR
F45
67
61
ACCELERATOR PEDAL POSITION (APP) SENSOR
E40
SENSOR 1
SENSOR 2
100
82
87
84
81
83
ECM
E10
F13
F14
36
38
47
37
6
5
49
45
4
ELECTRIC THROTTLE CONTROL ACTUATOR
F57
THROTTLE POSITION SENSOR
SENSOR 1
SENSOR 2
THROTTLE CONTROL MOTOR
AIR FUEL RATIO (A/F) SENSOR 1
F44
: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT" OF PG SECTION.
ABBWA0518GB


ECM (E10), (F13), (F14)
112
111
108
107
16
12
40
39
72
E9
1
JOINT CONNECTOR-F01
F47
6
3
4
5
F2
E11
6
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
E18, E201
22
23
24
101
102
103
REFRIGERANT PRESSURE SENSOR
E219
3
2
1
13
5
11
F1
E3
JUNCTION BLOCK
E44, E45
22
8
AABWA0342GB

ENGINE CONTROL SYSTEM CONNECTORS - QR25DE

Connector No.	M1
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

9G	8G	7G	6G	5G	4G	3G		1G
17G	16G	15G	14G	13G	12G	11G	10G	2G
26G	25G	24G	23G	22G	21G	20G		18G
34G	33G	32G	31G	30G	29G	28G	27G	19G
	41G	40G	39G	38G	37G	36G	35G	
	50G	49G	48G	47G	46G	45G	44G	43G	42G
	58G	57G	56G	55G		54G	53G	52G	51G
	63G	62G	61G	60G	59G				
	72G	71G	70G	69G	68G	67G	66G		
	80G	79G	78G	77G	76G	75G	74G	73G	65G	64G
			83G		82G		81G		

Terminal No.	Color of Wire	Signal Name
8G	P	–
15G	L	–
34G	O	–
51G	L	–
52G	P	–
55G	G/Y	–
58G	R	–
60G	V/W	–
63G	B/W	–

Connector No.	M3
Connector Name	FUSE BLOCK (J/B)
Connector Color	WHITE

H.S.

3N		2N	1N
	7N	6N	5N	4N
8N			

Terminal No.	Color of Wire	Signal Name
2N	G	–

Connector No.	M4
Connector Name	FUSE BLOCK (J/B)
Connector Color	WHITE

H.S.

4Q	3Q		2Q	1Q
10Q	9Q	8Q	7Q	6Q	5Q

Terminal No.	Color of Wire	Signal Name
6Q	Y/R	–

Connector No.	M5
Connector Name	FUSE BLOCK (J/B)
Connector Color	WHITE

H.S.

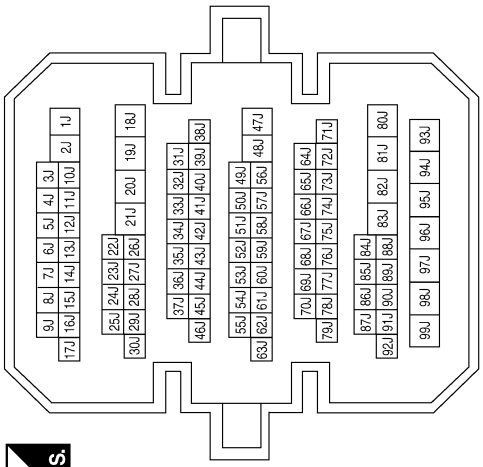
5M	4M		3M	2M	1M
12M	11M	10M	9M	8M	7M	6M

Terminal No.	Color of Wire	Signal Name
12M	O	–

AABIA0548GB

Connector No.	M6
Connector Name	WIRE TO WIRE
Connector Color	WHITE

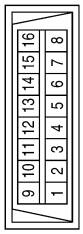
H.S.



Terminal No.	Color of Wire	Signal Name
30J	B/W	–

Connector No.	M22
Connector Name	DATA LINK CONNECTOR
Connector Color	WHITE

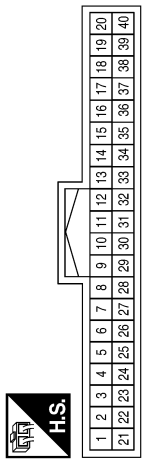
H.S.



Terminal No.	Color of Wire	Signal Name
4	B	–
5	B	–
6	L	–
7	O	–
8	G	–
14	P	–
16	Y/R	–

Connector No.	M24
Connector Name	COMBINATION METER
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
2	O	IGN
3	B	GND
4	B	GND
21	L	CAN-H
22	P	CAN-L
23	B	GND

Connector No.	M30
Connector Name	SPIRAL CABLE
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
25	G/Y	ASCD_SW
32	R	ASCD_GND

Connector No.	M59
Connector Name	POWER STEERING CONTROL UNIT
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
10	V/W	ENG_TACHO

Connector No.	M88
Connector Name	SPIRAL CABLE
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
13	Y	ASCD_SW
16	B	ASCD_GND

ABBIA0689GB

Connector No.	E1
Connector Name	JOINT CONNECTOR-E01
Connector Color	WHITE

H.S.

3	2	1
6	5	4

Terminal No.	Color of Wire	Signal Name
4	Y	–
5	Y	–
6	Y	–

Connector No.	E3
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
5	GR	–
9	BR	–
11	GR	–
13	SB	–

Connector No.	E6
Connector Name	FUSE BLOCK (J/B)
Connector Color	WHITE

H.S.

7P	6P	5P	4P		3P	2P	1P
16P	15P	14P	13P	12P	11P	10P	9P	8P

Terminal No.	Color of Wire	Signal Name
1P	SB	–
2P	P	–
4P	P	–
8P	R	–

Connector No.	E10
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
81	W	APS1
82	O	APS2
83	GR	AVCC1-APS1
84	B	GNDA-APS1
85	Y	ASCDSW
86	–	–
87	BR	AVCC2-APS2
88	O	KLINE
89	–	–
90	–	–
91	–	–

Terminal No.	Color of Wire	Signal Name
92	BR	GNDA-ASCDSW
93	Y	IGNSW
94	GR	TACHO (CABIN)
95	Y	TF
96	–	–
97	P	CAN-L
98	L	CAN-H
99	–	–
100	G	GNDA-APS2
101	–	–
102	R	NEUT-H
103	–	–
104	P	GNDA-TF
105	V	VBR
106	SB	BRAKE
107	B	GND
108	B	GND
109	W	CDCV
110	G	BNCSW
111	B	GND
112	B	GND

Connector No.	E11
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

1	2		3	4
5	6	7	8	9	10

Terminal No.	Color of Wire	Signal Name
1	B	–
2	L	–
5	R	–
6	B	–
7	O	–

AABIA0549GB

Connector No.	E12
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

1	2	3
4	5	6

Terminal No.	Color of Wire	Signal Name
1	R	–
2	GR	–
3	BR	–
4	P	–
5	L	–

Connector No.	E17
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

42	41	40	39
46	45	44	43

Terminal No.	Color of Wire	Signal Name
39	P	CAN-L
40	L	CAN-H
41	B	GND (SIGNAL)
42	SB	MOTOR_FAN_RLY_MID

Connector No.	E18
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

9	10	11	12	13	14
3	4	5	6	7	8

25	26	27	28	29	30	31	32	33	34
15	16	17	18	19	20	21	22	23	24

37	38
35	36

Terminal No.	Color of Wire	Signal Name
10	BR	ECM VB
12	B	GND (POWER)
13	SB	FUEL PUMP
15	W	START IG-E/R
19	Y	BCM IGNSW
22	W/R	PD SENS GND-E/R
23	B/R	PD SENS SIG-E/R
24	BR/W	PD SENS PWR-E/R
30	R/B	CLUTCH I/L SW
34	O/L	MOTOR FAN RLY HI
35	P	MOTOR FAN LO
38	R/W	F/L MOTOR FAN

Connector No.	E20
Connector Name	JOINT CONNECTOR-E02
Connector Color	WHITE

H.S.

3	2	1
6	5	4

Terminal No.	Color of Wire	Signal Name
1	GR	–
2	GR	–
3	GR	–
4	P	–
5	P	–
6	P	–

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Connector No.	E21
Connector Name	JOINT CONNECTOR-E03
Connector Color	WHITE

H.S.

4	3	2	1

Terminal No.	Color of Wire	Signal Name
1	L	–
2	L	–

Connector No.	E22
Connector Name	JOINT CONNECTOR-E04
Connector Color	WHITE

H.S.

4	3	2	1

Terminal No.	Color of Wire	Signal Name
1	P	–
2	P	–

Connector No.	E27
Connector Name	JOINT CONNECTOR-E06
Connector Color	WHITE

H.S.

4	3	2	1

Terminal No.	Color of Wire	Signal Name
1	W	–
2	W	–

Connector No.	E29
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

7	6	5	4		3	2	1
16	15	14	13	12	11	10	9	8

Terminal No.	Color of Wire	Signal Name
1	R	–
7	SB	–
8	B/Y	–
9	W	–
12	Y	–

Connector No.	E30
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
8G	P	–
15G	L	–
34G	O	–
51G	L	–
52G	P	–
55G	Y	–
58G	BR	–
60G	GR	–
63G	P	–

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Connector No.	E37
Connector Name	ASCD BRAKE SWITCH
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1	L	–
2	W	– (WITH CVT)
2	BR	– (WITH M/T)

Connector No.	E38
Connector Name	STOP LAMP SWITCH (WITH CVT)
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	–
2	LG	–
3	V	–
4	L	–

Connector No.	E38
Connector Name	STOP LAMP SWITCH (WITH M/T)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	–
2	LG	–

Connector No.	E39
Connector Name	ASCD CLUTCH SWITCH
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1	BR	–
2	W	–

Connector No.	E40
Connector Name	ACCELERATOR PEDAL POSITION (APP) SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	APS2
2	G	GND-A2
3	W	APS1
4	B	GND-A1
5	GR	AVCC1
6	BR	AVCC2

Connector No.	E42
Connector Name	COOLING FAN RELAY-2
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	–
2	G	–
3	L	–
5	Y	–
6	B	–
7	R	–

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Connector No.	E43
Connector Name	COOLING FAN RELAY-3
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	–
2	Y	–
3	GR	–
5	Y	–
6	B	–
7	P	–

Connector No.	E44
Connector Name	JUNCTION BLOCK
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	–
2	BR	–
3	L	–
4	W	–
6	W	–
8	G	–
10	SB	–
12	G/R	–

Connector No.	E45
Connector Name	JUNCTION BLOCK
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
14	G	–
15	R	–
16	O	–
17	V	–
20	SB	–
22	GR	–
24	W	–

Connector No.	E46
Connector Name	JUNCTION BLOCK
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
30	W	–
31	O	–
34	L	–

Connector No.	E47
Connector Name	JUNCTION BLOCK
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
43	SB	–
44	O	–

Connector No.	E48
Connector Name	JUNCTION BLOCK
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
47	G	–
48	Y	–
49	O	–
50	SB	–

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Connector No.	E50
Connector Name	JUNCTION BLOCK
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
55	BR	–

Connector No.	E55
Connector Name	JOINT CONNECTOR-E07
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	–
3	R	–
4	R	–

Connector No.	E56
Connector Name	JOINT CONNECTOR-E14
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
3	LG	–
4	LG	–

Connector No.	E57
Connector Name	STOP LAMP RELAY-1
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	LG	–
2	B	–
3	Y	–
5	W	–

Connector No.	E201
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
101	O/L	PD_SENS_GND
102	R/B	PD_SENS_SIG
103	P	PD_SEND_PWR

Connector No.	E203
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	–
2	R/W	–
3	R/Y	–
4	L/B	–
5	L	–

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Connector No.	E219
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	P	AVCC2
2	R	SIGNAL
3	W	GND

Connector No.	E220
Connector Name	COOLING FAN MOTOR-1
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	R/Y	LO +
2	R/Y	HI +
3	R	HI -
4	L/B	LO -

Connector No.	E221
Connector Name	COOLING FAN MOTOR-2
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	R/W	LO +
2	L	HI +
3	B	HI -
4	B	LO -

Connector No.	F1
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
5	L	–
9	W	–
11	V	–
13	GR	–

Connector No.	F2
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	B	–
2	G	–
5	V	–
6	GR	–
7	BR	–

Connector No.	F5
Connector Name	BATTERY CURRENT SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	BR	AVCC1
2	B	GND
3	Y	SIGNAL

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Connector No.	F10
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
49	V	ENG SOL
51	SB	INJECTOR #1
52	Y	INJECTOR #2
53	V	ENG SOL
54	GR	ETC
55	LG	ECM BAT
56	R	O2 SENS #1
57	O	O2 SENS #2
69	SB	SSOFF
70	G	MOTRLY
72	W	NPSW
74	L	START IG EGI
77	GR	FPR

Connector No.	F11
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	P	TW
2	SB	GND

Terminal No.	Color of Wire	Signal Name
62	–	–
63	–	–
64	L	GND-PHASE#1
65	R	POS
66	–	–
67	SHIELD	GNDA-KNK 1
68	–	–
69	Y	PHASE#1
70	–	–
71	–	–
72	V	AVCC2-PDPRES
73	–	–
74	–	–
75	–	–
76	L	AVCC2-POS
77	LG	BATT
78	P	CVTC#1
79	–	–
80	–	–

Terminal No.	Color of Wire	Signal Name
43	–	–
44	B	GNDA-CURSEN
45	G	AF+1
46	P	TW
47	W	AVCC1-TPS-B1
48	LG	GNDA-PSPRES
49	L	AF-1
50	O	TA1
51	BR	AVCC1-CURSEN
52	SB	GNDA-TW
53	–	–
54	–	–
55	Y	AVCC1-PSPRES
56	R	GNDA-TA1
57	–	–
58	GR	QA1+
59	O	AVCC1-PHASE#1
60	W	GND-POS
61	W	KNK1

Connector No.	F13
Connector Name	ECM
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
33	BR	OSR1
34	–	–
35	B	GNDA-O2SR2
36	G	GNDA-TPS-B1
37	B	TPS1-B1
38	R	TPS2-B1
39	L	PDPRES
40	GR	GNDA-PDPRES
41	SB	PSPRES
42	Y	CURSEN

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Connector No.	F14
Connector Name	ECM
Connector Color	GRAY

H.S.

1	5	9	13	17	21	25	29
2	6	10	14	18	22	26	30
3	7	11	15	19	23	27	31
4	8	12	16	20	24	28	32

Terminal No.	Color of Wire	Signal Name
1	–	–
2	L	VMOT-B1
3	–	–
4	LG	AFH1
5	GR	MOTOR1-B1
6	BR	MOTOR2-B1

Terminal No.	Color of Wire	Signal Name
7	–	–
8	–	–
9	O	IGN #3
10	LG	IGN #2
11	Y	IGN #1
12	GR	GND
13	Y	O2HR1
14	B/R	FPR
15	R	MOTRLY-B1
16	B	GND
17	–	–
18	–	–
19	–	–

Terminal No.	Color of Wire	Signal Name
20	–	–
21	BR	IGN #4
22	–	–
23	–	–
24	SB	SSOF
25	P	EVAP
26	–	–
27	–	–
28	–	–
29	LG	INJ #4
30	W	INJ #3
31	O	INJ #2
32	V	INJ #1

Connector No.	F17
Connector Name	FUEL INJECTOR NO. 1
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	IGN
2	V	C/U

Connector No.	F18
Connector Name	FUEL INJECTOR NO. 2
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	IGN
2	O	C/U

Connector No.	F19
Connector Name	FUEL INJECTOR NO. 3
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	IGN
2	W	C/U

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Connector No.	F20
Connector Name	FUEL INJECTOR NO. 4
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	IGN
2	LG	C/U

Connector No.	F25
Connector Name	TRANSMISSION RANGE SWITCH
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	L	–
2	W	–

Connector No.	F26
Connector Name	CONDENSER-2
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	V	VBR
2	B	GND

Connector No.	F29
Connector Name	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	G	VBR
2	P	C/U

Connector No.	F30
Connector Name	CRANKSHAFT POSITION SENSOR (POS)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	L	AVCC2
2	W	GND
3	R	POS

Connector No.	F31
Connector Name	MASS AIR FLOW SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
2	BR	VB
3	R	GND
4	GR	QA+
5	O	TA+
6	Y	TA-

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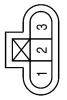
Connector No.	F32
Connector Name	PARK/NEUTRAL POSITION (PNP) SWITCH
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	L	–
2	W	–

Connector No.	F34
Connector Name	IGNITION COIL NO. 1 (WITH POWER TRANSISTOR)
Connector Color	GRAY

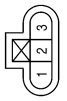
H.S.



Terminal No.	Color of Wire	Signal Name
1	Y	SIGNAL
2	B	GND
3	V	VBR

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	SIGNAL
2	B	GND
3	V	VBR

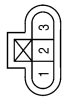
Connector No.	F36
Connector Name	IGNITION COIL NO. 3 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	SIGNAL
2	B	GND
3	V	VBR

Connector No.	F37
Connector Name	IGNITION COIL NO. 4 (WITH POWER TRANSISTOR)
Connector Color	GRAY

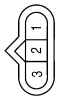
H.S.



Terminal No.	Color of Wire	Signal Name
1	BR	SIGNAL
2	B	GND
3	V	VBR

Connector No.	F40
Connector Name	POWER STEERING PRESSURE SENSOR
Connector Color	BLACK

H.S.



Terminal No.	Color of Wire	Signal Name
1	Y	AVCC1
2	SB	OUTPUT
3	LG	GND

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Connector No.	F42
Connector Name	HEATED OXYGEN SENSOR 2
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	B	SENSOR(-)
2	R	HEATER(+)
3	Y	HEATER(-)
4	BR	SENSOR(+)

Connector No.	F44
Connector Name	AIR FUEL RATIO (A/F) SENSOR 1
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	G	AF(+)
2	L	AF(-)
3	LG	HEATER(-)
4	O	HEATER(+)

Connector No.	F45
Connector Name	KNOCK SENSOR
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	KNK
2	SHIELD	GND

Connector No.	F47
Connector Name	JOINT CONNECTOR-F01
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
3	SHIELD	–
4	GR	–
5	SHIELD	–
6	GR	–

Connector No.	F50
Connector Name	JOINT CONNECTOR-F04
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
3	SB	–
4	SB	–
5	SB	–
8	Y	–
9	Y	–
10	Y	–

Connector No.	F51
Connector Name	JOINT CONNECTOR-F05
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	B	–
2	B	–
3	B	–
4	B	–
5	B	–
6	B	–

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Connector No.	F52
Connector Name	JOINT CONNECTOR-F06
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	–
2	R	–
6	Y	–

Connector No.	F55
Connector Name	CAMSHAFT POSITION SENSOR (PHASE)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	AVCC1
2	L	GND
3	Y	PHASE

Connector No.	F57
Connector Name	ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	INPUT
2	B	OUTPUT1
3	R	OUTPUT2
4	G	GND
5	BR	MOTOR2
6	GR	MOTOR1

Connector No.	F59
Connector Name	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	V	VB
2	P	C/U

Connector No.	B1
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
30J	B	–

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Connector No.	B10
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	R	–
7	W	–
8	B	–
9	W	–
12	Y	–

Connector No.	B39
Connector Name	EVAP CANISTER VENT CONTROL VALVE
Connector Color	BLACK

H.S.

1	2

Terminal No.	Color of Wire	Signal Name
1	R	BATT
2	W	C/U

Connector No.	B42
Connector Name	FUEL LEVEL SENSOR UNIT AND FUEL PUMP
Connector Color	GRAY

H.S.

1	2	3	4	5

Terminal No.	Color of Wire	Signal Name
1	W	IGN
3	B	GND
4	Y	TEMP SENS
5	B	SENSOR -

AABIA0559GB

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:0000000006391846

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-250
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-323
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-247
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-241
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-270
	Incorrect idle speed adjustment						1	1	1	1		1			EC-15
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-200 EC-206
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-15
	Ignition circuit	1	1	2	2	2		2	2			2			EC-264
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-115
Mass air flow sensor circuit		1			2										EC-128
Engine coolant temperature sensor circuit					3		3			3					EC-133
Air fuel ratio (A/F) sensor 1 circuit															EC-228
Throttle position sensor circuit			1	2		2	2	2	2	2		2			EC-136 EC-139 EC-172 EC-174 EC-215
Accelerator pedal position sensor circuit				3	2	1									EC-208 EC-211 EC-218
Knock sensor circuit				2								3			EC-142
Crankshaft position sensor (POS) circuit		2	2												EC-144
Camshaft position sensor (PHASE) circuit		3	2												EC-148
Vehicle speed signal circuit			2	3		3						3			EC-152
Power steering pressure sensor circuit			2					3	3						EC-154

	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	
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-157 EC-159
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-125
PNP signal circuit			3		3		3	3			3			EC-164
Refrigerant pressure sensor circuit		2				3			3		4			EC-271
Electrical load signal circuit							3							EC-239
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-4 HAC-107
ABS actuator and electric unit (control unit)			4											BRC-15 BRC-81

1 - 6: The numbers refer to the order of inspection.

(continued on next table)

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-14
	Fuel piping			5	5	5		5	5			5			EM-36
	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-25
	Air cleaner														EM-25
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)														EM-25
	Electric throttle control actuator														EM-26
	Air leakage from intake manifold/ Collector/Gasket														EM-25
Cranking	Battery	1	1	1		1		1	1			1		1	PG-140
	Generator circuit														CHG-10
	Starter circuit	3													STR-9
	Signal plate	6													EM-77
	PNP signal	4													TM-22 TM-410
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-68
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-77
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mecha-nism	Timing chain	5	5	5	5	5		5	5			5			EM-53
	Camshaft														EM-41
	Intake valve timing control														EM-53
	Intake valve												3		EM-53
	Exhaust valve														

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			EM-30 EX-5
	Three way catalyst														
Lubrica-tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-32 LU-11 LU-13 LU-16
	Oil level (Low)/Filthy oil														LU-9
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-15
	Thermostat									5					CO-20
	Water pump														CO-18
	Water gallery														CO-11
	Cooling fan									5					CO-17
	Coolant level (Low)/Contaminat-ed coolant														CO-11
NATS (Nissan Anti-Theft System)		1	1												SEC-222

1 - 6: The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

Description

INFOID:0000000006391847

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-31, "System Description".

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000006391848

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the “SRS AIR BAG” and “SEAT BELT” of this Service Manual.

WARNING:

Always observe the following items for preventing accidental activation.

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see “SRS AIR BAG”.**
- **Never use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

Always observe the following items for preventing accidental activation.

- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.**

Precaution Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:0000000008680966

NOTE:

- Before removing and installing any control units, first turn the push-button ignition switch to the LOCK position, then disconnect both battery cables.
- After finishing work, confirm that all control unit connectors are connected properly, then re-connect both battery cables.
- Always use CONSULT to perform self-diagnosis as a part of each function inspection after finishing work. If a DTC is detected, perform trouble diagnosis according to self-diagnosis results.

This vehicle is equipped with a push-button ignition switch and a steering lock unit.

If the battery is disconnected or discharged, the steering wheel will lock and cannot be turned.

If turning the steering wheel is required with the battery disconnected or discharged, follow the procedure below before starting the repair operation.

OPERATION PROCEDURE

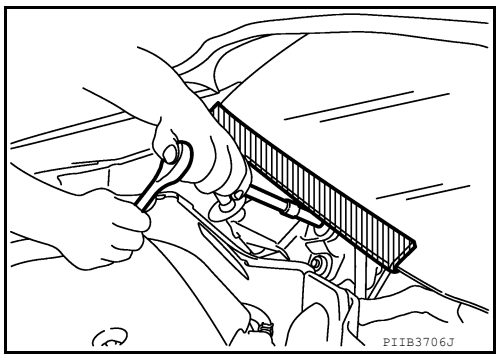
1. Connect both battery cables.
   NOTE:
   Supply power using jumper cables if battery is discharged.
2. Carry the Intelligent Key or insert it to the key slot and turn the push-button ignition switch to ACC position. (At this time, the steering lock will be released.)
3. Disconnect both battery cables. The steering lock will remain released with both battery cables disconnected and the steering wheel can be turned.
4. Perform the necessary repair operation.
5. When the repair work is completed, re-connect both battery cables. With the brake pedal released, turn the push-button ignition switch from ACC position to ON position, then to LOCK position. (The steering wheel will lock when the push-button ignition switch is turned to LOCK position.)

6. Perform self-diagnosis check of all control units using CONSULT.

Precaution for Procedure without Cowl Top Cover

INFOID:0000000006391849

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



Precautions For Xenon Headlamp Service

INFOID:0000000006391850

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:0000000006391851

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

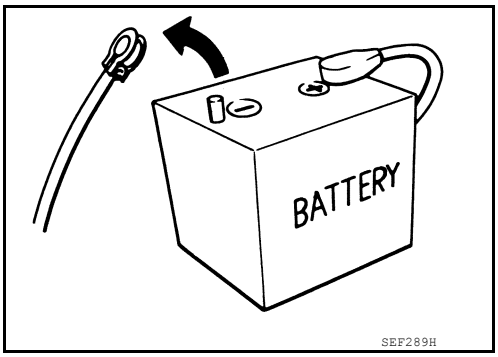
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-57, "Description" (COUPE) or PG-129, "Description" (SEDAN).**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.**

General Precautions

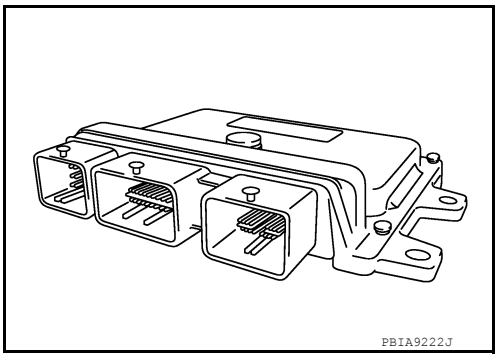
INFOID:0000000006391852

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery ground cable.**



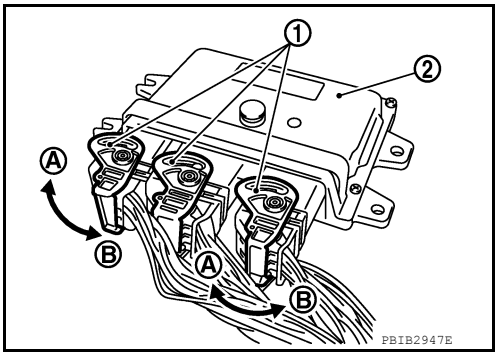
- **Do not disassemble ECM.**
- **If a battery cable is disconnected, the memory will return to the ECM value.**
  The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- **If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.**

- **Diagnostic trouble codes**
- **1st trip diagnostic trouble codes**
- **Freeze frame data**
- **1st trip freeze frame data**

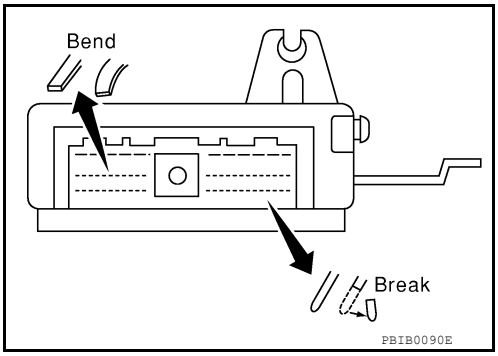


- **When connecting ECM harness connector (1), fasten (B) it securely with a lever as far as it will go as shown in the figure.**

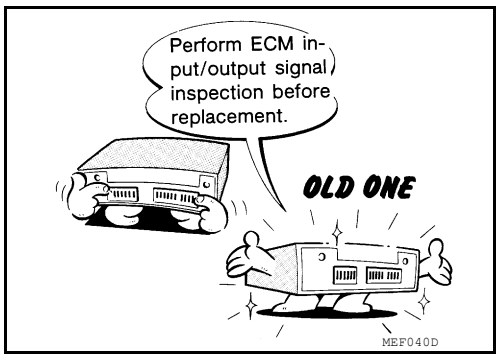
2. ECM
A. Loosen



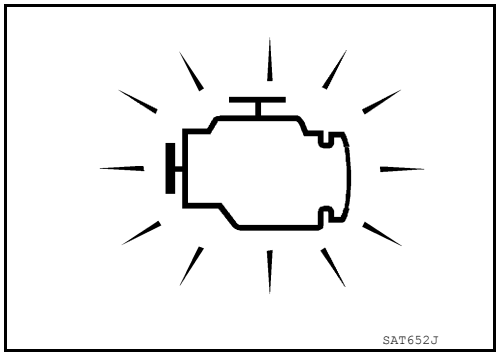
- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can 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.**



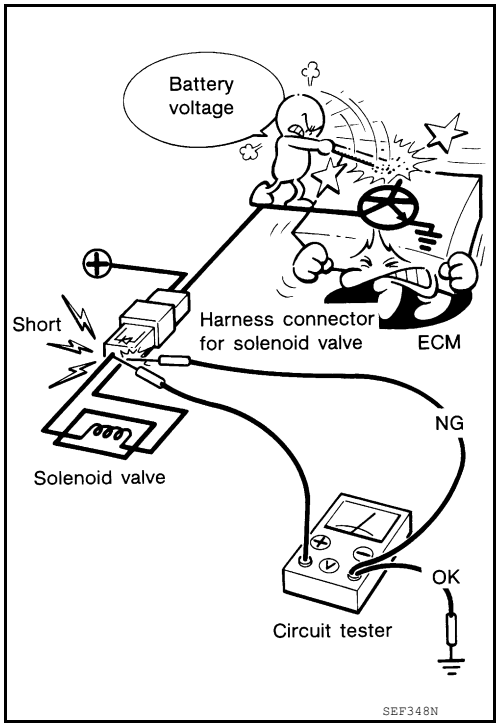
- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-274, "Reference Value".**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble 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).**



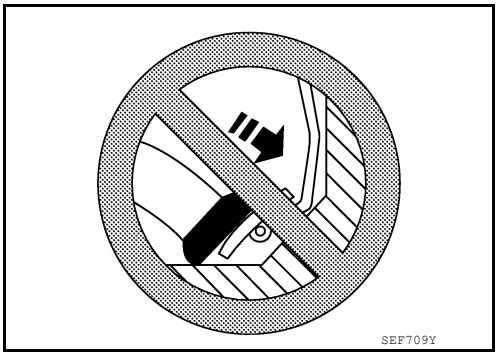
- **After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Component Function Check. The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.**



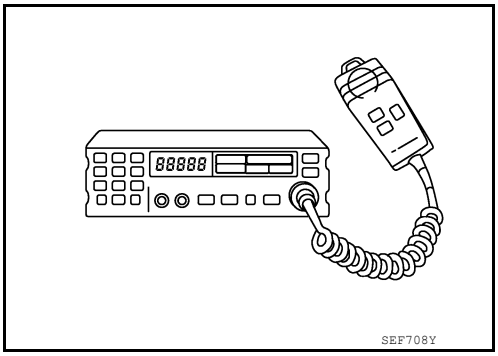
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified 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.**

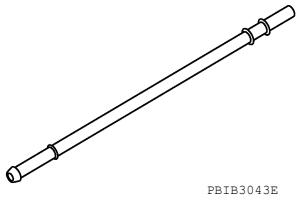


PREPARATION

PREPARATION

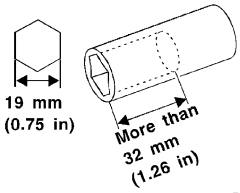
Special Service Tools

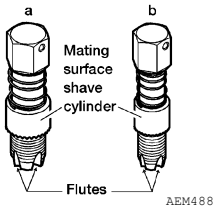
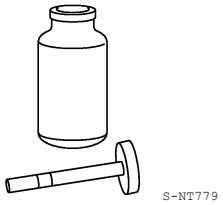
INFOID:0000000006391853

Tool number Tool name	Description
KV10118400 Fuel tube adapter  PBIB3043E	Measuring fuel pressure

Commercial Service Tools

INFOID:0000000006391854

Tool name (SPX-North America No.)	Description
Quick connector release  PBIC0198E	Removing fuel tube quick connectors in engine room
Fuel filler cap adapter i.e.: (MLR-8382)  S-NT815	Checking fuel tank vacuum relief valve opening pressure
Socket wrench  S-NT705	Removing and installing engine coolant temperature sensor

Tool name (SPX-North America No.)		Description
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)		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)		Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

PERIODIC MAINTENANCE

FUEL PRESSURE

Inspection

INFOID:0000000006391855

FUEL PRESSURE RELEASE

With CONSULT-III

1. Turn ignition switch ON.
2. Perform “FUEL PRESSURE RELEASE” in “WORK SUPPORT” mode with CONSULT-III.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.

With CONSULT-III

1. Remove fuel pump fuse located in IPDM E/R.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.

FUEL PRESSURE CHECK

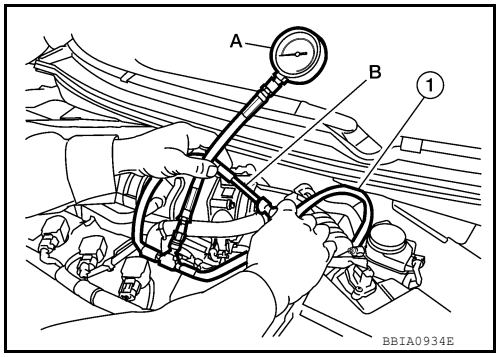
CAUTION:

- **Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.**

NOTE:

- **Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because L32 models do not have fuel return system.**
- **Be careful not to scratch or get the fuel hose connection area dirty when servicing, so that the quick connector o-ring maintains sealability.**
- **Use fuel pressure gauge and fuel pressure adapter [SST: (KV10118400)] to check fuel pressure.**

1. Release fuel pressure to zero.
2. Remove fuel hose using quick connector release (commercial service tool).
   - Do not twist or kink fuel hose because it is plastic hose.
   - Do not remove fuel hose from quick connector.
   - Keep fuel hose connections clean.
3. Install fuel pressure adapter [SST: (KV10118400)] (B) and fuel pressure gauge (A) as shown in figure.
   - Do not distort or bend fuel rail tube when installing fuel pressure adapter [SST: (KV10118400)].
   - When reconnecting fuel hose (1), check the original fuel hose for damage and abnormality.
4. Turn ignition switch ON (reactivate fuel pump), and check for fuel leakage.
5. Start engine and check for fuel leakage.
6. Read the indication of fuel pressure gauge.
   - During fuel pressure check, check for fuel leakage from fuel connection every 3 minutes.



At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2, 51 psi)

7. If result is unsatisfactory, go to next step.
8. Check the following.
   - Fuel hoses and fuel tubes for clogging
   - Fuel filter for clogging
   - Fuel pump
   - Fuel pressure regulator for clogging

If OK, replace “fuel filter and fuel pump assembly”.
If NG, repair or replace.

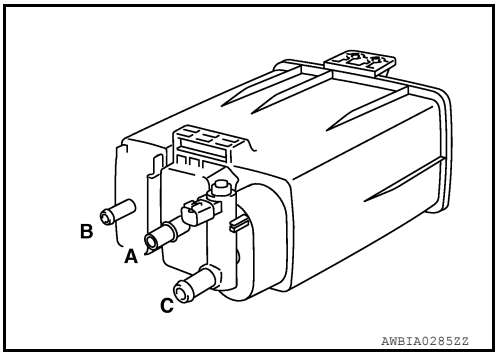
EVAPORATIVE EMISSION SYSTEM

Inspection

INFOID:0000000006391856

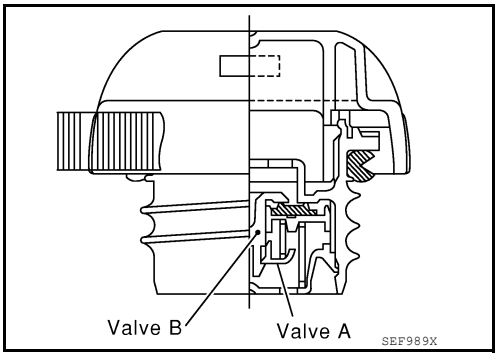
1. Visually inspect EVAP vapor lines for improper attachment and for cracks, damage, loose connections, chafing and deterioration.
2. Check EVAP canister as follows:

a. Block port (B).
b. Blow air into port (A) and check that it flows freely out of port (C).
c. Release blocked port (B).
d. Apply vacuum pressure to port (B) and check that vacuum pressure exists at the ports (A) and (C).
e. Block port (A) and (B).
f. Apply pressure to port (C) and check that there is no leakage.



3. Inspect fuel tank filler cap vacuum relief valve for clogging, sticking, etc.

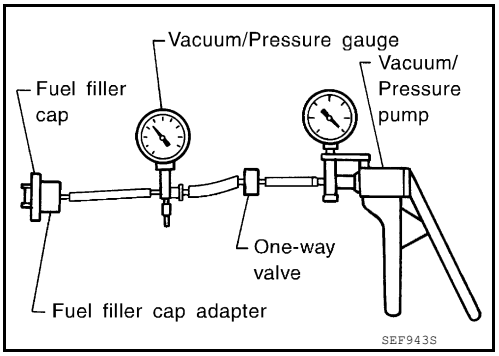
a. Wipe clean valve housing.



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 –3.3 kPa (–0.060 to –0.033 bar, – 0.061 to –0.034 kg/cm^2, –0.87 to –0.48 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:0000000006391857

Transmission	Condition	Specification
CVT	No load* (in P or N position)	650 ± 50 rpm
M/T	No load* (in Neutral position)	650 ± 50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Timing

INFOID:0000000006391858

Transmission	Condition	Specification
CVT	No load* (in P or N position)	15 ± 5° BTDC
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

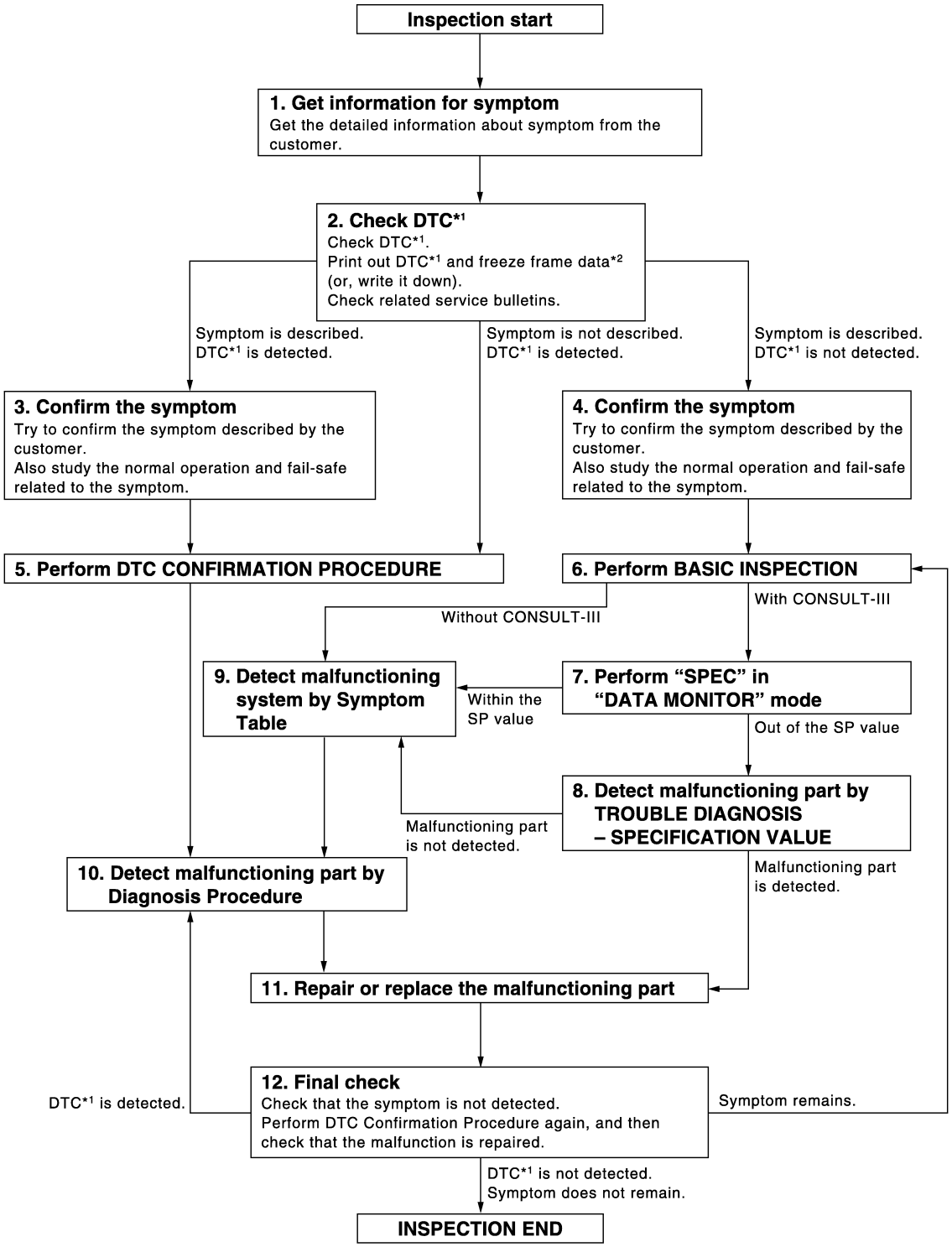
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:0000000006391859

OVERALL SEQUENCE



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

JMBIA1416GB

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-329, "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-420, "On Board Diagnosis Function" or EC-423, "CONSULT-III Function".)
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to EC-689, "Symptom Table".)

3. Check related service bulletins for information.

Is any symptom described and any DTC detected?

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

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).
Also study the normal operation and fail safe related to the symptom. Refer to EC-693, "Description" and EC-656, "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-693, "Description" and EC-656, "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-658, "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 GI-42, "Intermittent Incident".

6.PERFORM BASIC INSPECTION

Perform EC-331, "BASIC INSPECTION : Special Repair Requirement".

Do you have CONSULT-III?

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

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

With CONSULT-III
Make sure that "MAS A/F SE-B1", "B/FUEL SCHDL", and "A/F ALPHA-B1", "A/F ALPHA-B2" are within the SP value using CONSULT-III in "SPEC" of "DATA MONITOR" mode. Refer to EC-430, "Component Function Check".

Are they 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-431, "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-689, "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 DIAGNOSTIC PROCEDURE

Inspect according to Diagnostic Procedure of the system.

NOTE:
The Diagnostic Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to Circuit Inspection in GI-45, "Circuit Inspection".

Is malfunctioning part detected?

YES >> GO TO 11.
NO >> Monitor input data from related sensors or check voltage of related ECM terminals using CONSULT-III. Refer to EC-643, "Reference Value".

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnostic Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it, refer to EC-420, "On Board Diagnosis Function" or EC-423, "CONSULT-III Function".

>> GO TO 12.

12. FINAL CHECK

When DTC was detected in step 2, perform DTC Confirmation Procedure or Overall 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-420, "On Board Diagnosis Function" or EC-423, "CONSULT-III Function".)

Diagnostic Work Sheet

INFOID:0000000006391860

DESCRIPTION

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about an incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the 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	

MTBL0017

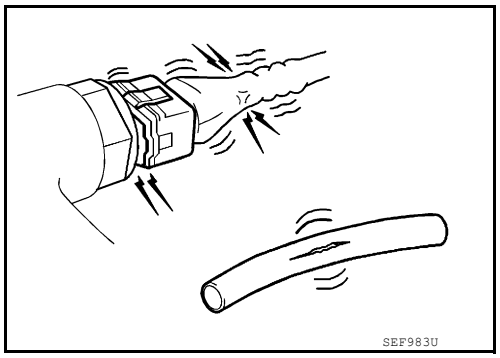
INSPECTION AND ADJUSTMENT
BASIC INSPECTION

BASIC INSPECTION : Special Repair Requirement

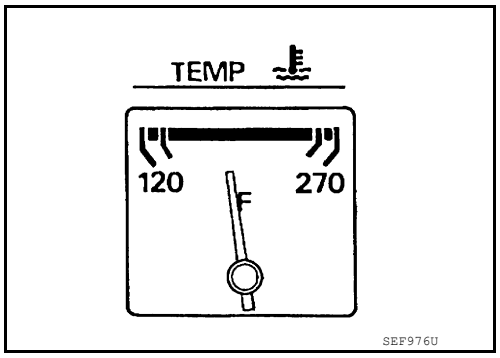
INFOID:0000000006391861

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.



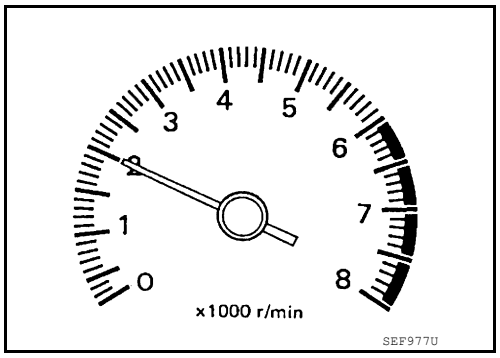
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
Ensure engine stays below 1,000 rpm.



5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT-III or ECM [Diagnostic Test Mode II (self-diagnostic results)].

Is any DTC detected?

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



2.REPAIR OR REPLACE

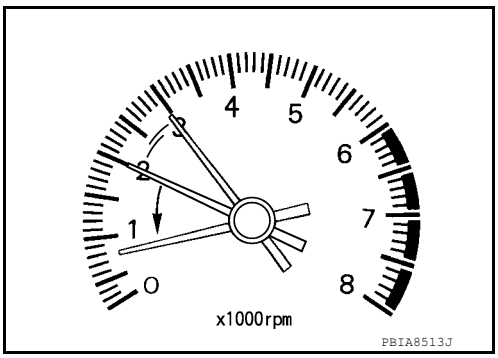
Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> 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-334, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to EC-704, "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-335, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-336, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-336, "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-334, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to EC-704, "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-505, "Diagnosis Procedure".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-501, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 9.
NO >> 1. Repair or replace.
2. 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-13, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement" (COUPE models) or SEC-227, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement" (SEDAN models).

>> 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-335, "IGNITION TIMING : Special Repair Requirement".
   For specification, refer to EC-704, "Ignition Timing".

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-335, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-336, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-336, "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-334, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to EC-704, "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-335, "IGNITION TIMING : Special Repair Requirement".
   For specification, refer to EC-704, "Ignition Timing".

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-170, "Installation".

Is the inspection result normal?

YES >> GO TO 17.
NO >> 1. Repair the timing chain installation.
2. GO TO 4.

17. DETECT MALFUNCTIONING PART

Check the following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-505, "Diagnosis Procedure".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-501, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 18.

NO >> 1. Repair or replace.
2. 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 EC-334, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 4.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description

INFOID:0000000006391862

When replacing ECM, this procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement

INFOID:0000000006391863

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

Refer to SEC-13, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement" (COUPE models) or SEC-227, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement" (SEDAN models).

>> GO TO 2.

2. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-335, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-336, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 4.

4. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-336, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

IDLE SPEED

IDLE SPEED : Description

INFOID:0000000006391864

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

IDLE SPEED : Special Repair Requirement

INFOID:0000000006391865

1. CHECK IDLE SPEED

With CONSULT-III
Check idle speed in “DATA MONITOR” mode with CONSULT-III.

Without CONSULT-III
Check idle speed by installing the pulse type tachometer clamp on the loop wire or on suitable high-tension wire which installed between No. 1 ignition coil and No. 1 Spark plug.

>> INSPECTION END

IGNITION TIMING

IGNITION TIMING : Description

INFOID:0000000006391866

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

IGNITION TIMING : Special Repair Requirement

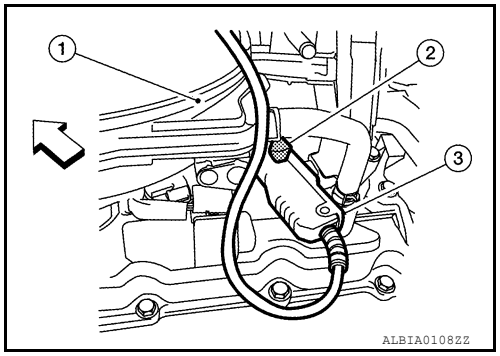
INFOID:0000000006391867

1.CHECK IGNITION TIMING

1. Slide the harness protector of ignition coil No.1 (2) to clear the wires.

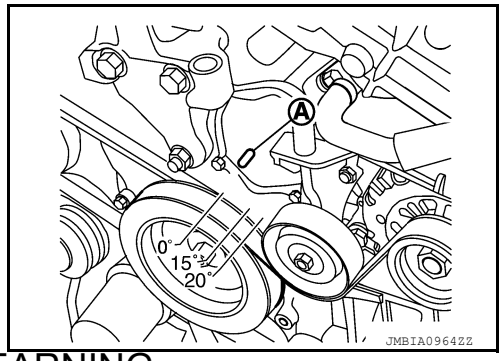
   1 : Intake manifold collector
   3 : Timing light pick-up lead
   ⇦ : Vehicle front

2. Attach timing light to the ignition coil No.1 wires as shown in the figure.



3. Check ignition timing.

   A : Timing indicator



>> INSPECTION END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description

INFOID:0000000006391868

Accelerator Pedal Released Position Learning is an operation 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:0000000006391869

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:0000000006391870

Throttle Valve Closed Position Learning is an operation 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:0000000006391871

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:0000000006391872

Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps engine idle speed within the specific range. It must be performed under 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:0000000006391873

1.PRECONDITIONING

Before performing Idle Air Volume Learning, make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.
- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 100°C (158 - 212°F)
- Selector lever: P or N
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
- Apply parking brake
- Set lighting switch to the 1st position
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
- With CONSULT-III: Drive vehicle until “ATF TEMP SE” in “DATA MONITOR” mode of “CVT” system indicates less than 0.9V.
- Without CONSULT-III: Drive vehicle for 10 minutes.

Do you have CONSULT-III?

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

2.PERFORM IDLE AIR VOLUME LEARNING

With CONSULT-III

1. Perform EC-335, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
2. Perform EC-336, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
3. Start engine and warm it up to normal operating temperature.
4. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode.
5. Touch “START” and wait 20 seconds.

Is “CMPLT” displayed on CONSULT-III screen?

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

3. PERFORM IDLE AIR VOLUME LEARNING

Without CONSULT-III

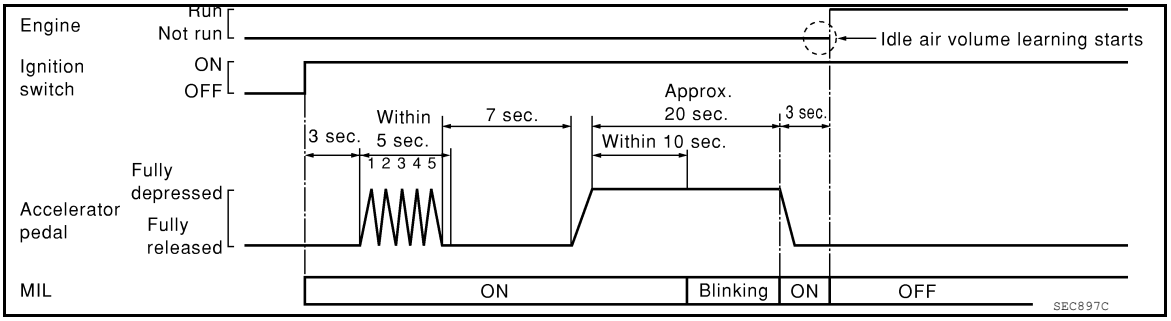
NOTE:

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

1. Perform EC-335, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
2. Perform EC-336, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
3. Start engine and warm it up to normal operating temperature.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
6. Repeat the following procedure quickly five times within 5 seconds.

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

7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops blinking and turned ON.
8. Fully release the accelerator pedal within 3 seconds after the MIL turned ON.
9. Start engine and let it idle.
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 procedure, refer to EC-334, "IDLE SPEED : Special Repair Requirement" and EC-335, "IGNITION TIMING : Special Repair Requirement".

For specification, refer to EC-704, "Idle Speed" and EC-704, "Ignition Timing".

Is the inspection result normal?

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

5. DETECT MALFUNCTIONING PART-I

Check the following

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

Is the inspection result normal?

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

6. DETECT MALFUNCTIONING PART-II

When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.

It is useful to perform “TROUBLE DIAGNOSIS - SPECIFICATION VALUE”. Refer to EC-430, "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:0000000006391874

This describes show 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:0000000006391875

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-420, "On Board Diagnosis Function".
7. Make sure that DTC P0000 is displayed.

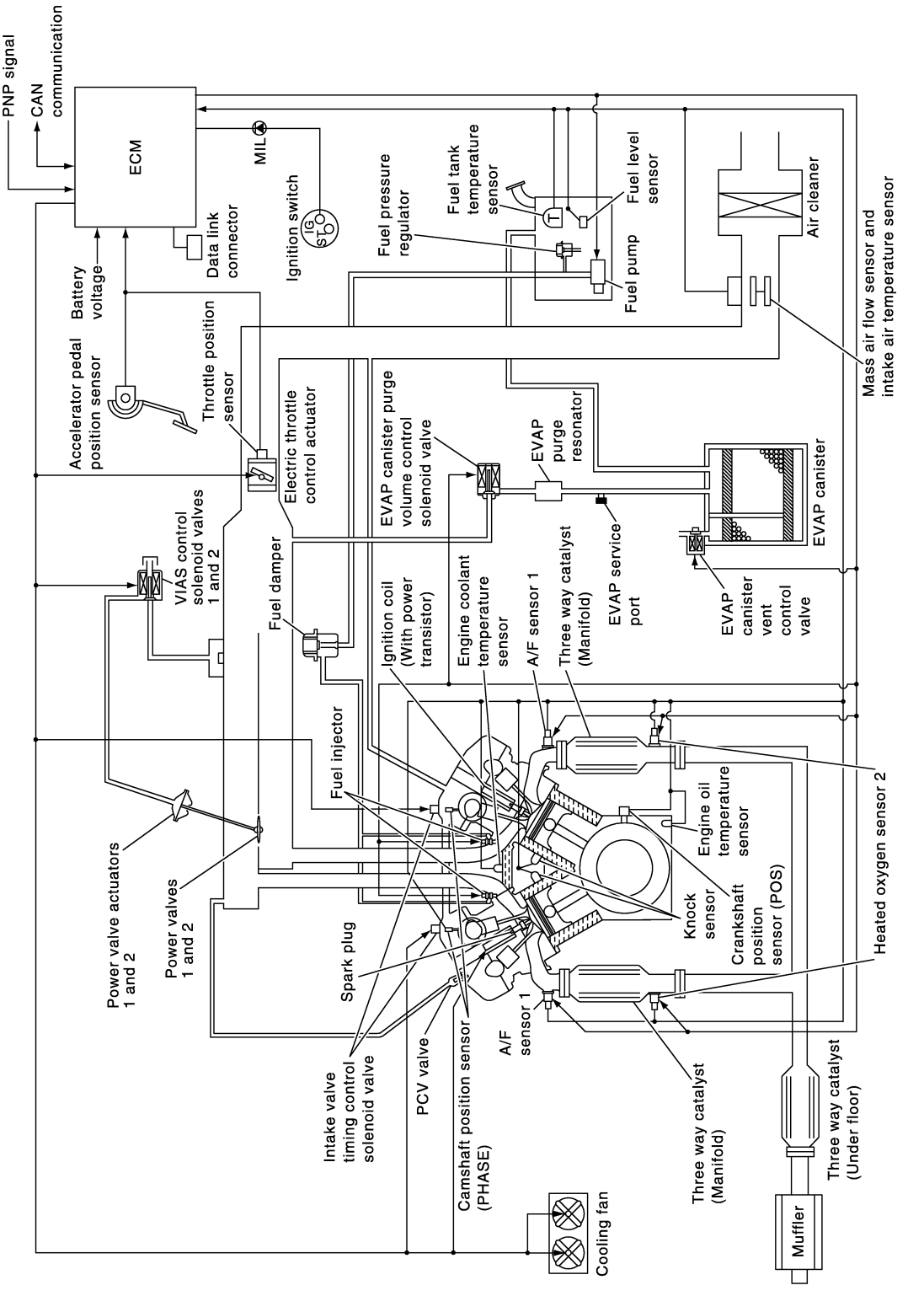
>> END

SYSTEM DESCRIPTION

ENGINE CONTROL SYSTEM

System Diagram

INFOID:0000000006391876



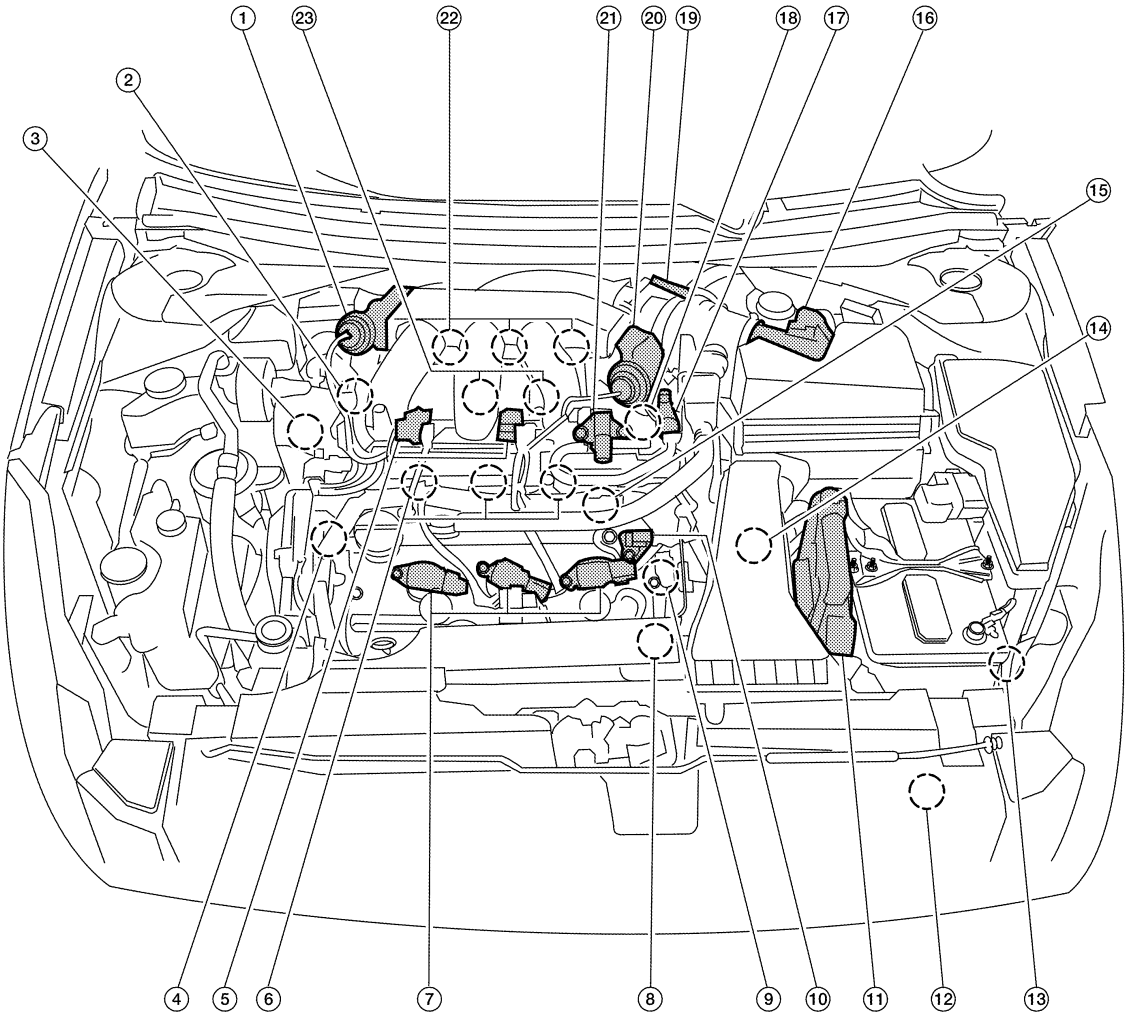
System Description

INFOID:0000000006391877

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

Component Parts Location

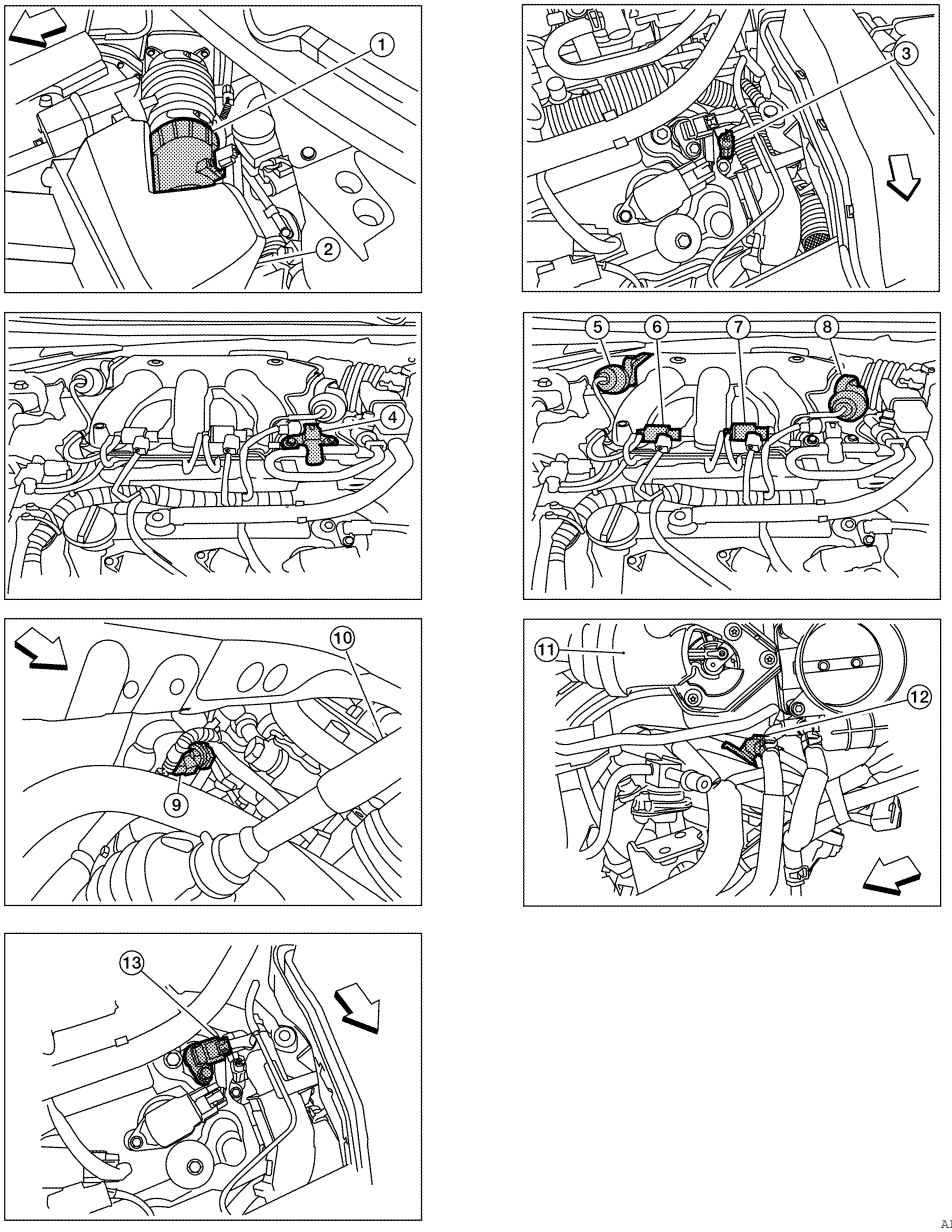
INFOID:0000000006391878



ALBIA0110ZZ

1. Power valve actuator 1
2. Intake valve timing control solenoid valve (bank 1)
3. Power steering pressure sensor
4. Intake valve timing control solenoid valve (bank 2)
5. VIAS control solenoid valves 1 and 2
6. Fuel injector (bank 2)
7. Ignition coil (with power transistor) and spark plug (bank 2)
8. Crankshaft position sensor (POS)
9. Engine coolant temperature sensor
10. Camshaft position sensor (PHASE) (bank 2)
11. ECM
12. Refrigerant pressure sensor
13. Battery current sensor
14. Transmission range switch
15. Condenser-2
16. Mass air flow sensor (with intake air temperature sensor)
17. EVAP service port
18. Camshaft position sensor (PHASE) (bank 1)

19. Electric throttle control actuator
20. Power valve actuator 2
21. EVAP canister purge volume control solenoid valve
22. Ignition coil (with power transistor) and spark plug (bank 1)
23. Knock sensor



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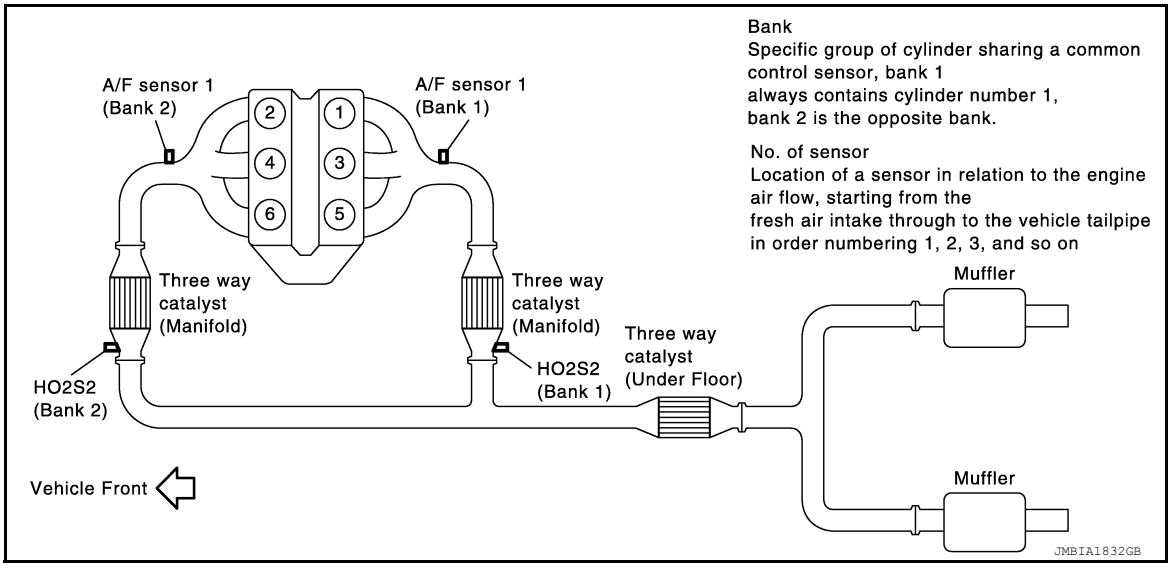
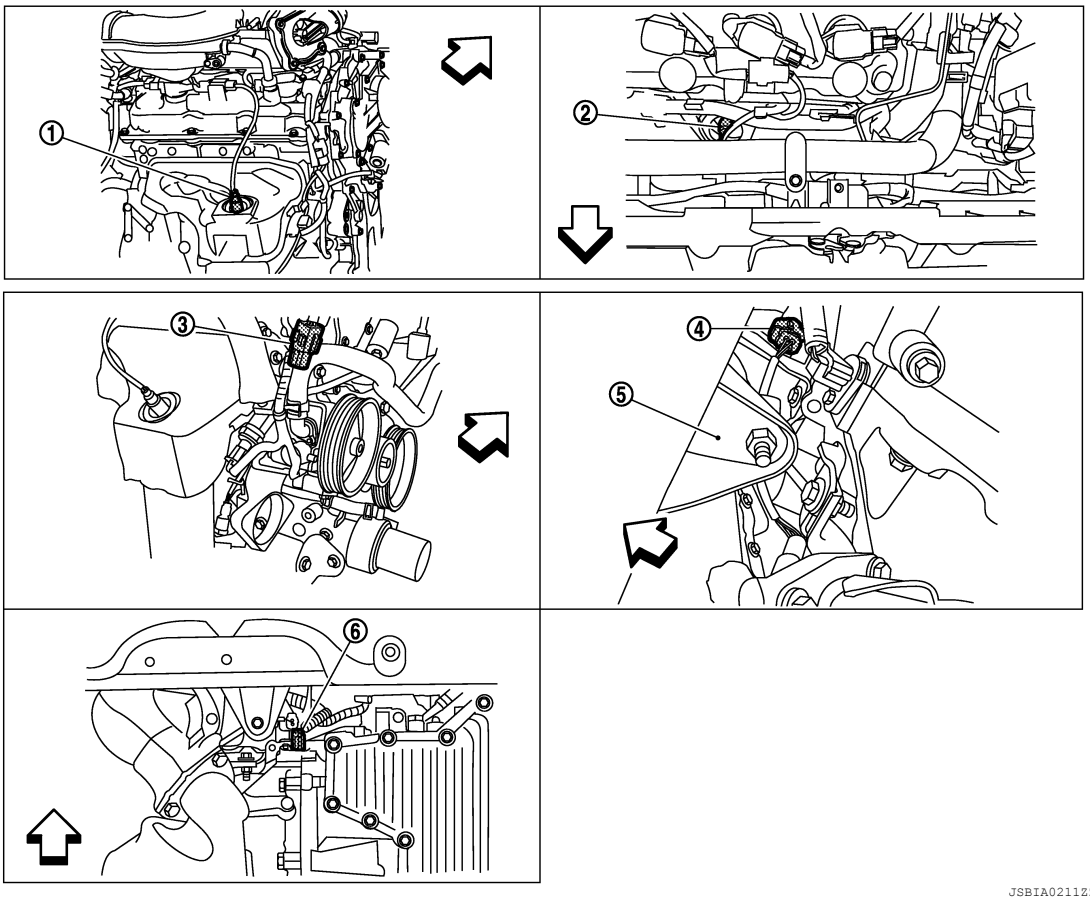
1. Mass air flow sensor (with intake air temperature sensor)
2. Air cleaner case
3. Engine coolant temperature sensor
4. EVAP canister purge volume control solenoid valve
5. Power valve actuator 1
6. VIAS control solenoid valve 1
7. VIAS control solenoid valve 2
8. Power valve actuator 2
9. Power steering pressure sensor
10. Tie rod (RH)
11. Power valve actuator 2
12. Camshaft position sensor (PHASE) (bank 1)
13. Camshaft position sensor (PHASE) (bank 2)

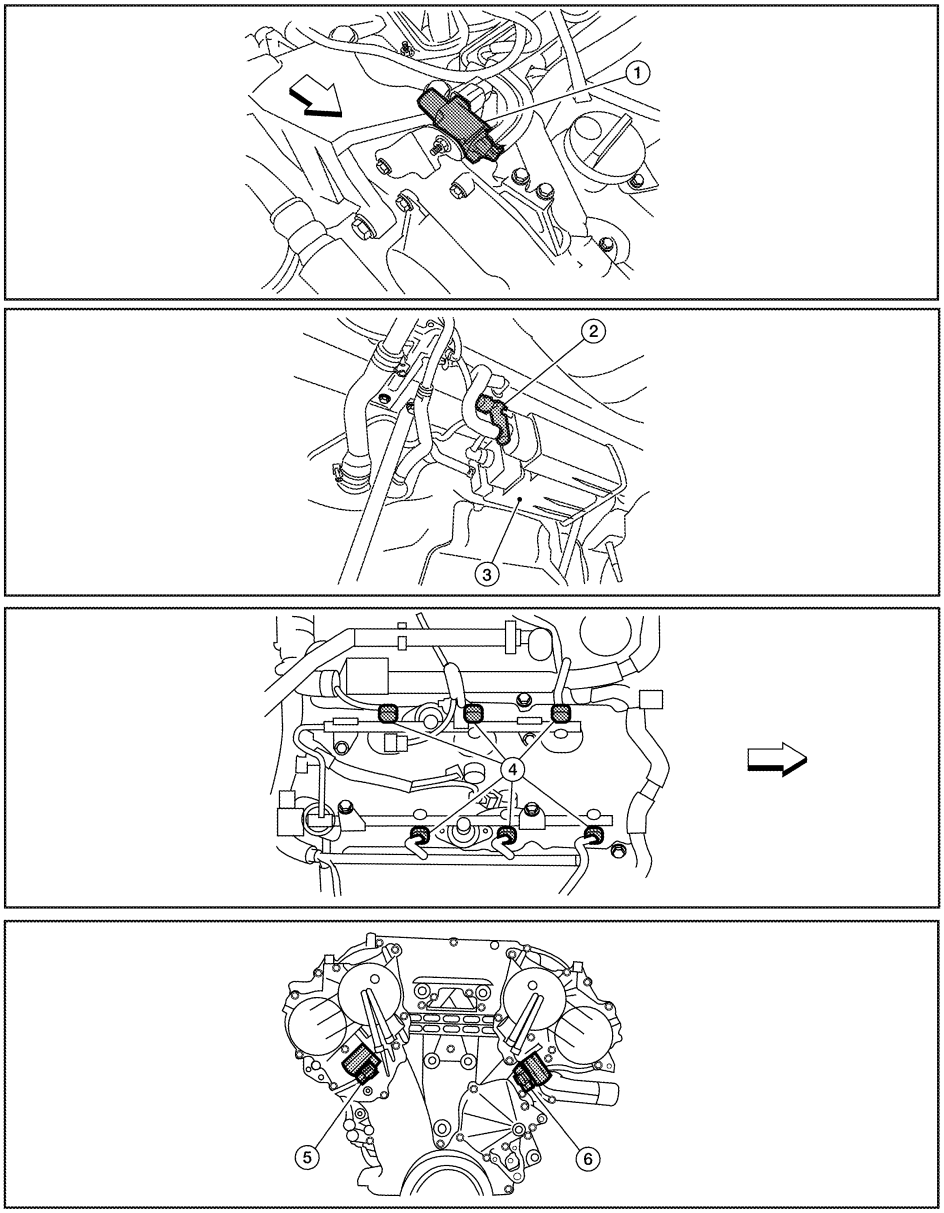
⇦ : Vehicle front





1. A/F sensor 1 (bank 1)
2. A/F sensor 1 (bank 2)
3. HO2S2 (bank 1) harness connector
4. HO2S2 (bank 2) harness connector
5. Front engine mount
6. Crankshaft position sensor (POS)

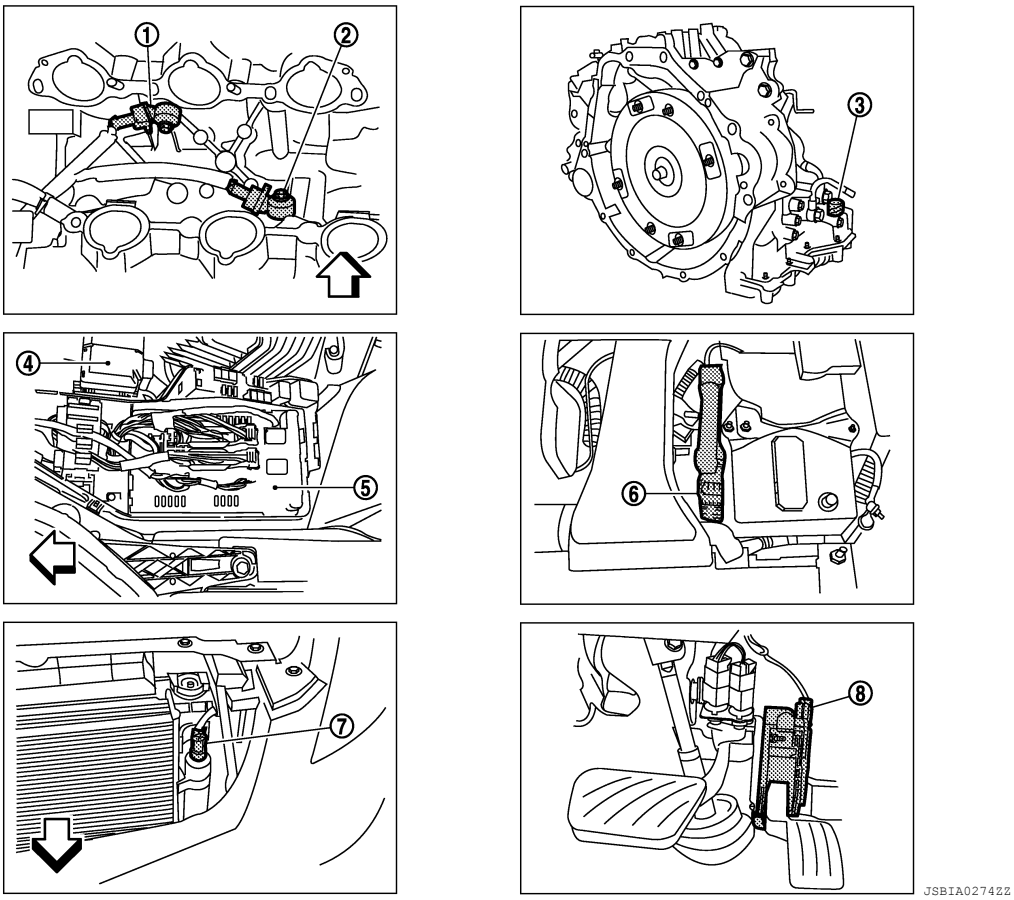
⇦ : Vehicle front



ALBIA0519ZZ

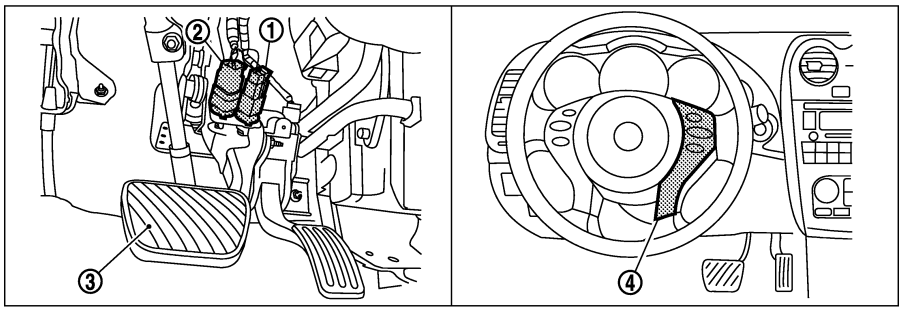
1. Electronic controlled engine mount control solenoid valve
2. EVAP canister vent control valve (view with rear suspension member removed)
3. EVAP canister
4. Fuel injector harness connector
5. Intake valve timing control solenoid valve (bank 1)
6. Intake valve timing control solenoid valve (bank 2)

⇦ : Vehicle front



1. Knock sensor (bank 2)
2. Knock sensor (bank 1)
3. Transmission range switch
4. Battery
5. IPDM E/R
6. ECM
7. Refrigerant pressure sensor (shown with front grill removed)
8. Accelerator pedal position sensor

⇦ : Vehicle front



1. ASCD brake switch
2. Stop lamp switch
3. Brake pedal
4. ASCD steering switch

Component Description

INFOID:0000000006391879

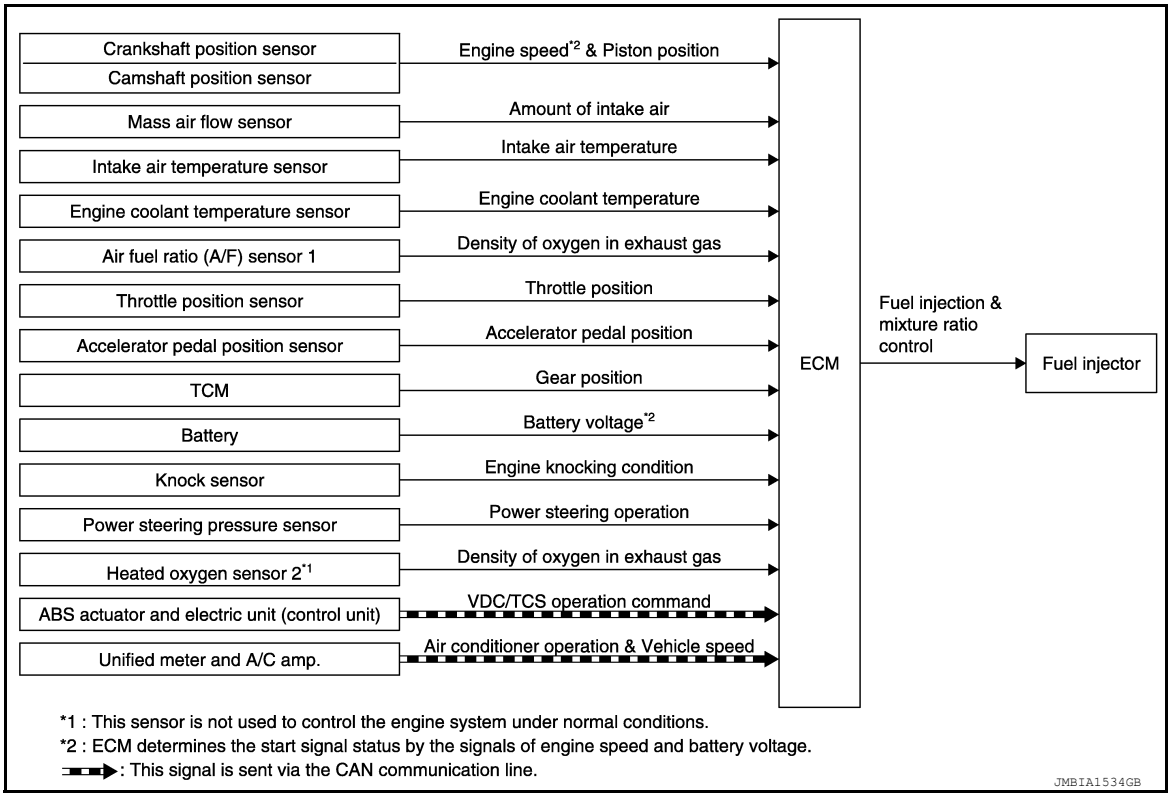
Component	Reference
A/F sensor 1	EC-471, "Description"
A/F sensor 1 heater	EC-447, "Description"
Accelerator pedal position sensor	EC-585, "Description"

Component	Reference
ASCD brake switch	EC-551, "Description"
ASCD steering switch	EC-548, "Description"
Battery current sensor	EC-536, "Description"
Camshaft position sensor (PHASE)	EC-504, "Description"
Cooling fan motor	EC-603, "Description"
Crankshaft position sensor (POS)	EC-500, "Description"
Electric throttle control actuator	EC-583, "Description"
Electronic controlled engine mount	EC-610, "Description"
Engine coolant temperature sensor	EC-465, "Description"
EVAP canister purge volume control solenoid valve	EC-508, "Description"
Fuel injector	EC-616, "Description"
Fuel pump	EC-619, "Description"
Heated oxygen sensor 2	EC-623, "Description"
Heated oxygen sensor 2 heater	EC-456, "Description"
Ignition signal	EC-629, "Description"
Intake air temperature sensor	EC-465, "Description"
Intake valve timing control solenoid valve	EC-453, "Description"
Knock sensor	EC-497, "Description"
Mass air flow sensor	EC-456, "Description"
PCV valve	EC-635, "Description"
Power steering pressure sensor	EC-513, "Description"
Power valves 1 and 2	EC-639, "Description"
Refrigerant pressure sensor	EC-636, "Description"
Stop lamp switch	EC-570, "Description"
TCM	EC-524, "Description"
Throttle control motor	EC-580, "Description"
Throttle control motor relay	EC-574, "Description"
Throttle position sensor	EC-468, "Description"
VIAS control solenoid valve 1	EC-565, "Description"
VIAS control solenoid valve 2	EC-567, "Description"

MULTIPORT FUEL INJECTION SYSTEM

System Diagram

INFOID:0000000006391880



System Description

INFOID:0000000006391881

INPUT/OUTPUT SIGNAL CHART

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

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

SYSTEM DESCRIPTION

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

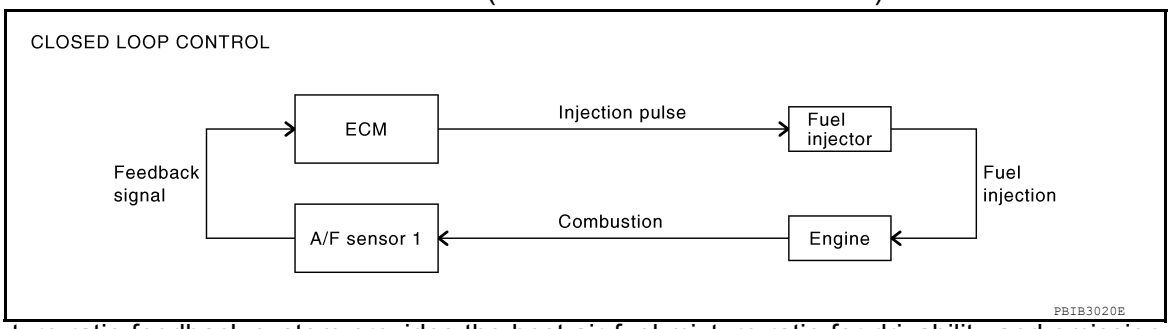
VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

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

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

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for drivability and emission control. The three way catalyst (manifold) can better reduce CO, HC and NOx emissions. This system uses A/F sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about A/F sensor 1, refer to EC-471, "Description". This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).

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

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

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

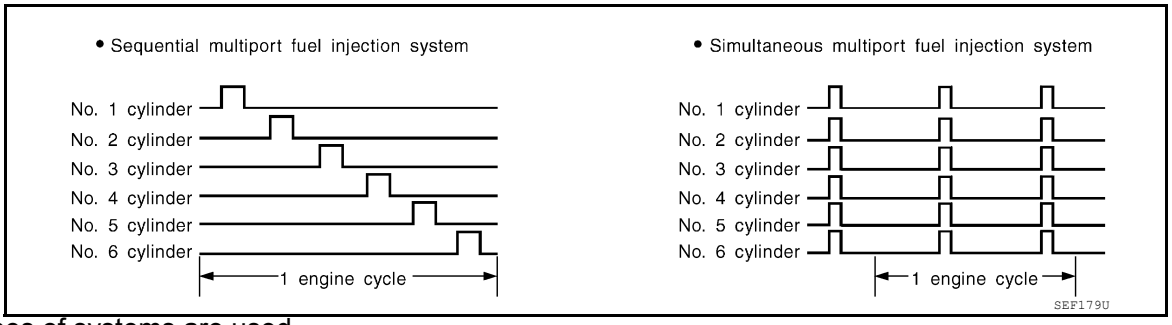
- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of A/F sensor 1 or its circuit
- Insufficient activation of A/F sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

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

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

FUEL INJECTION TIMING



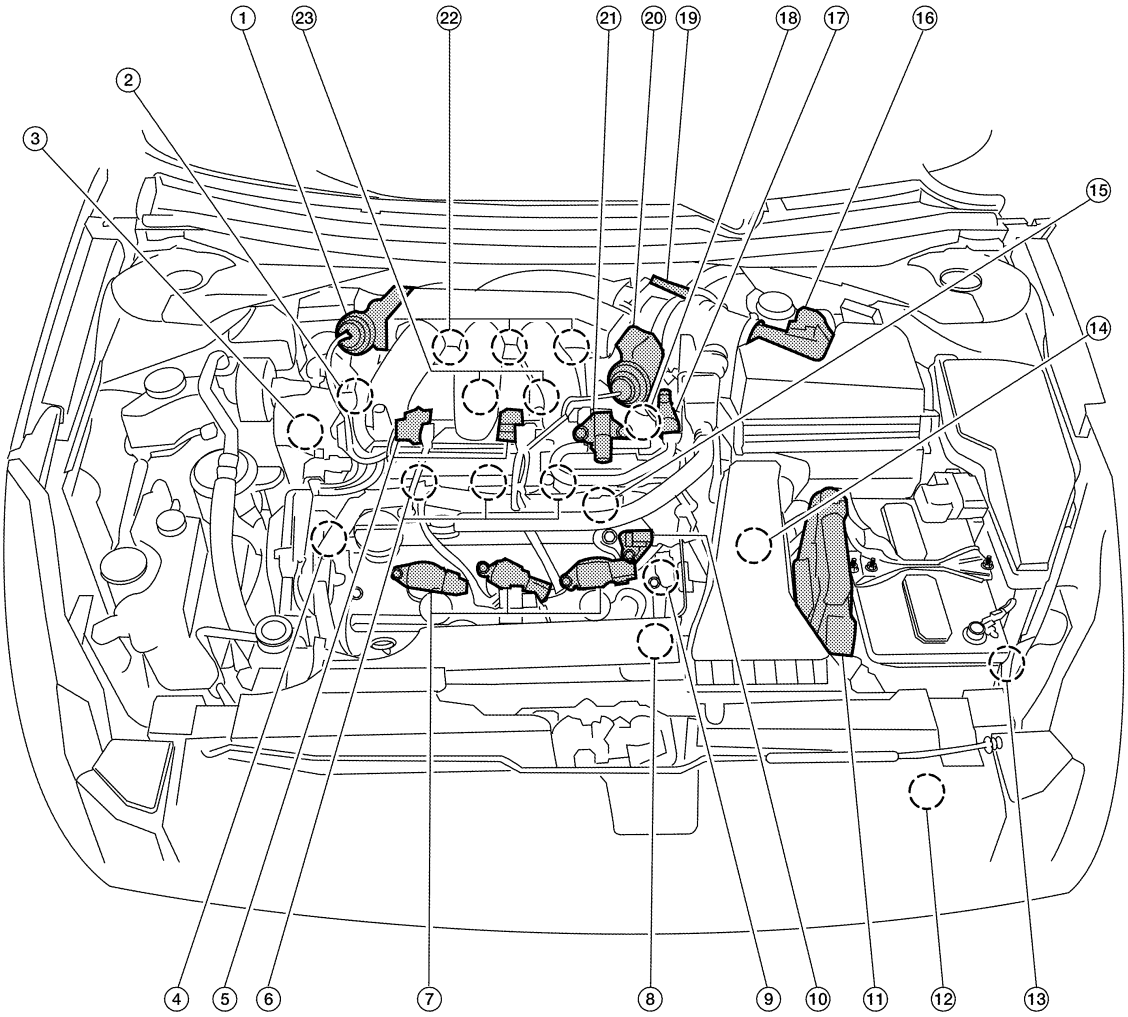
Two types of systems are used.
- Sequential Multiport Fuel Injection System
  Fuel is injected into each cylinder during each engine cycle according to the ignition order. This system is used when the engine is running.
- Simultaneous Multiport Fuel Injection System
  Fuel is injected simultaneously into all six cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
  The six injectors will then receive the signals 2 times for each engine cycle.
  This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

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

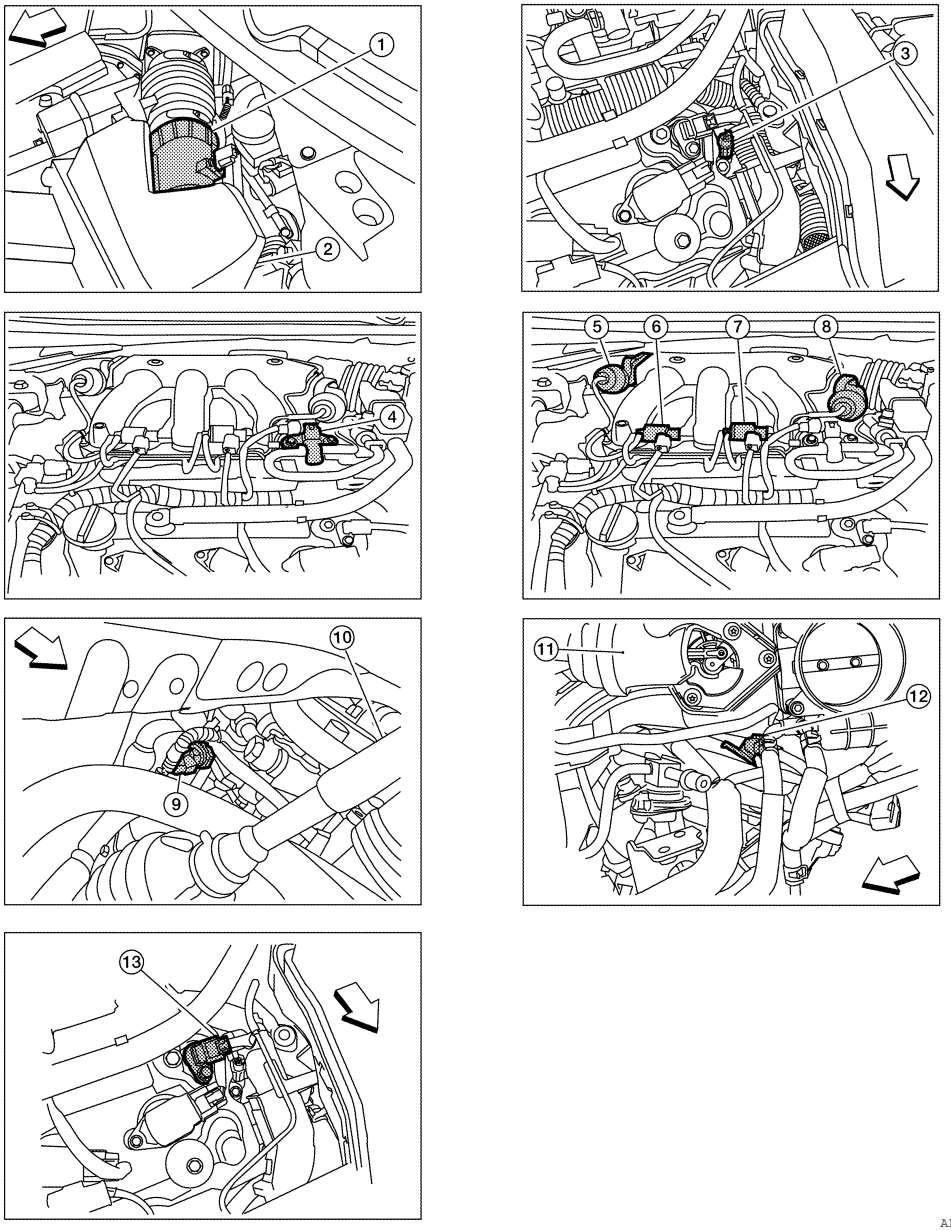
Component Parts Location

INFOID:0000000006391882



ALBIA0110ZZ

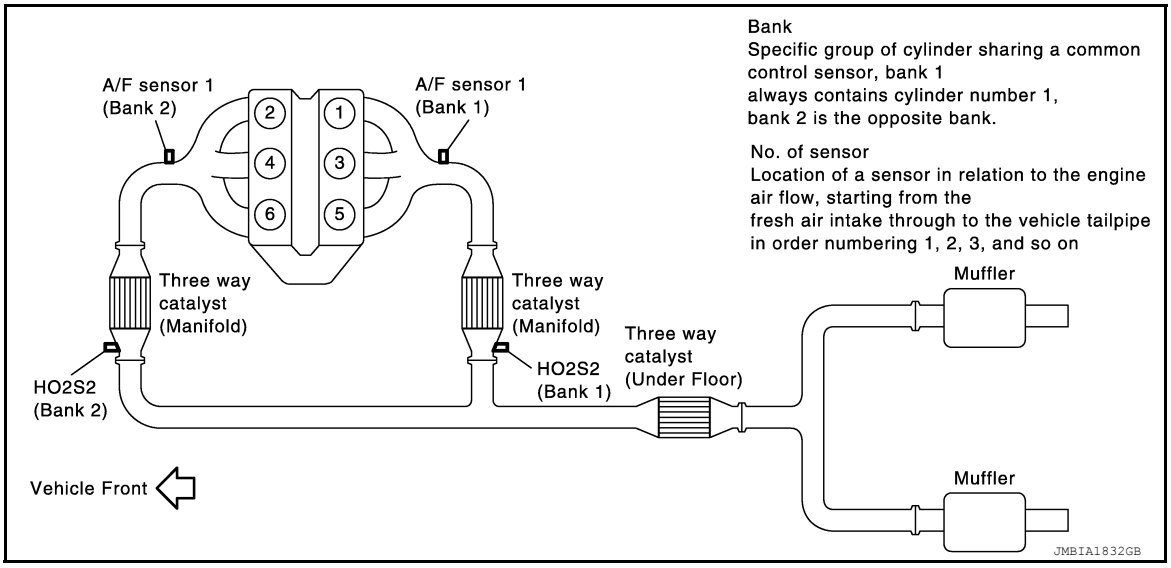
1. Power valve actuator 1
2. Intake valve timing control solenoid valve (bank 1)
3. Power steering pressure sensor
4. Intake valve timing control solenoid valve (bank 2)
5. VIAS control solenoid valves 1 and 2
6. Fuel injector (bank 2)
7. Ignition coil (with power transistor) and spark plug (bank 2)
8. Crankshaft position sensor (POS)
9. Engine coolant temperature sensor
10. Camshaft position sensor (PHASE) (bank 2)
11. ECM
12. Refrigerant pressure sensor
13. Battery current sensor
14. Transmission range switch
15. Condenser-2
16. Mass air flow sensor (with intake air temperature sensor)
17. EVAP service port
18. Camshaft position sensor (PHASE) (bank 1)
19. Electric throttle control actuator
20. Power valve actuator 2
21. EVAP canister purge volume control solenoid valve
22. Ignition coil (with power transistor) and spark plug (bank 1)
23. Knock sensor

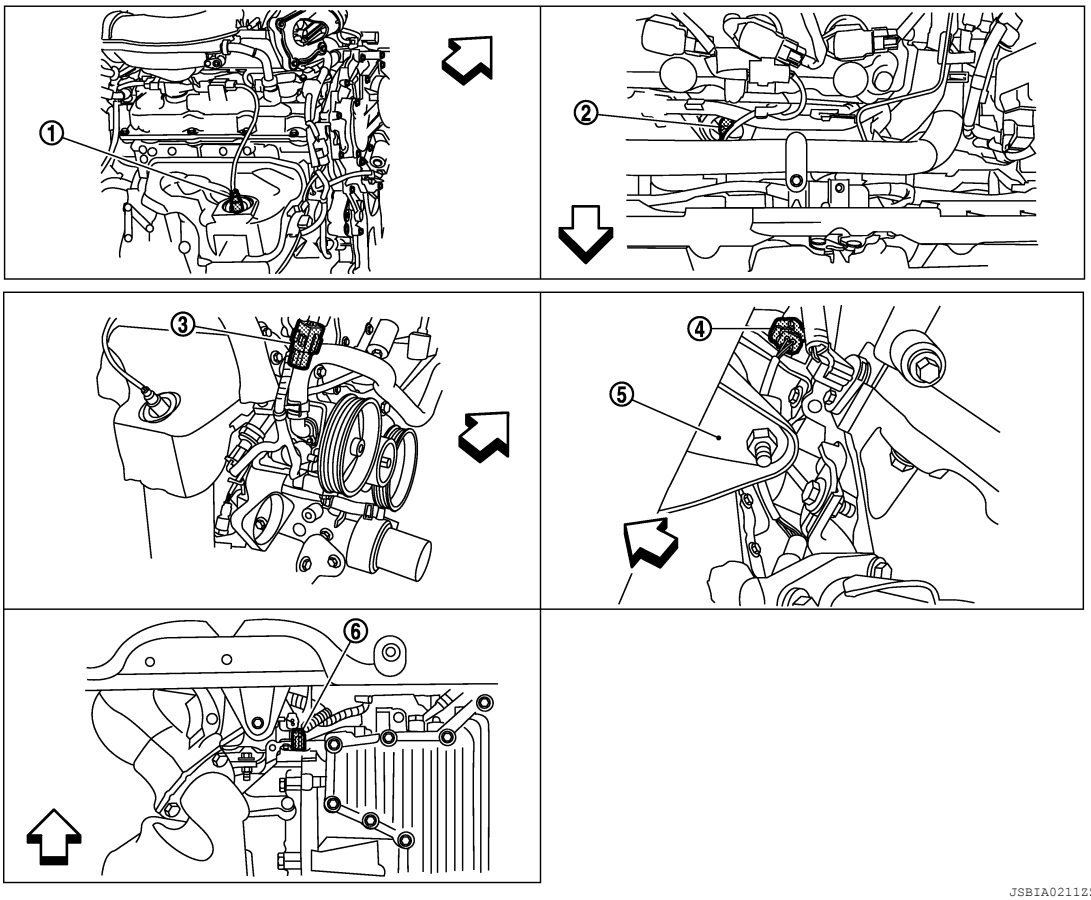


ALBIA0101ZZ

1. Mass air flow sensor (with intake air temperature sensor)
2. Air cleaner case
3. Engine coolant temperature sensor
4. EVAP canister purge volume control solenoid valve
5. Power valve actuator 1
6. VIAS control solenoid valve 1
7. VIAS control solenoid valve 2
8. Power valve actuator 2
9. Power steering pressure sensor
10. Tie rod (RH)
11. Power valve actuator 2
12. Camshaft position sensor (PHASE) (bank 1)
13. Camshaft position sensor (PHASE) (bank 2)

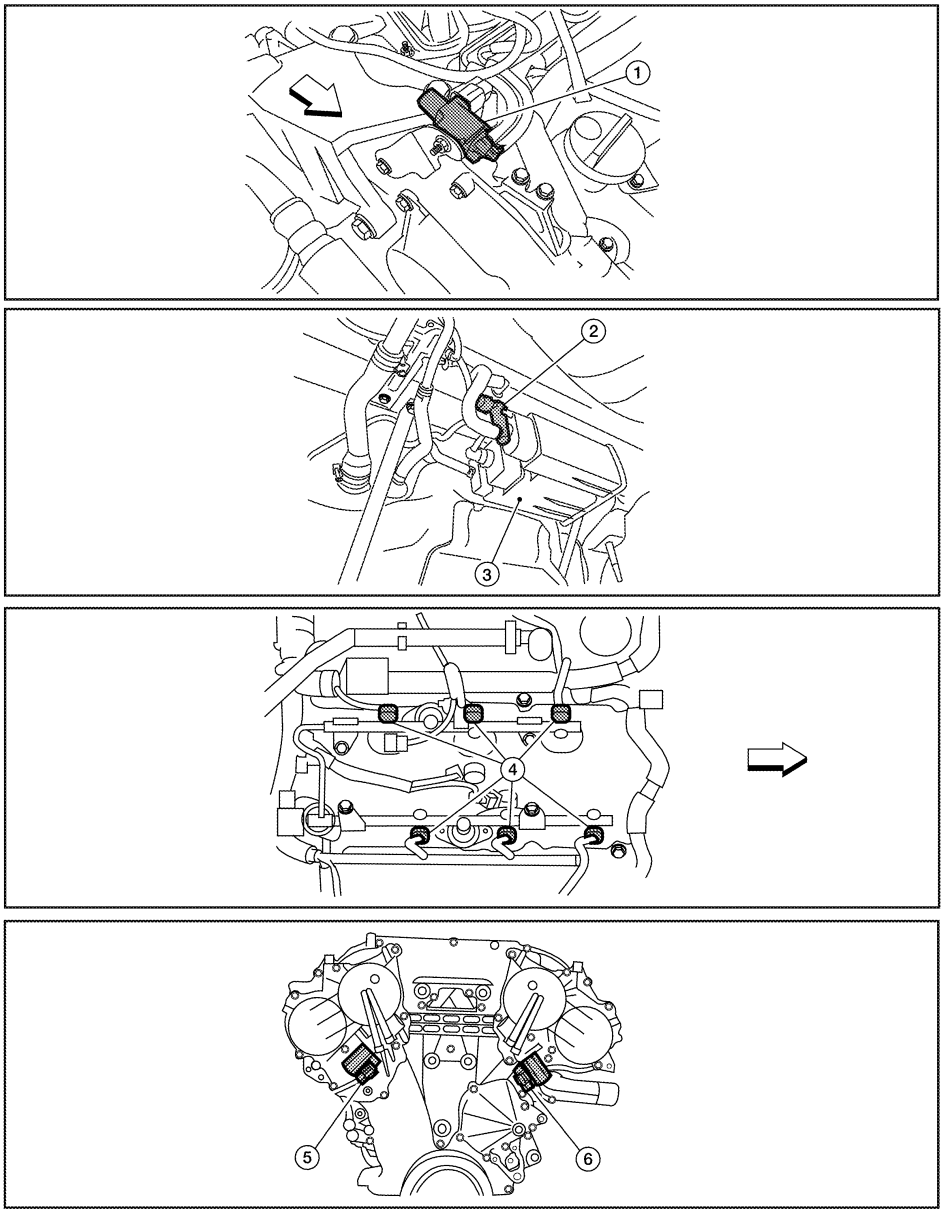
⇦ : Vehicle front





1. A/F sensor 1 (bank 1)
2. A/F sensor 1 (bank 2)
3. HO2S2 (bank 1) harness connector
4. HO2S2 (bank 2) harness connector
5. Front engine mount
6. Crankshaft position sensor (POS)

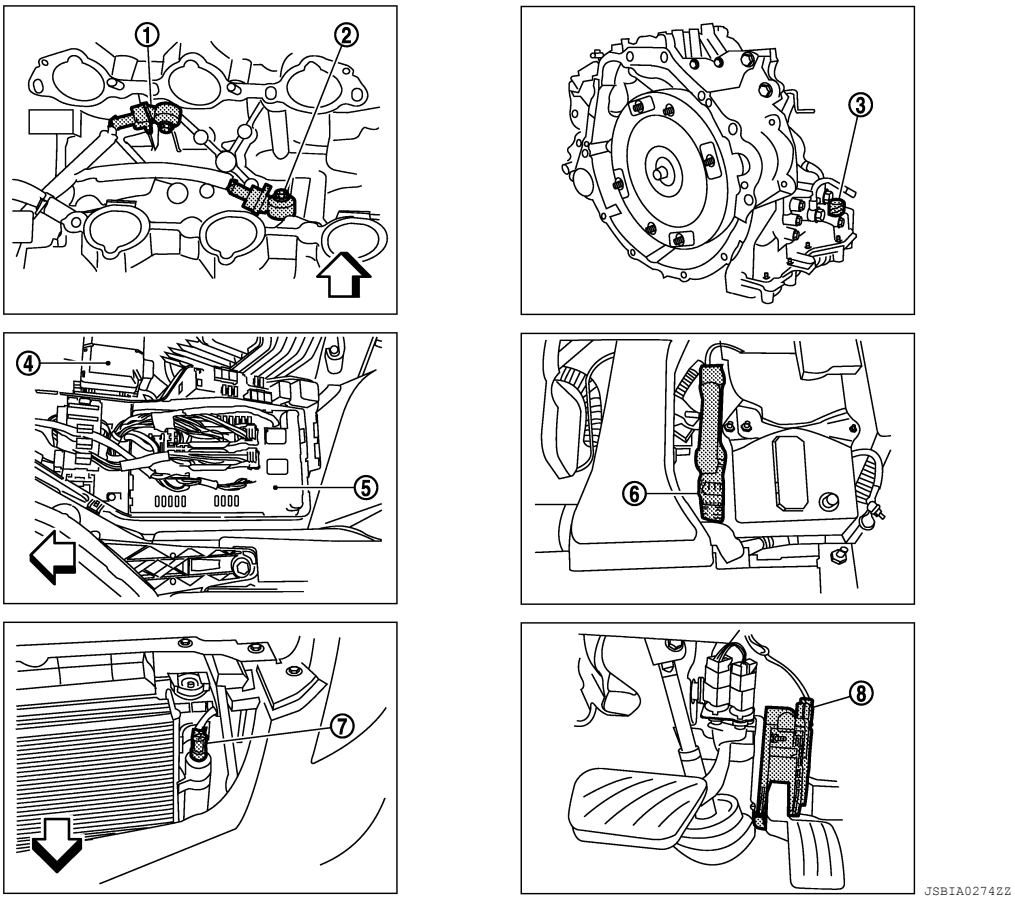
⇦ : Vehicle front



ALBIA0519ZZ

1. Electronic controlled engine mount control solenoid valve
2. EVAP canister vent control valve (view with rear suspension member removed)
3. EVAP canister
4. Fuel injector harness connector
5. Intake valve timing control solenoid valve (bank 1)
6. Intake valve timing control solenoid valve (bank 2)

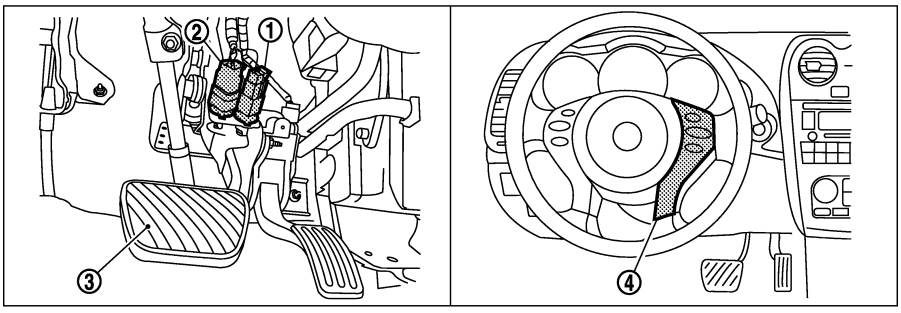
⇦ : Vehicle front



JSBIA0274ZZ

1. Knock sensor (bank 2)
2. Knock sensor (bank 1)
3. Transmission range switch
4. Battery
5. IPDM E/R
6. ECM
7. Refrigerant pressure sensor (shown with front grill removed)
8. Accelerator pedal position sensor

⇦ : Vehicle front



JSBIA0212ZZ

1. ASCD brake switch
2. Stop lamp switch
3. Brake pedal
4. ASCD steering switch

Component Description

INFOID:0000000006391883

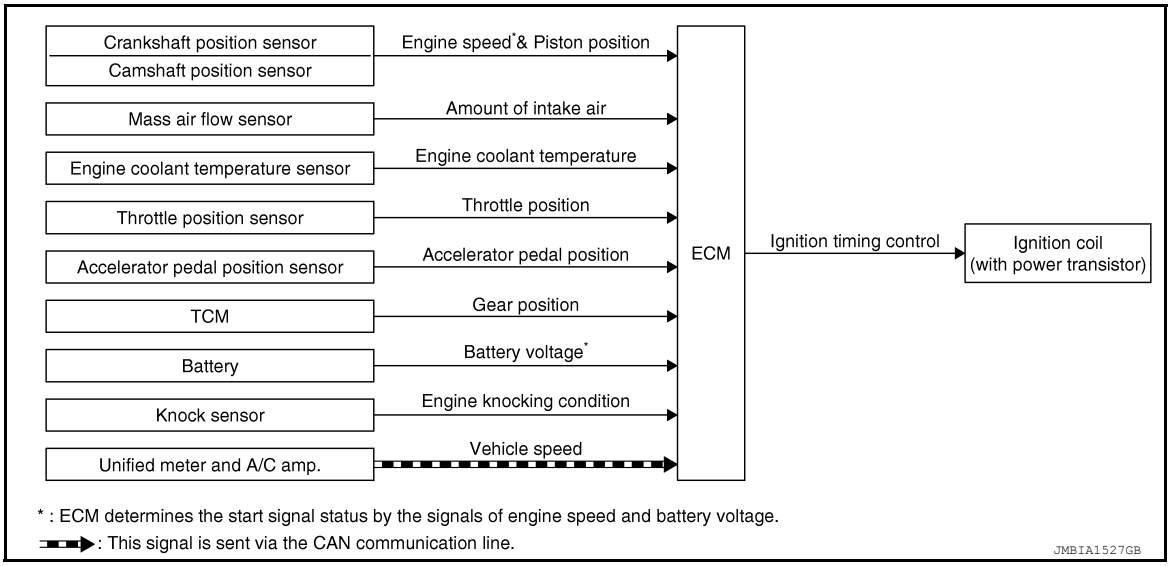
Component	Reference
A/F sensor 1	EC-471, "Description"
Accelerator pedal position sensor	EC-585, "Description"
Camshaft position sensor (PHASE)	EC-504, "Description"

Component	Reference
Crankshaft position sensor (POS)	EC-500, "Description"
Engine coolant temperature sensor	EC-465, "Description"
Fuel injector	EC-616, "Description"
Heated oxygen sensor 2	EC-623, "Description"
Intake air temperature sensor	EC-462, "Description"
Knock sensor	EC-497, "Description"
Mass air flow sensor	EC-456, "Description"
Power steering pressure sensor	EC-513, "Description"
TCM	EC-524, "Description"
Throttle position sensor	EC-468, "Description"

ELECTRIC IGNITION SYSTEM

System Diagram

INFOID:0000000006391884



System Description

INFOID:0000000006391885

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		
TCM	Gear position		
Battery	Battery voltage*2		
Knock sensor	Engine knocking		
Unified meter and A/C amp.	Vehicle speed*1		

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

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

SYSTEM DESCRIPTION

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

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

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

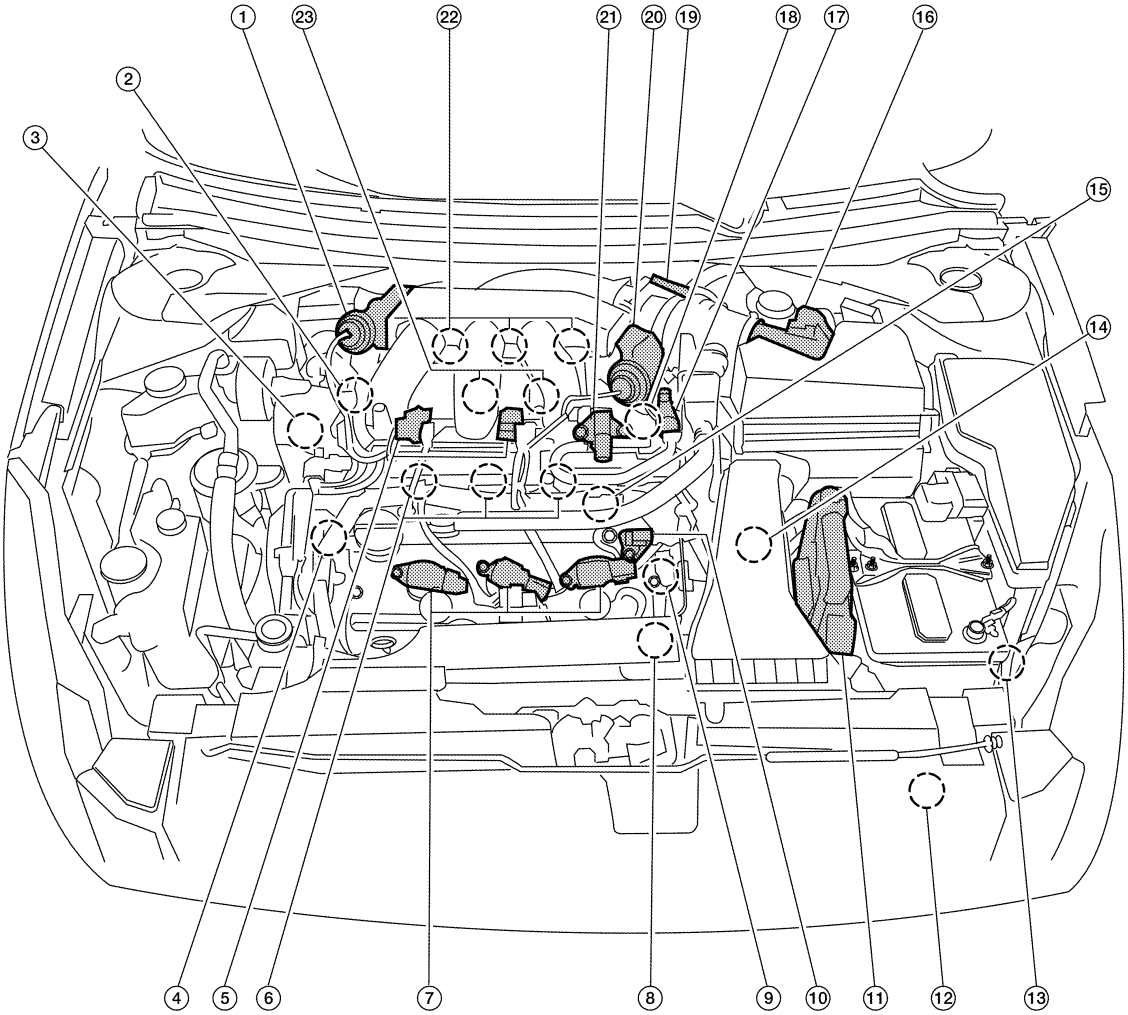
- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

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

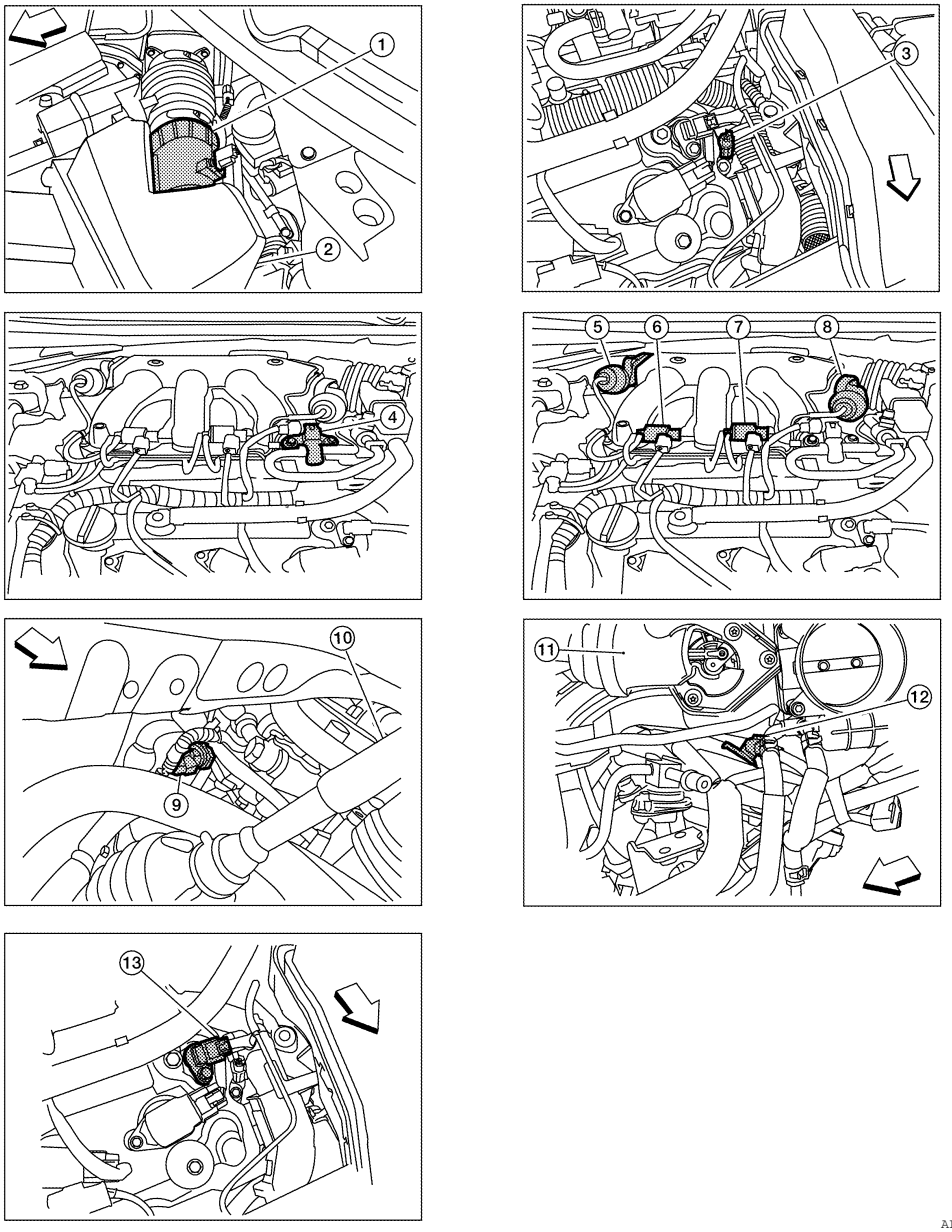
INFOID:0000000006391886



ALBIA0110ZZ

1. Power valve actuator 1
2. Intake valve timing control solenoid valve (bank 1)
3. Power steering pressure sensor
4. Intake valve timing control solenoid valve (bank 2)
5. VIAS control solenoid valves 1 and 2
6. Fuel injector (bank 2)
7. Ignition coil (with power transistor) and spark plug (bank 2)
8. Crankshaft position sensor (POS)
9. Engine coolant temperature sensor
10. Camshaft position sensor (PHASE) (bank 2)
11. ECM
12. Refrigerant pressure sensor
13. Battery current sensor
14. Transmission range switch
15. Condenser-2
16. Mass air flow sensor (with intake air temperature sensor)
17. EVAP service port
18. Camshaft position sensor (PHASE) (bank 1)

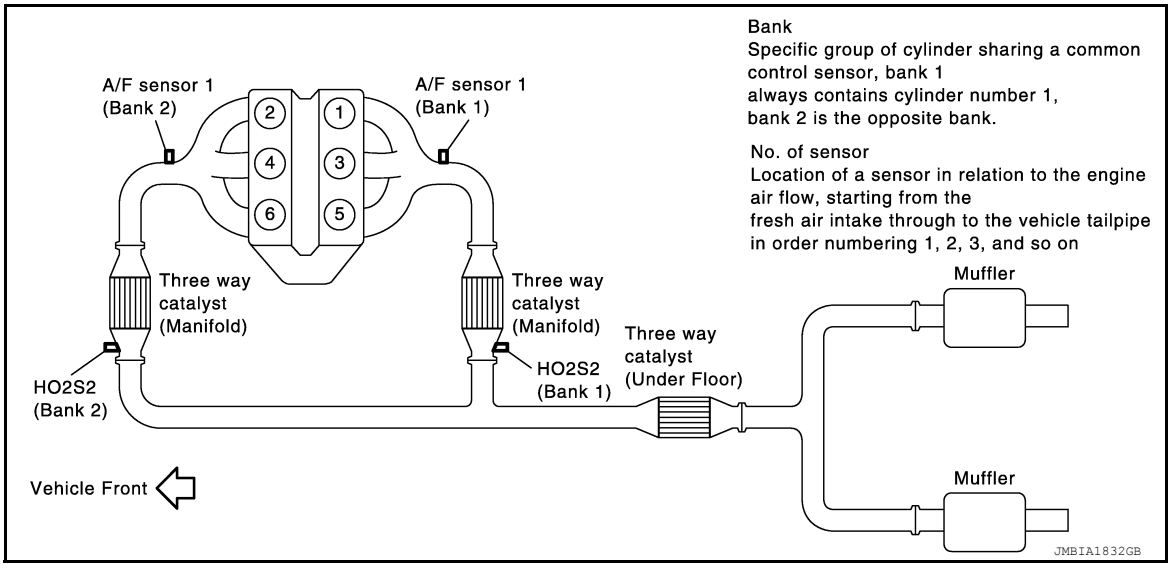
19. Electric throttle control actuator
20. Power valve actuator 2
21. EVAP canister purge volume control solenoid valve
22. Ignition coil (with power transistor) and spark plug (bank 1)
23. Knock sensor

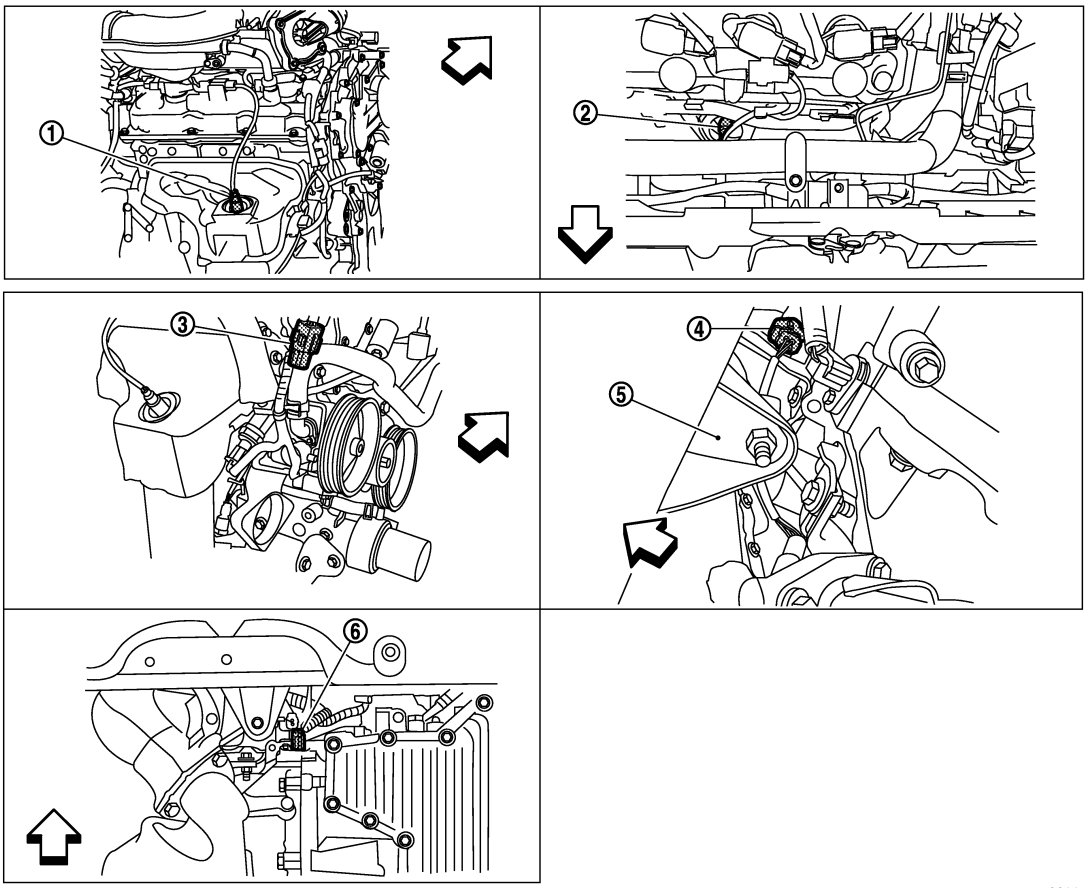


ALBIA0101ZZ

1. Mass air flow sensor (with intake air temperature sensor)
2. Air cleaner case
3. Engine coolant temperature sensor
4. EVAP canister purge volume control solenoid valve
5. Power valve actuator 1
6. VIAS control solenoid valve 1
7. VIAS control solenoid valve 2
8. Power valve actuator 2
9. Power steering pressure sensor
10. Tie rod (RH)
11. Power valve actuator 2
12. Camshaft position sensor (PHASE) (bank 1)
13. Camshaft position sensor (PHASE) (bank 2)

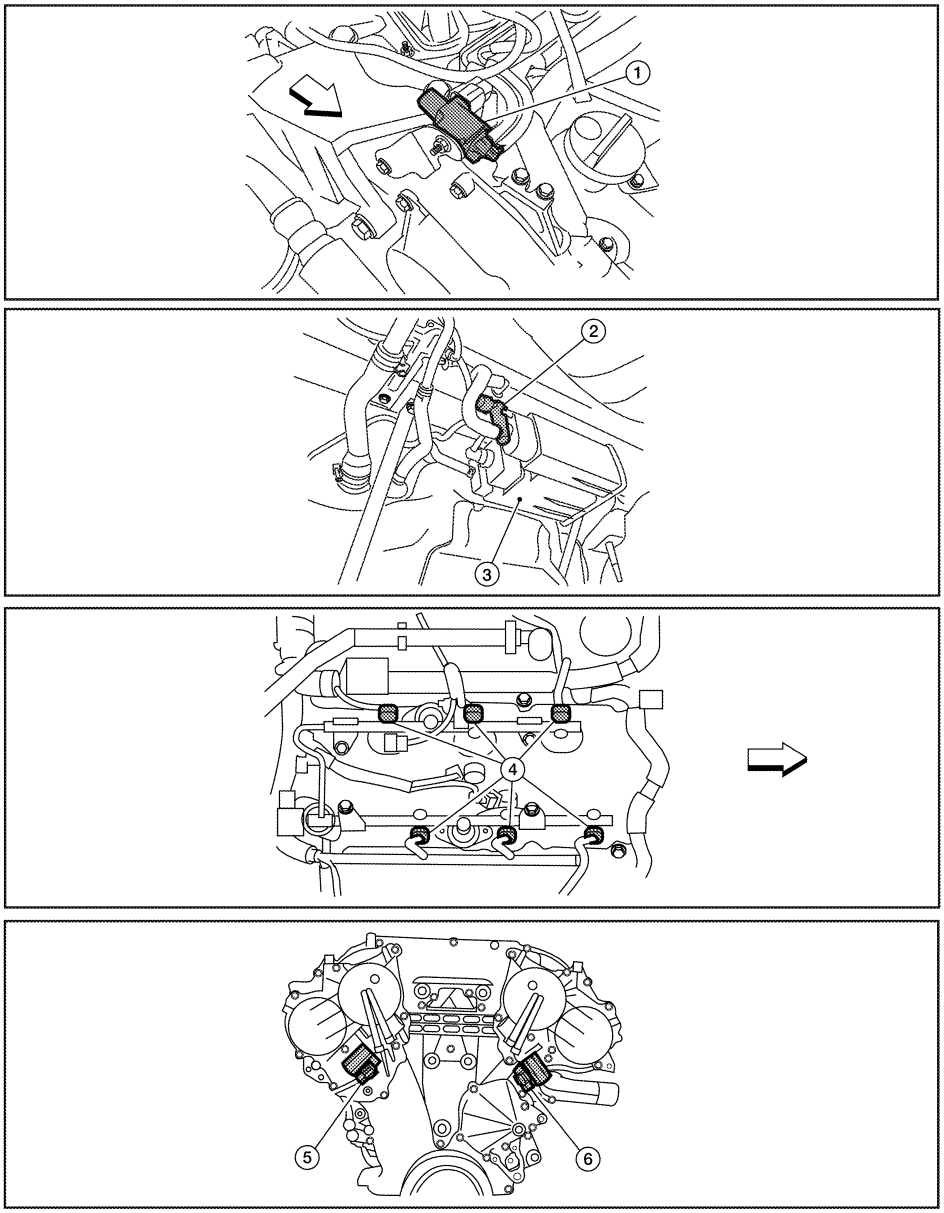
⇦ : Vehicle front





1. A/F sensor 1 (bank 1)
2. A/F sensor 1 (bank 2)
3. HO2S2 (bank 1) harness connector
4. HO2S2 (bank 2) harness connector
5. Front engine mount
6. Crankshaft position sensor (POS)

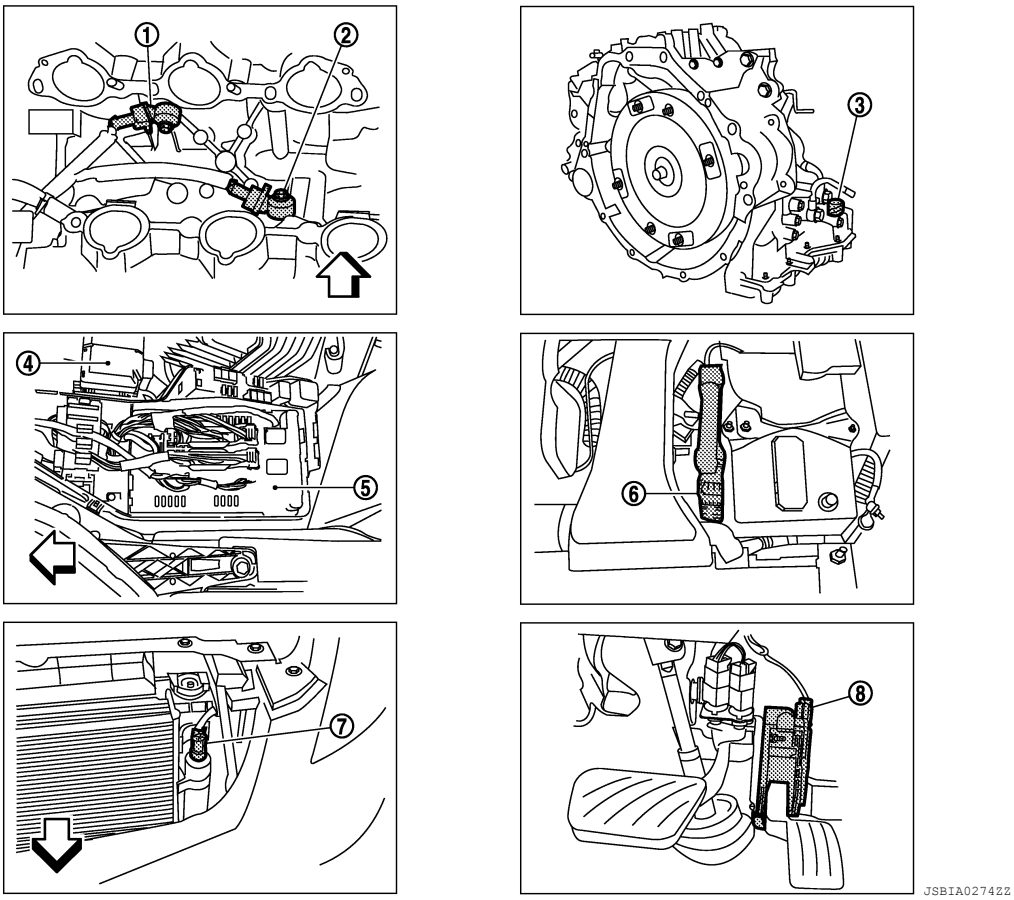
⇦ : Vehicle front



ALBIA0519ZZ

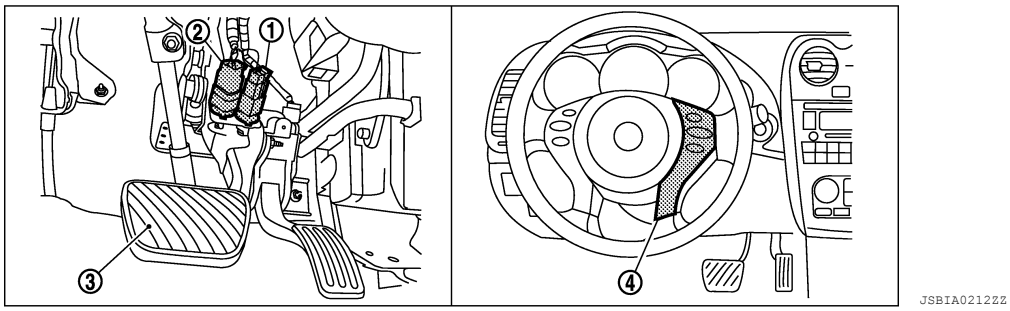
1. Electronic controlled engine mount control solenoid valve
2. EVAP canister vent control valve (view with rear suspension member removed)
3. EVAP canister
4. Fuel injector harness connector
5. Intake valve timing control solenoid valve (bank 1)
6. Intake valve timing control solenoid valve (bank 2)

⇦ : Vehicle front



1. Knock sensor (bank 2)
2. Knock sensor (bank 1)
3. Transmission range switch
4. Battery
5. IPDM E/R
6. ECM
7. Refrigerant pressure sensor (shown with front grill removed)
8. Accelerator pedal position sensor

⇦ : Vehicle front



1. ASCD brake switch
2. Stop lamp switch
3. Brake pedal
4. ASCD steering switch

Component Description

INFOID:0000000006391887

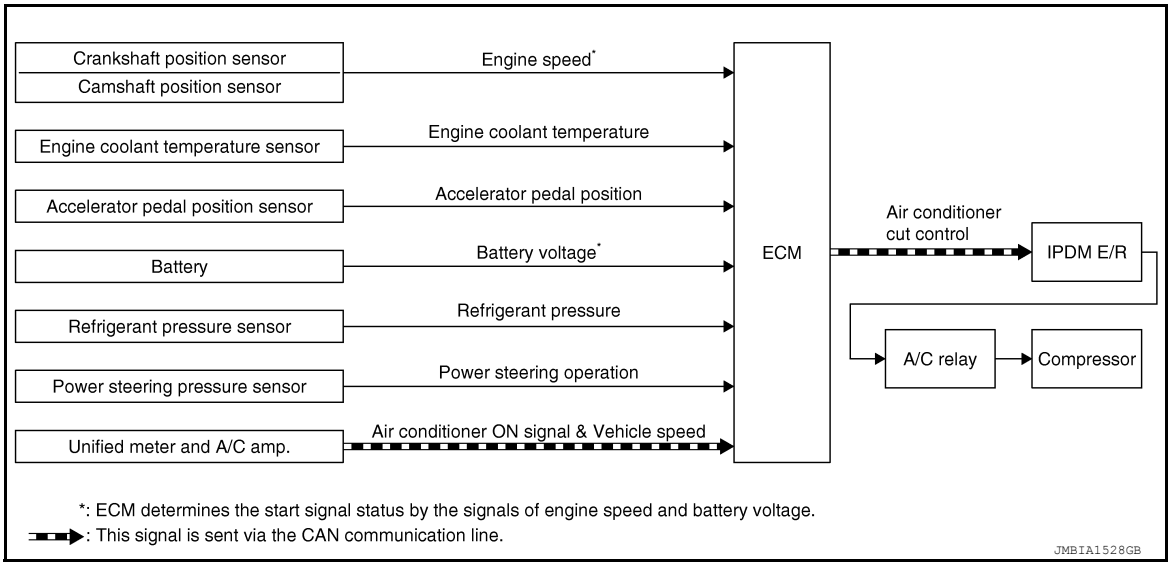
Component	Reference
Accelerator pedal position sensor	EC-585, "Description"
Camshaft position sensor (PHASE)	EC-504, "Description"
Crankshaft position sensor (POS)	EC-500, "Description"

Component	Reference
Engine coolant temperature sensor	EC-465, "Description"
Ignition signal	EC-629, "Description"
Knock sensor	EC-497, "Description"
Mass air flow sensor	EC-456, "Description"
TCM	EC-524, "Description"
Throttle position sensor	EC-468, "Description"

AIR CONDITIONING CUT CONTROL

System Diagram

INFOID:0000000006391888



System Description

INFOID:0000000006391889

INPUT/OUTPUT SIGNAL CHART

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

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

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

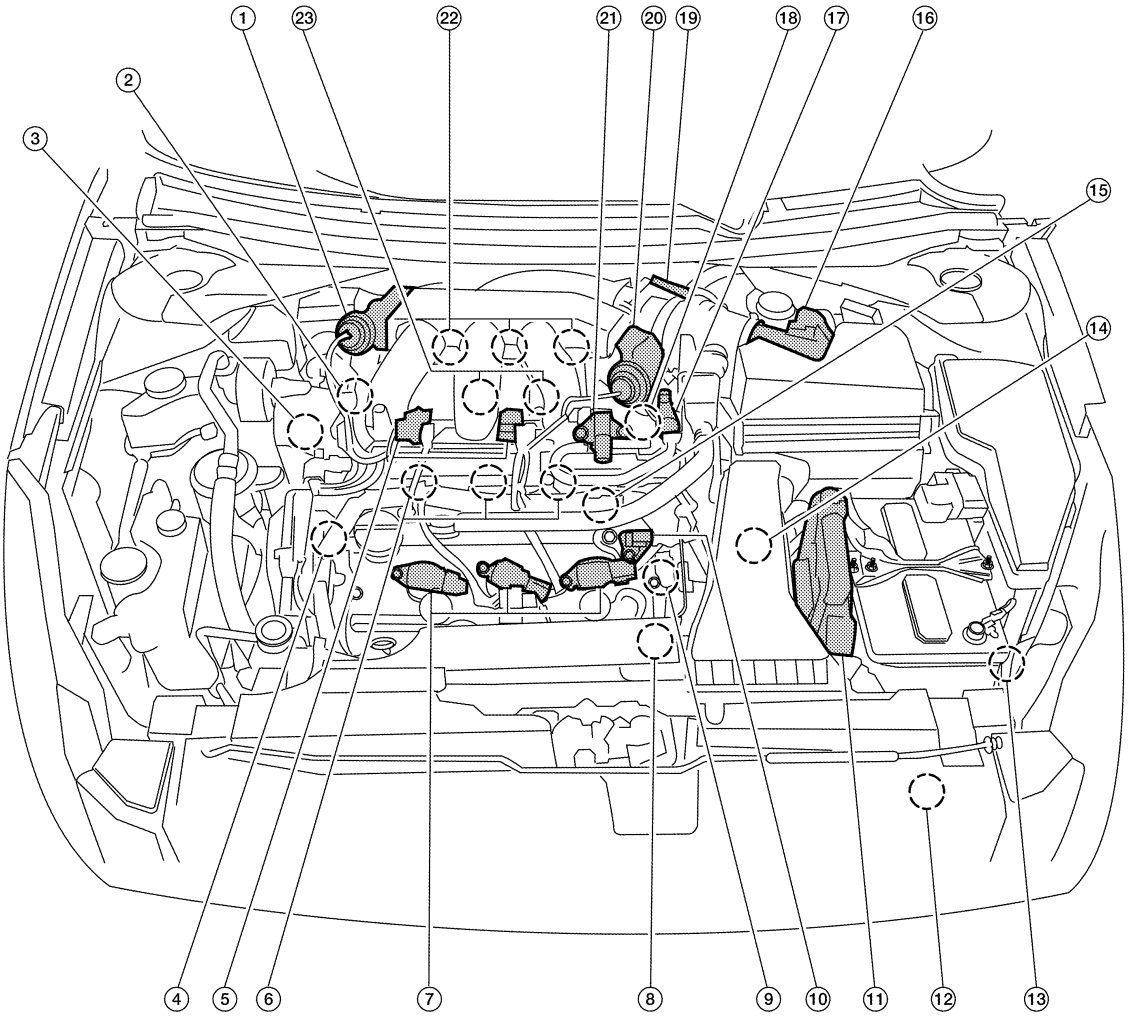
SYSTEM DESCRIPTION

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.

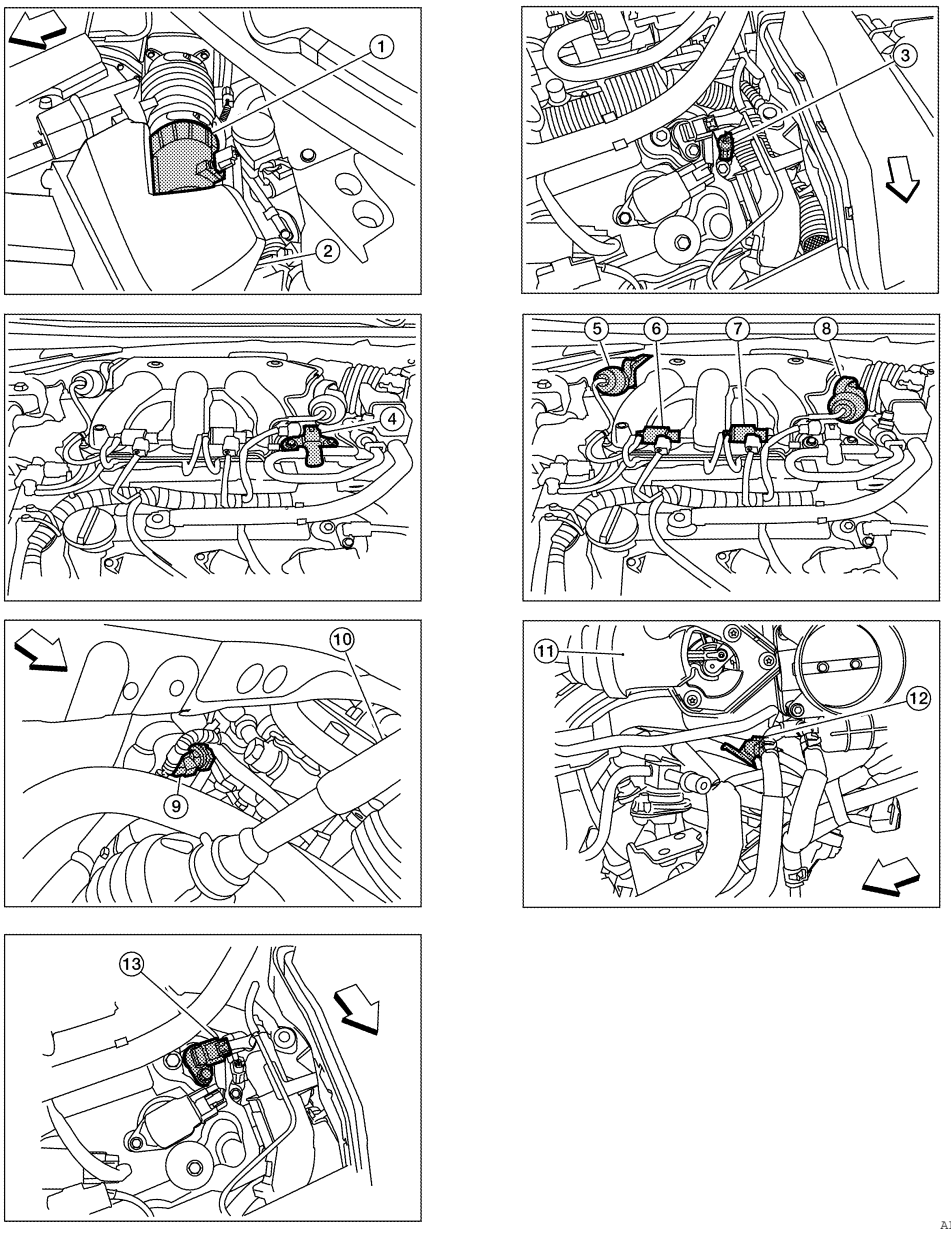
Component Parts Location

INFOID:0000000006391890



ALBIA0110ZZ

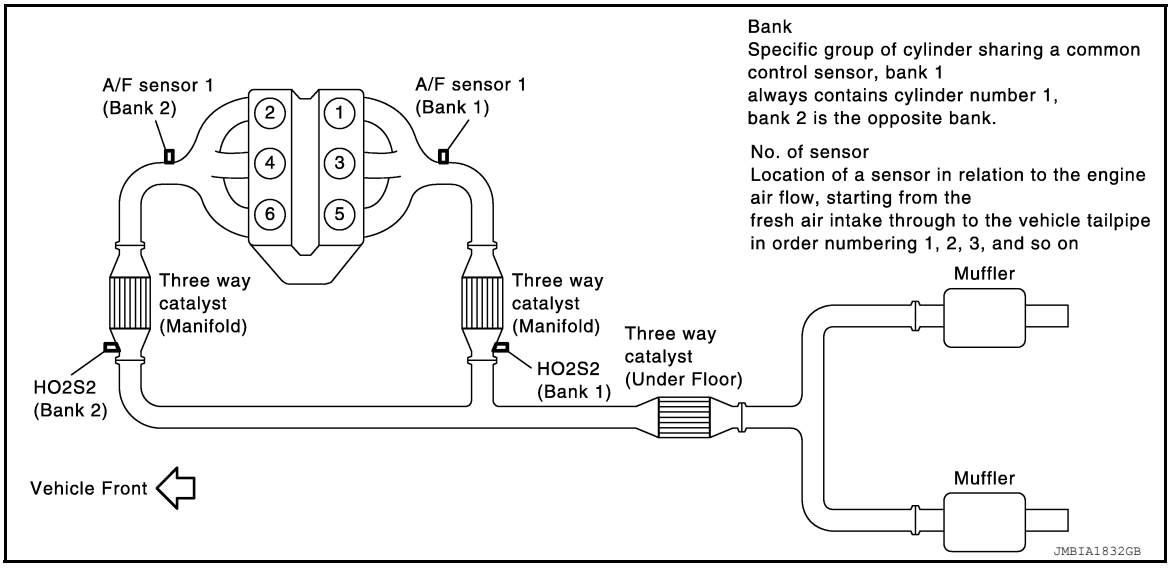
1. Power valve actuator 1
2. Intake valve timing control solenoid valve (bank 1)
3. Power steering pressure sensor
4. Intake valve timing control solenoid valve (bank 2)
5. VIAS control solenoid valves 1 and 2
6. Fuel injector (bank 2)
7. Ignition coil (with power transistor) and spark plug (bank 2)
8. Crankshaft position sensor (POS)
9. Engine coolant temperature sensor
10. Camshaft position sensor (PHASE) (bank 2)
11. ECM
12. Refrigerant pressure sensor
13. Battery current sensor
14. Transmission range switch
15. Condenser-2
16. Mass air flow sensor (with intake air temperature sensor)
17. EVAP service port
18. Camshaft position sensor (PHASE) (bank 1)
19. Electric throttle control actuator
20. Power valve actuator 2
21. EVAP canister purge volume control solenoid valve
22. Ignition coil (with power transistor) and spark plug (bank 1)
23. Knock sensor

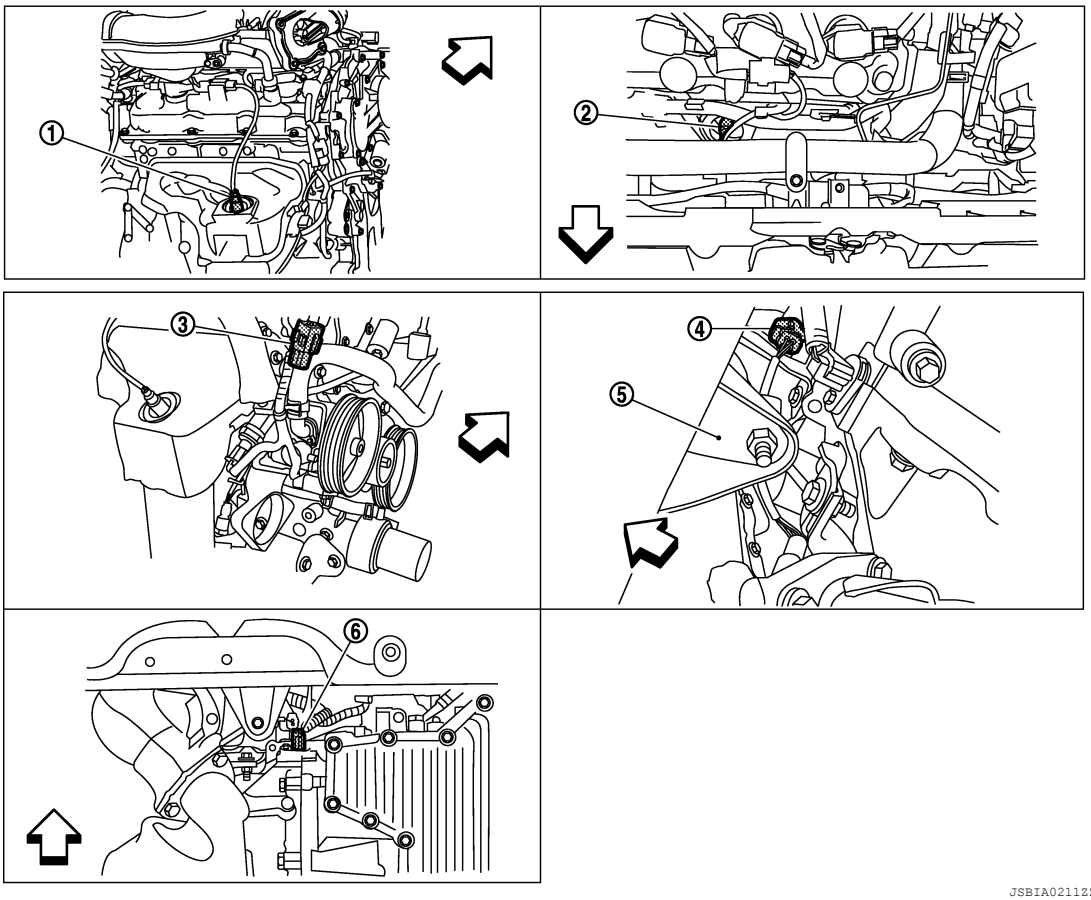


ALBIA0101ZZ

1. Mass air flow sensor (with intake air temperature sensor)
2. Air cleaner case
3. Engine coolant temperature sensor
4. EVAP canister purge volume control solenoid valve
5. Power valve actuator 1
6. VIAS control solenoid valve 1
7. VIAS control solenoid valve 2
8. Power valve actuator 2
9. Power steering pressure sensor
10. Tie rod (RH)
11. Power valve actuator 2
12. Camshaft position sensor (PHASE) (bank 1)
13. Camshaft position sensor (PHASE) (bank 2)

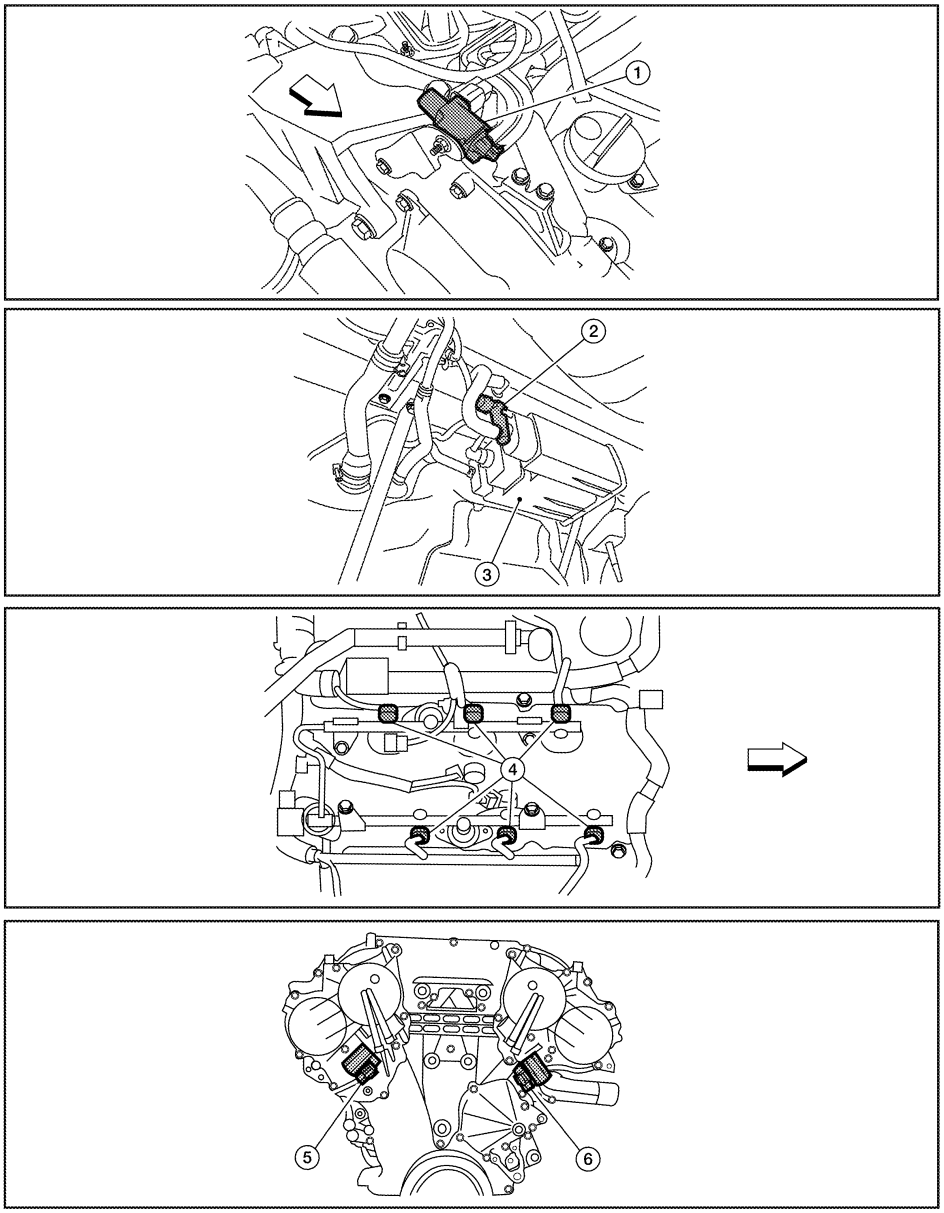
⇦ : Vehicle front





1. A/F sensor 1 (bank 1)
2. A/F sensor 1 (bank 2)
3. HO2S2 (bank 1) harness connector
4. HO2S2 (bank 2) harness connector
5. Front engine mount
6. Crankshaft position sensor (POS)

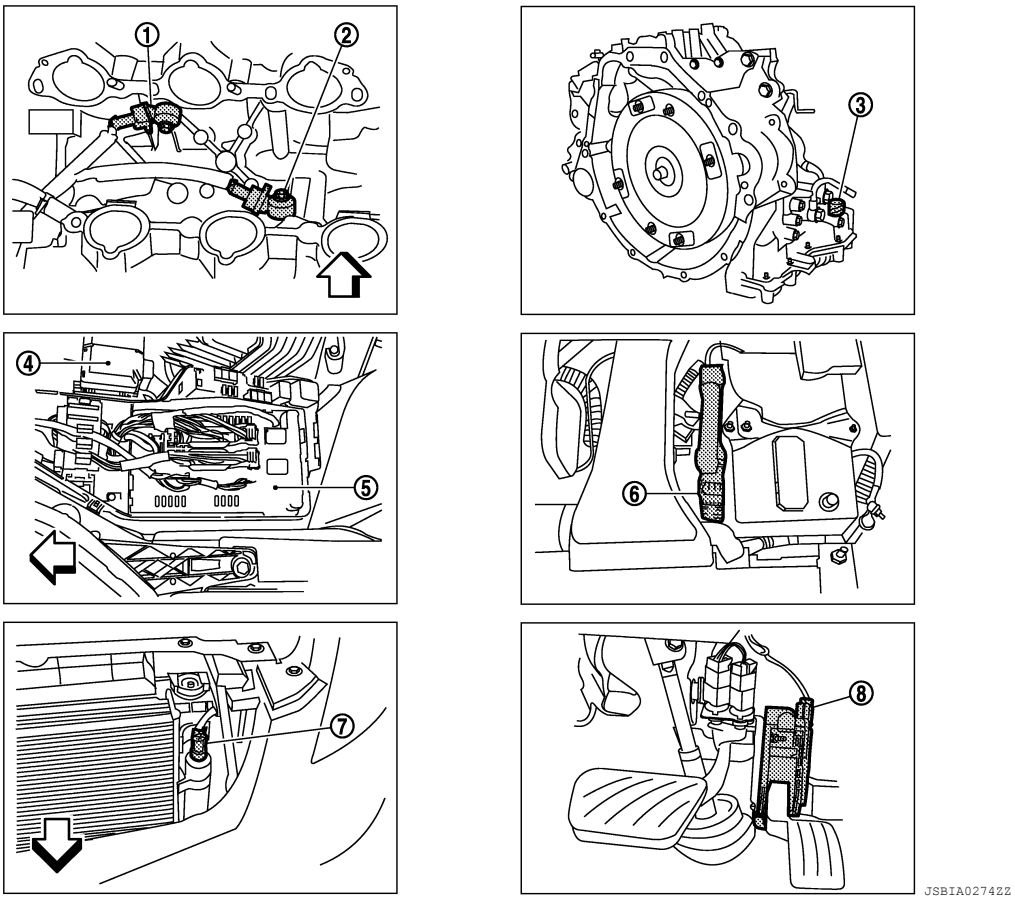
⇦ : Vehicle front



ALBIA0519ZZ

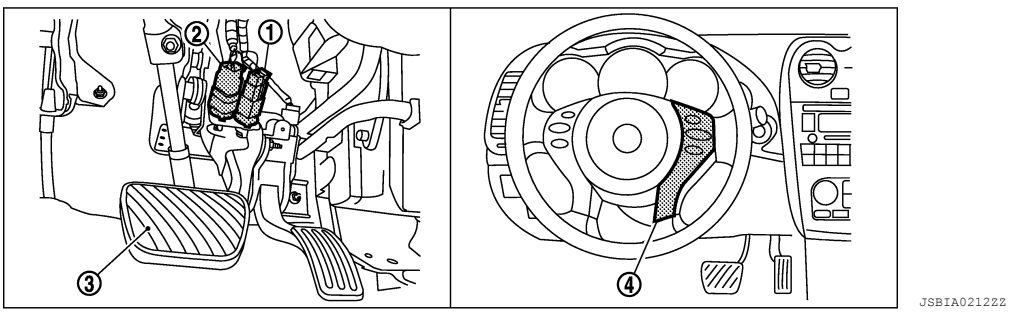
1. Electronic controlled engine mount control solenoid valve
2. EVAP canister vent control valve (view with rear suspension member removed)
3. EVAP canister
4. Fuel injector harness connector
5. Intake valve timing control solenoid valve (bank 1)
6. Intake valve timing control solenoid valve (bank 2)

⇦ : Vehicle front



1. Knock sensor (bank 2)
2. Knock sensor (bank 1)
3. Transmission range switch
4. Battery
5. IPDM E/R
6. ECM
7. Refrigerant pressure sensor (shown with front grill removed)
8. Accelerator pedal position sensor

⇦ : Vehicle front



1. ASCD brake switch
2. Stop lamp switch
3. Brake pedal
4. ASCD steering switch

Component Description

INFOID:0000000006391891

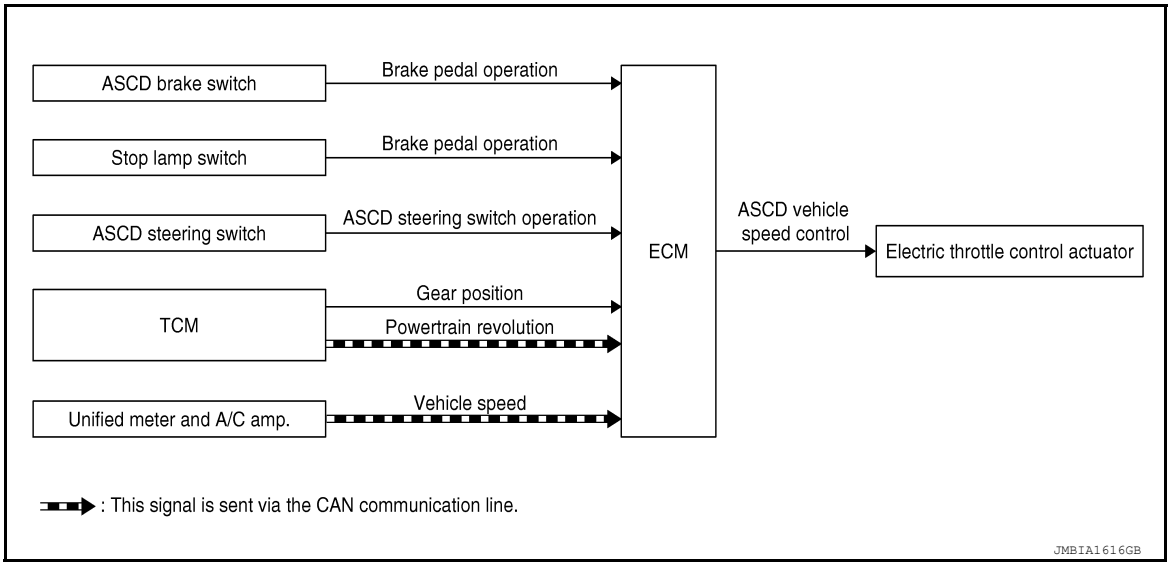
Component	Reference
Accelerator pedal position sensor	EC-585, "Description"
Camshaft position sensor (PHASE)	EC-504, "Description"
Crankshaft position sensor (POS)	EC-500, "Description"

Component	Reference
Engine coolant temperature sensor	EC-465, "Description"
Power steering pressure sensor	EC-513, "Description"
Refrigerant pressure sensor	EC-636, "Description"

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Diagram

INFOID:0000000006391892



System Description

INFOID:0000000006391893

INPUT/OUTPUT SIGNAL CHART

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

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

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.
Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 210 km/h (130 MPH).
ECM controls throttle angle of electric throttle control actuator to regulate engine speed.
The ASCD operation status is indicated by two indicators (CRUISE and SET on the information display) on the combination meter. If any malfunction occurs in the ASCD system, SET indicator blinks and ASCD control is deactivated.
NOTE:
Always drive vehicle in a safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press MAIN switch. (CRUISE is indicated on the information display.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 210 km/h (130 MPH), press SET/COAST switch. (Then SET is indicated on the information display in combination meter.)

ACCELERATE OPERATION

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

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.
- CANCEL switch is pressed
- More than 2 switches on ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Selector lever position is changed to N, P or R
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- TCS system is operated
- CVT control system has a malfunction. Refer to EC-561, "Description".

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

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

COAST OPERATION

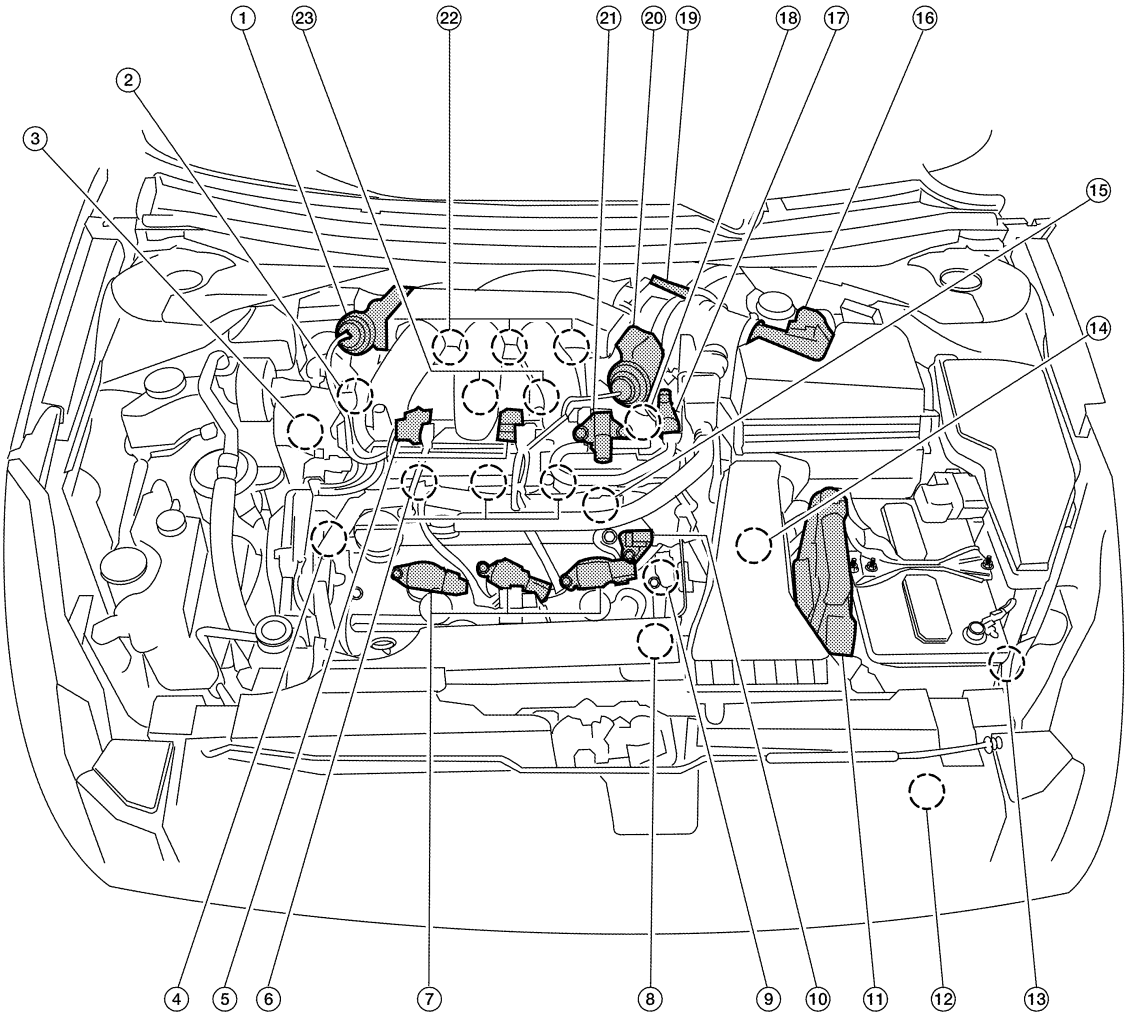
When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will maintain the new set speed.

RESUME OPERATION

When the RESUME/ACCELERATE switch is pressed after canceling operation other than pressing the MAIN switch, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.
- Brake pedal is released
- Selector lever position is other than P and N
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 210 km/h (130 MPH)

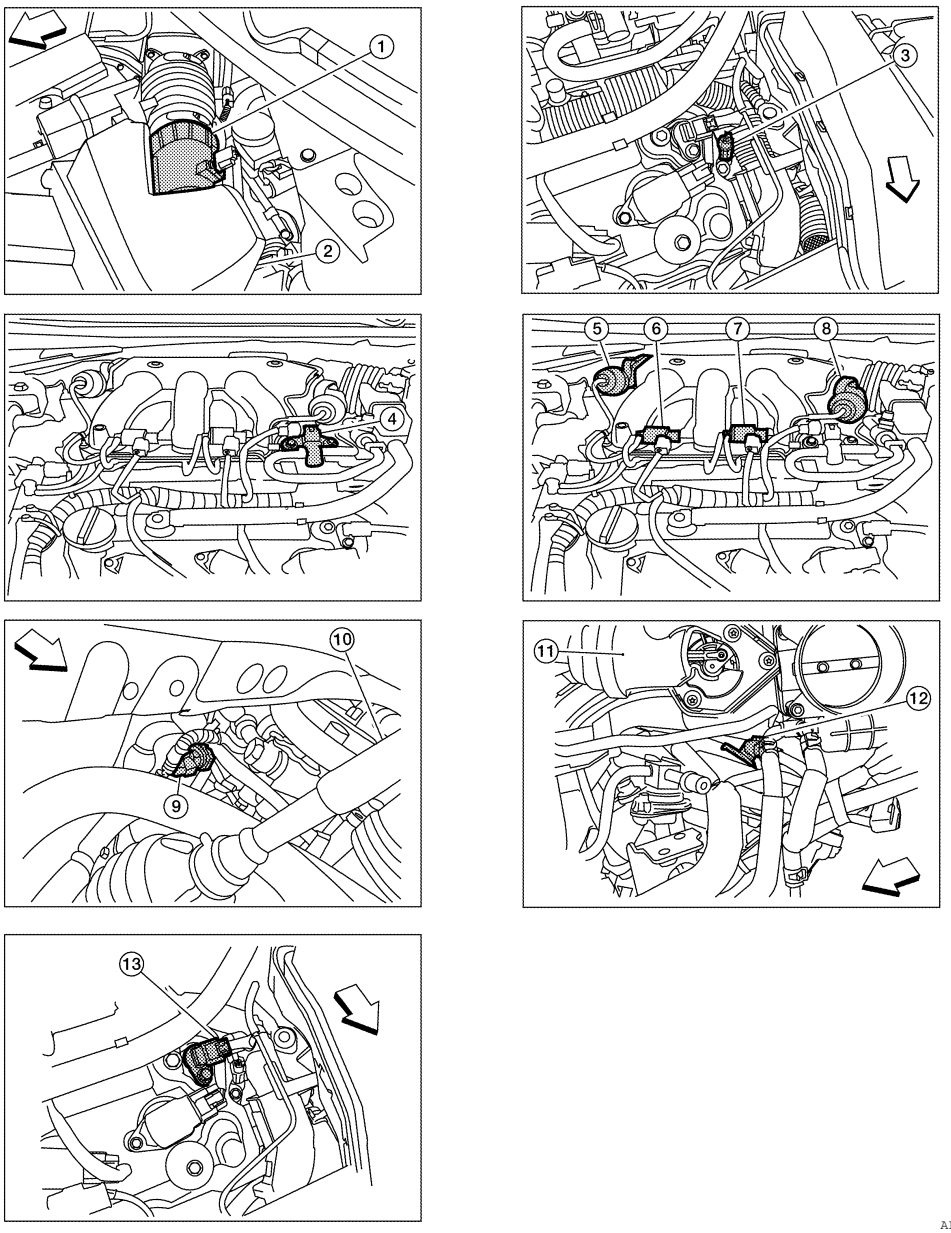
Component Parts Location

INFOID:0000000006391894



ALBIA0110ZZ

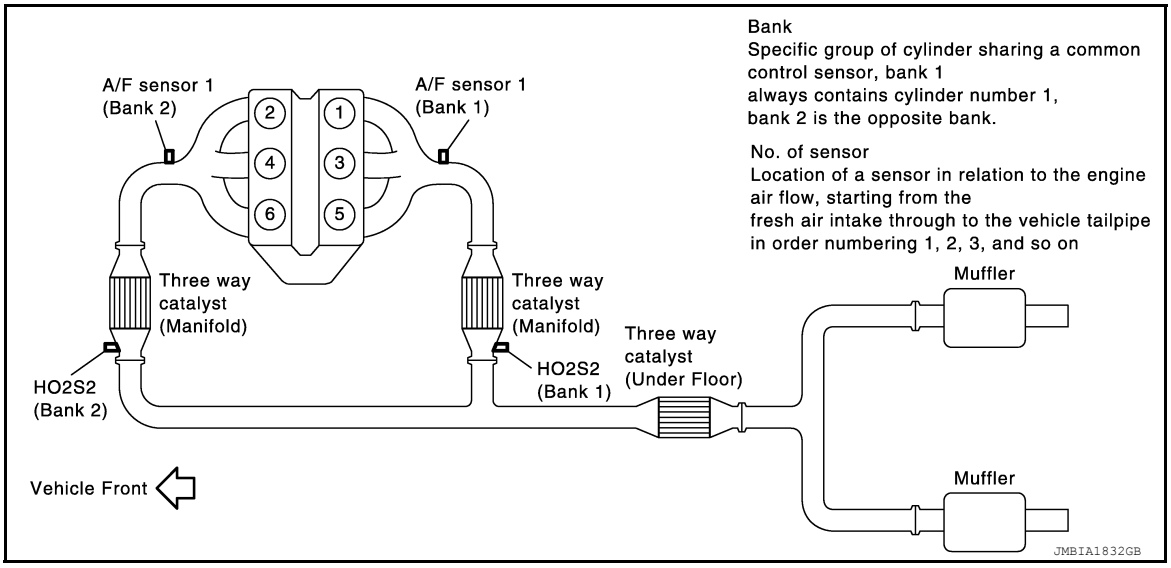
1. Power valve actuator 1
2. Intake valve timing control solenoid valve (bank 1)
3. Power steering pressure sensor
4. Intake valve timing control solenoid valve (bank 2)
5. VIAS control solenoid valves 1 and 2
6. Fuel injector (bank 2)
7. Ignition coil (with power transistor) and spark plug (bank 2)
8. Crankshaft position sensor (POS)
9. Engine coolant temperature sensor
10. Camshaft position sensor (PHASE) (bank 2)
11. ECM
12. Refrigerant pressure sensor
13. Battery current sensor
14. Transmission range switch
15. Condenser-2
16. Mass air flow sensor (with intake air temperature sensor)
17. EVAP service port
18. Camshaft position sensor (PHASE) (bank 1)
19. Electric throttle control actuator
20. Power valve actuator 2
21. EVAP canister purge volume control solenoid valve
22. Ignition coil (with power transistor) and spark plug (bank 1)
23. Knock sensor

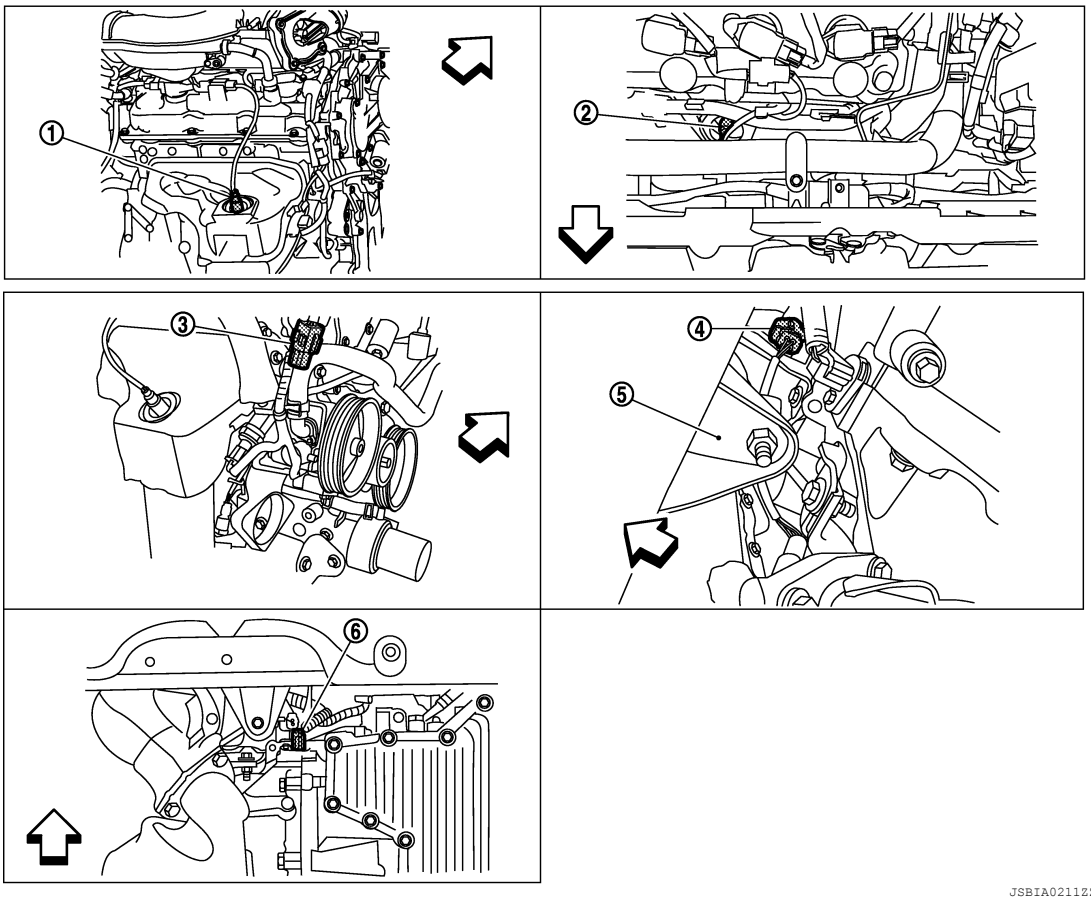


ALBIA0101ZZ

1. Mass air flow sensor (with intake air temperature sensor)
2. Air cleaner case
3. Engine coolant temperature sensor
4. EVAP canister purge volume control solenoid valve
5. Power valve actuator 1
6. VIAS control solenoid valve 1
7. VIAS control solenoid valve 2
8. Power valve actuator 2
9. Power steering pressure sensor
10. Tie rod (RH)
11. Power valve actuator 2
12. Camshaft position sensor (PHASE) (bank 1)
13. Camshaft position sensor (PHASE) (bank 2)

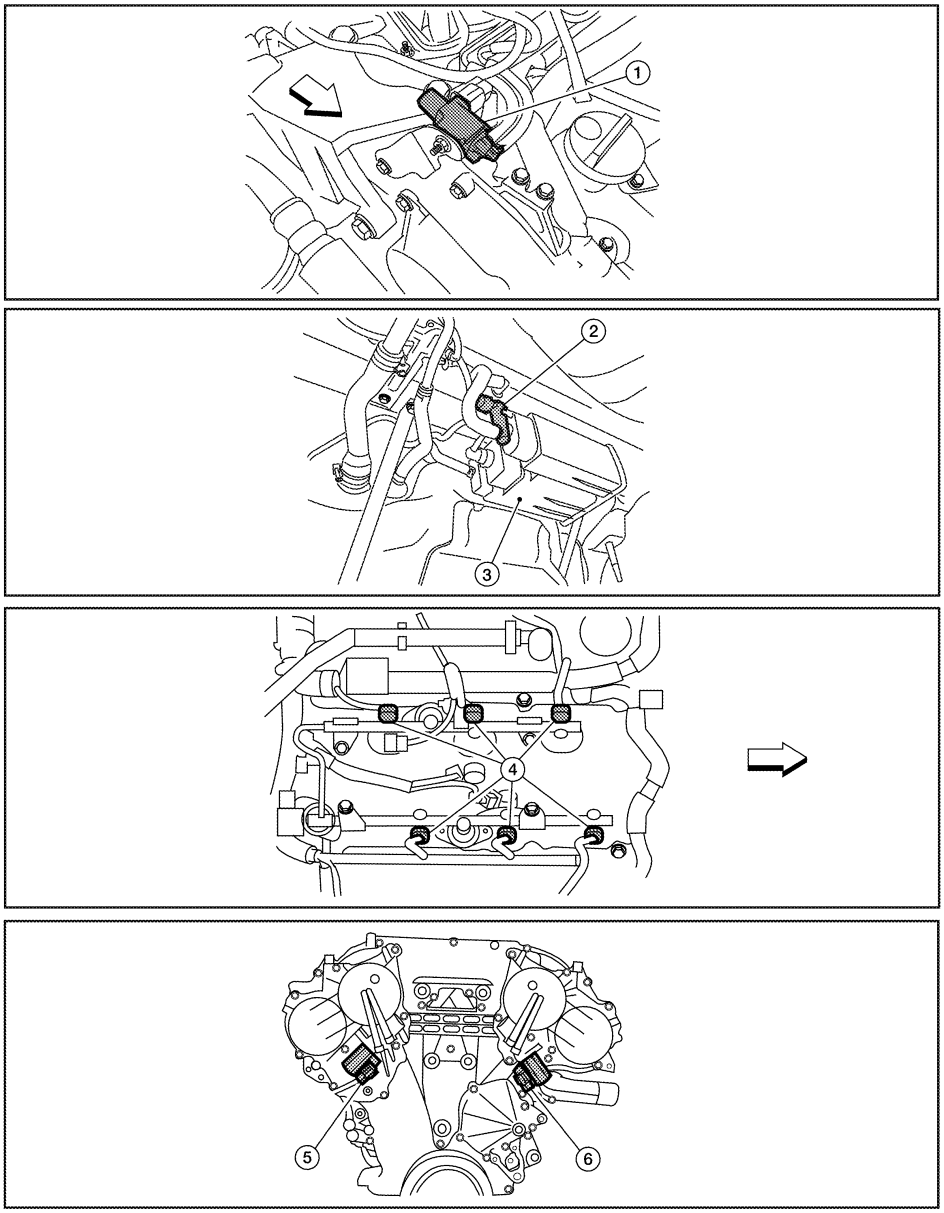
⇦ : Vehicle front





1. A/F sensor 1 (bank 1)
2. A/F sensor 1 (bank 2)
3. HO2S2 (bank 1) harness connector
4. HO2S2 (bank 2) harness connector
5. Front engine mount
6. Crankshaft position sensor (POS)

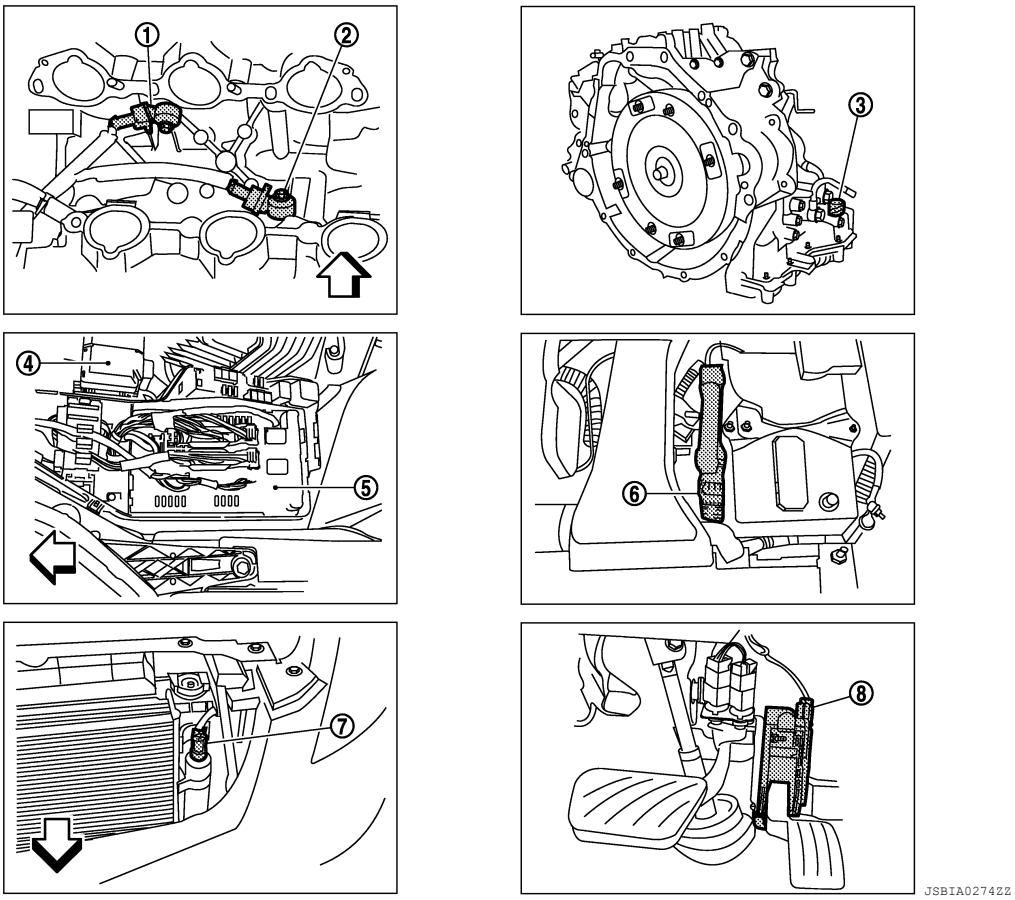
⇦ : Vehicle front



ALBIA0519ZZ

1. Electronic controlled engine mount control solenoid valve
2. EVAP canister vent control valve (view with rear suspension member removed)
3. EVAP canister
4. Fuel injector harness connector
5. Intake valve timing control solenoid valve (bank 1)
6. Intake valve timing control solenoid valve (bank 2)

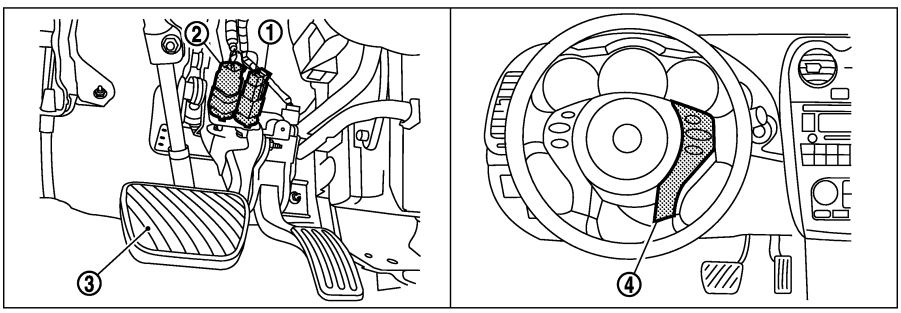
⇦ : Vehicle front



JSBIA0274ZZ

1. Knock sensor (bank 2)
2. Knock sensor (bank 1)
3. Transmission range switch
4. Battery
5. IPDM E/R
6. ECM
7. Refrigerant pressure sensor (shown with front grill removed)
8. Accelerator pedal position sensor

⇦ : Vehicle front



JSBIA0212ZZ

1. ASCD brake switch
2. Stop lamp switch
3. Brake pedal
4. ASCD steering switch

Component Description

INFOID:0000000006391895

Component	Reference
ASCD brake switch	EC-551, "Description"
ASCD indicator	EC-602, "Description"
ASCD steering switch	EC-548, "Description"

Component	Reference
Electric throttle control actuator	EC-583, "Description"
Stop lamp switch	EC-570, "Description"
TCM	EC-524, "Description"

CAN COMMUNICATION

System Description

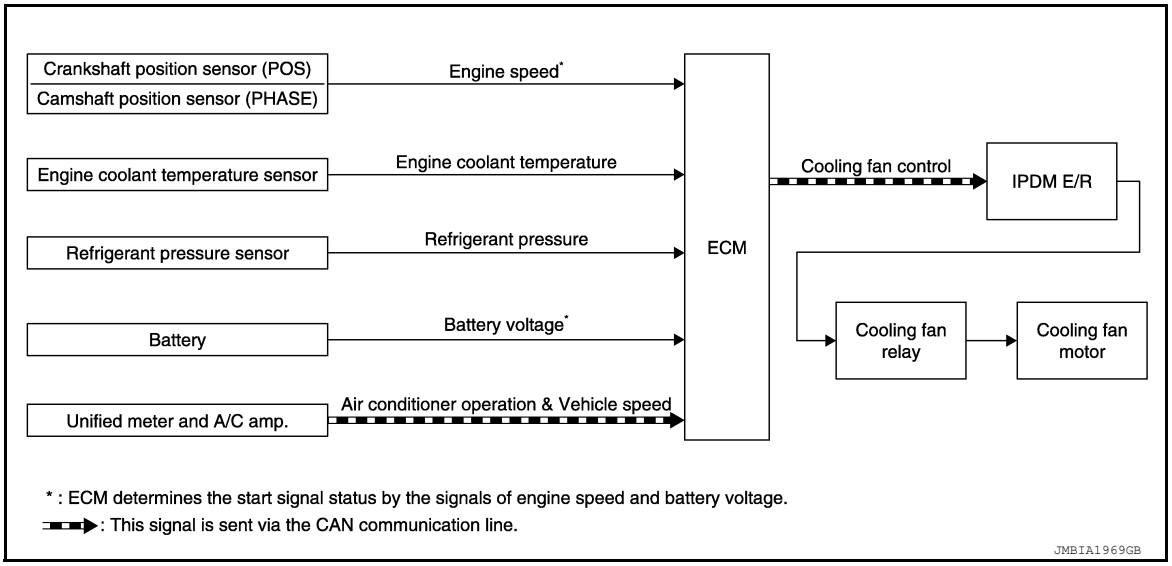
INFOID:0000000006391896

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-24, "CAN Communication Signal Chart", about CAN communication for detail.

COOLING FAN CONTROL

System Diagram

INFOID:0000000006391897



System Description

INFOID:0000000006391898

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
Engine coolant temperature sensor	Engine coolant temperature		
Refrigerant pressure sensor	Refrigerant pressure		
Battery	Battery voltage*1		
Unified meter and A/C amp.	Air conditioner ON signal*2		
	Vehicle speed*2		

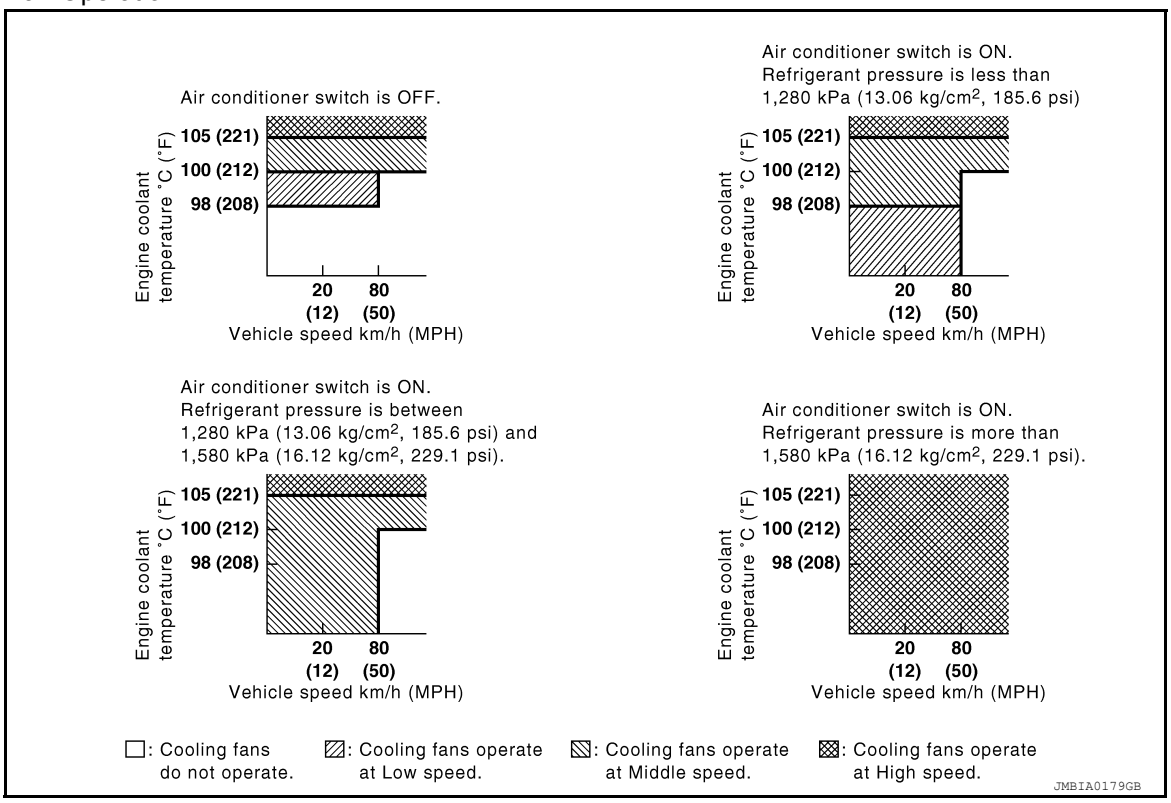
*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.

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

SYSTEM DESCRIPTION

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

Cooling Fan Operation



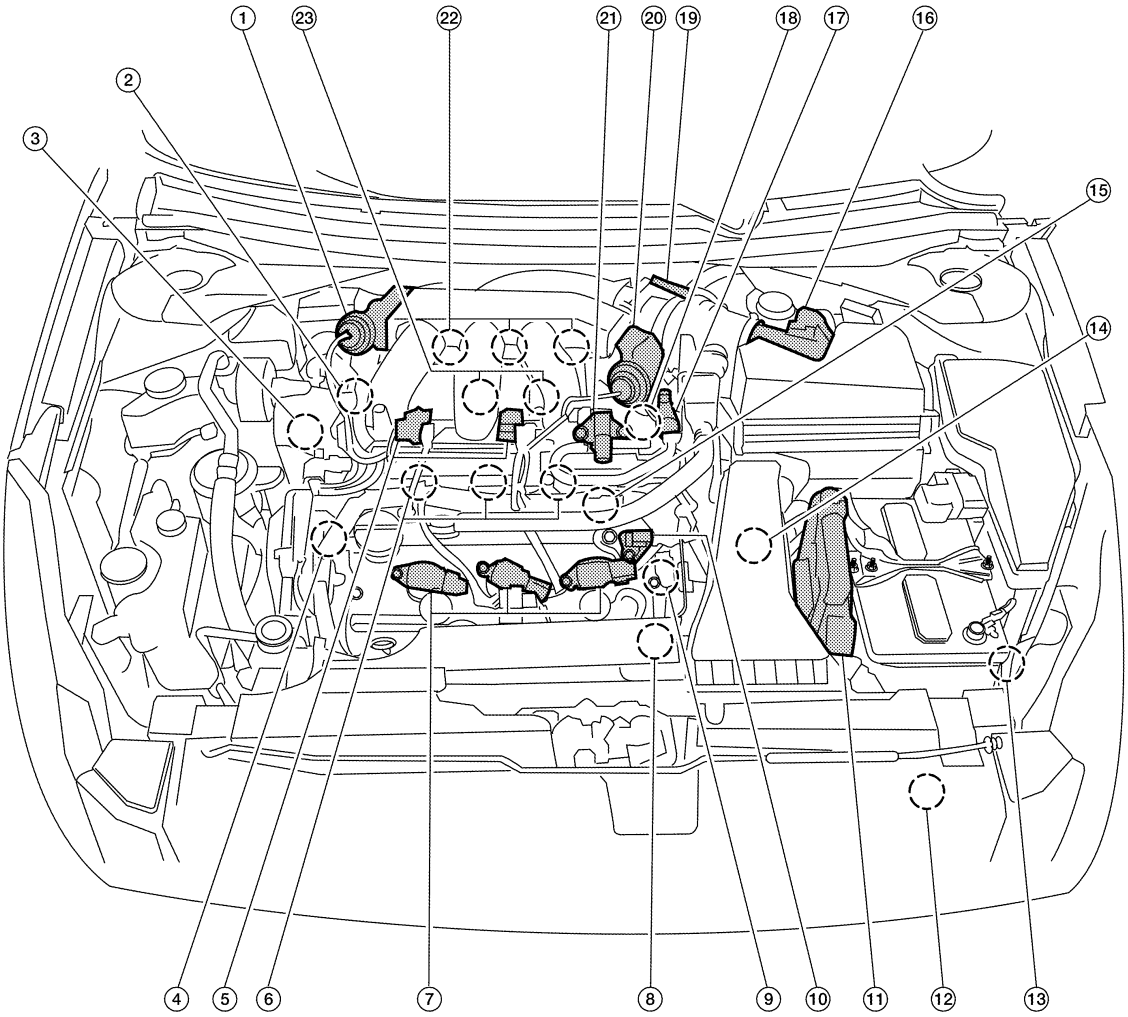
Cooling Fan Relay Operation

The ECM controls cooling fan relays in the IPDM E/R via the CAN communication line.

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

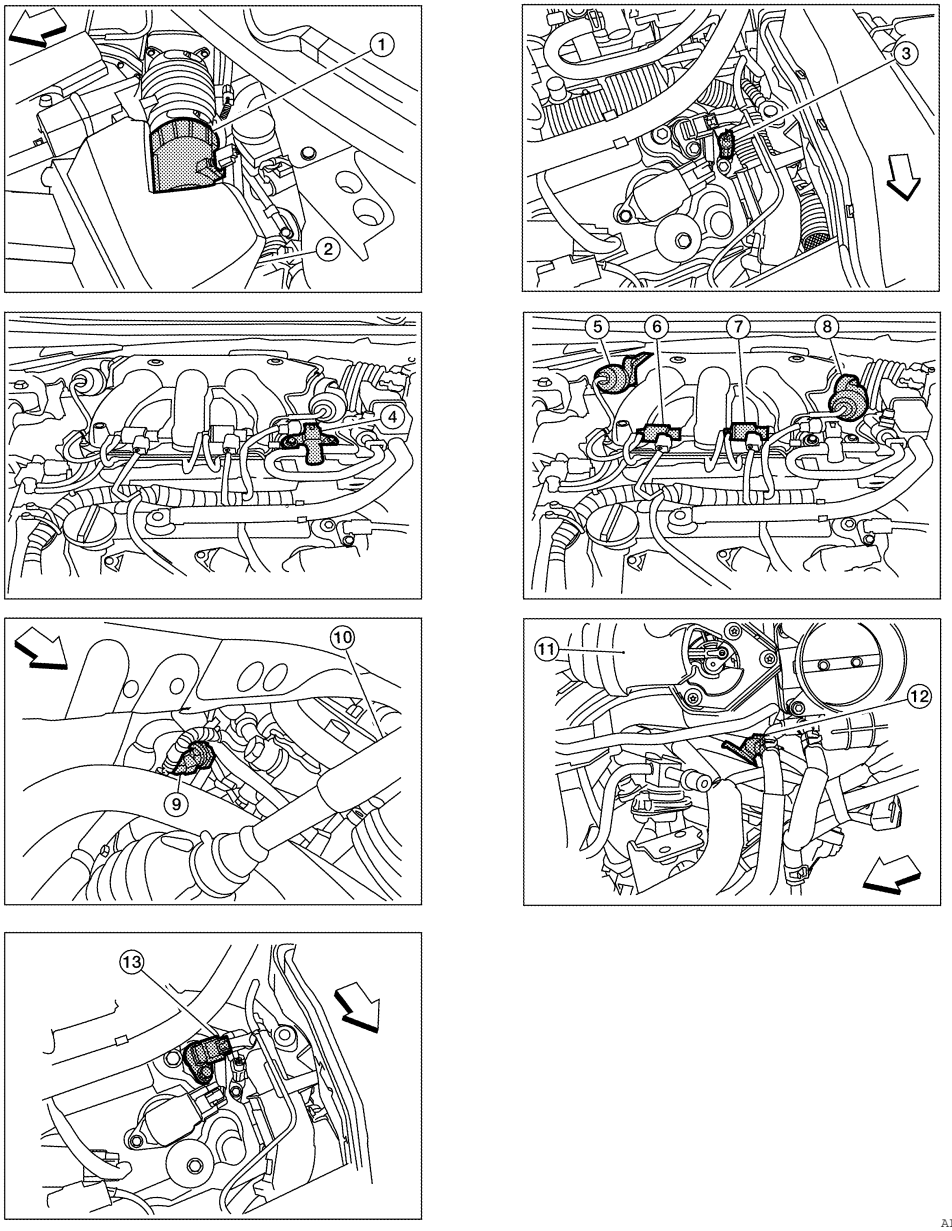
Component Parts Location

INFOID:0000000006391899



ALBIA0110ZZ

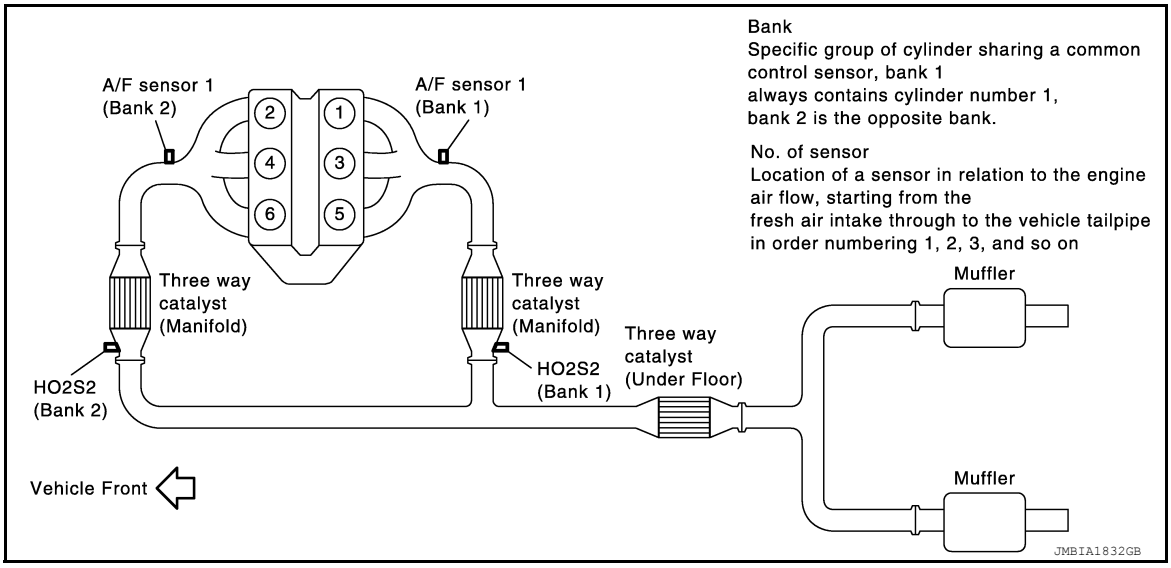
1. Power valve actuator 1
2. Intake valve timing control solenoid valve (bank 1)
3. Power steering pressure sensor
4. Intake valve timing control solenoid valve (bank 2)
5. VIAS control solenoid valves 1 and 2
6. Fuel injector (bank 2)
7. Ignition coil (with power transistor) and spark plug (bank 2)
8. Crankshaft position sensor (POS)
9. Engine coolant temperature sensor
10. Camshaft position sensor (PHASE) (bank 2)
11. ECM
12. Refrigerant pressure sensor
13. Battery current sensor
14. Transmission range switch
15. Condenser-2
16. Mass air flow sensor (with intake air temperature sensor)
17. EVAP service port
18. Camshaft position sensor (PHASE) (bank 1)
19. Electric throttle control actuator
20. Power valve actuator 2
21. EVAP canister purge volume control solenoid valve
22. Ignition coil (with power transistor) and spark plug (bank 1)
23. Knock sensor

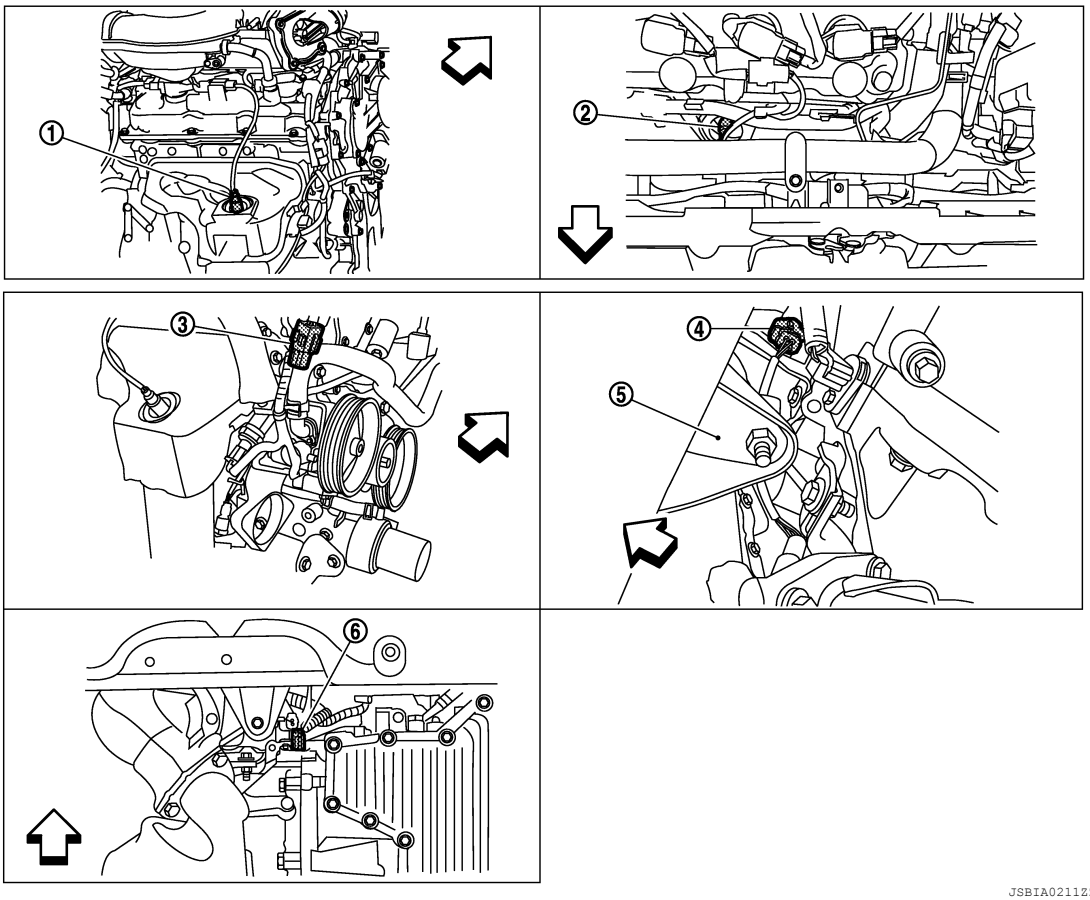


ALBIA0101ZZ

1. Mass air flow sensor (with intake air temperature sensor)
2. Air cleaner case
3. Engine coolant temperature sensor
4. EVAP canister purge volume control solenoid valve
5. Power valve actuator 1
6. VIAS control solenoid valve 1
7. VIAS control solenoid valve 2
8. Power valve actuator 2
9. Power steering pressure sensor
10. Tie rod (RH)
11. Power valve actuator 2
12. Camshaft position sensor (PHASE) (bank 1)
13. Camshaft position sensor (PHASE) (bank 2)

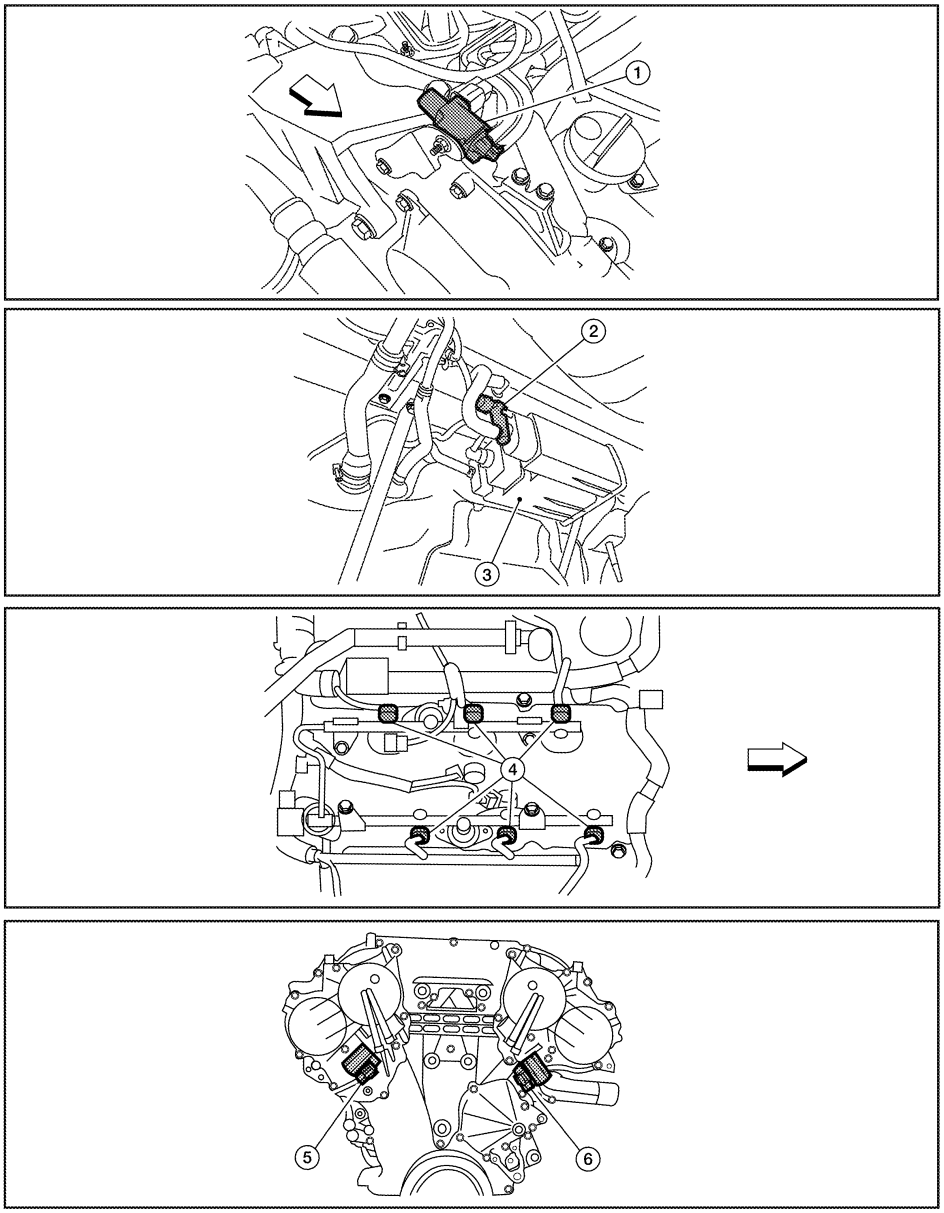
⇦ : Vehicle front





1. A/F sensor 1 (bank 1)
2. A/F sensor 1 (bank 2)
3. HO2S2 (bank 1) harness connector
4. HO2S2 (bank 2) harness connector
5. Front engine mount
6. Crankshaft position sensor (POS)

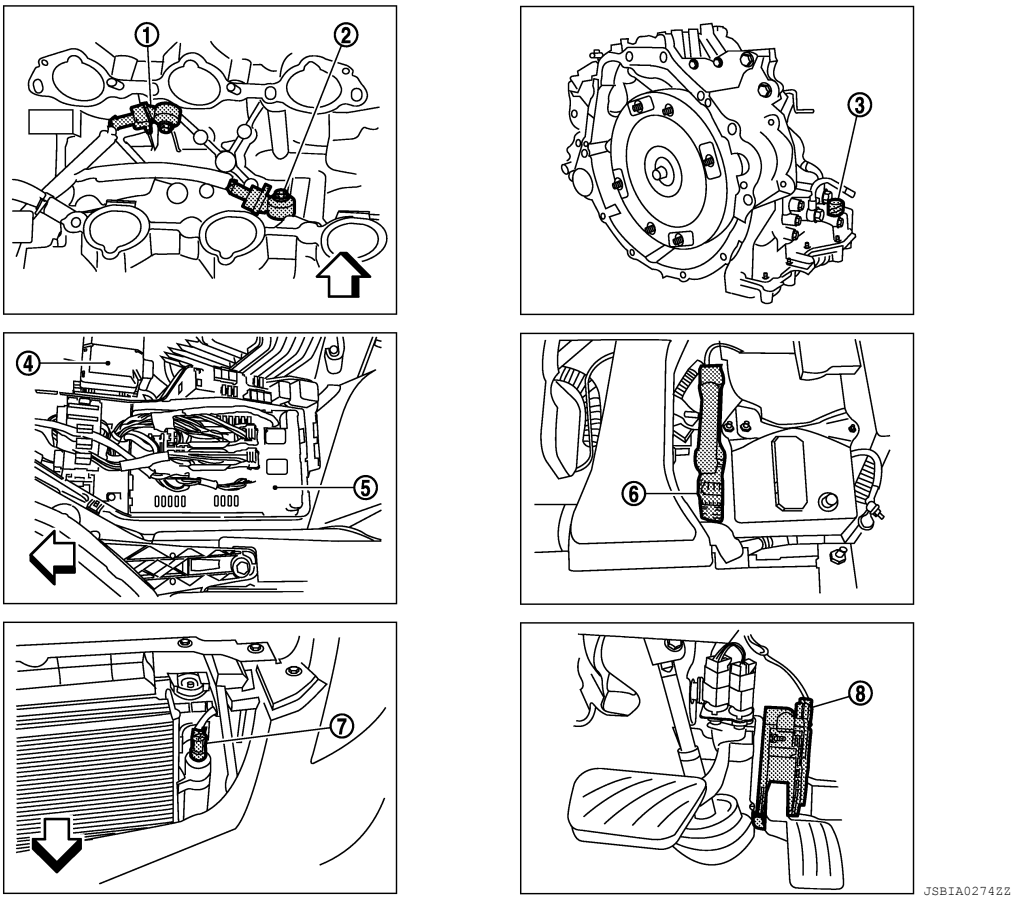
⇦ : Vehicle front



ALBIA0519ZZ

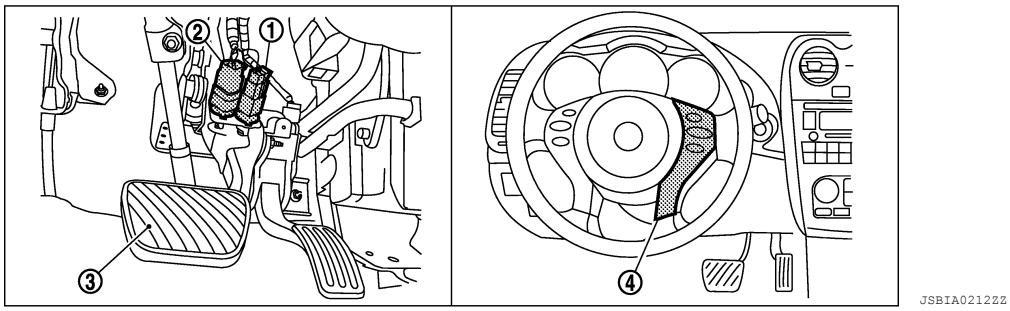
1. Electronic controlled engine mount control solenoid valve
2. EVAP canister vent control valve (view with rear suspension member removed)
3. EVAP canister
4. Fuel injector harness connector
5. Intake valve timing control solenoid valve (bank 1)
6. Intake valve timing control solenoid valve (bank 2)

⇦ : Vehicle front



1. Knock sensor (bank 2)
2. Knock sensor (bank 1)
3. Transmission range switch
4. Battery
5. IPDM E/R
6. ECM
7. Refrigerant pressure sensor (shown with front grill removed)
8. Accelerator pedal position sensor

⇦ : Vehicle front



1. ASCD brake switch
2. Stop lamp switch
3. Brake pedal
4. ASCD steering switch

Component Description

INFOID:0000000006391900

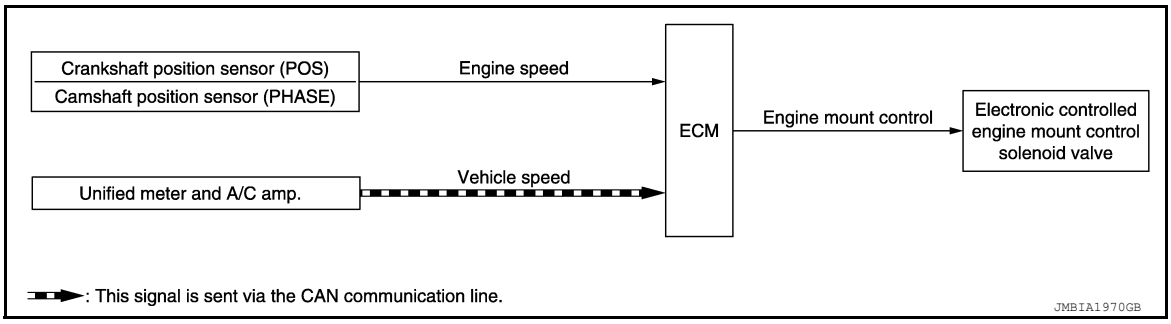
Component	Reference
Camshaft position sensor (PHASE)	EC-504, "Description"
Crankshaft position sensor (POS)	EC-500, "Description"
Cooling fan motor	EC-603, "Description"

Component	Reference
Engine coolant temperature sensor	EC-465, "Description"
Refrigerant pressure sensor	EC-636, "Description"

ELECTRONIC CONTROLLED ENGINE MOUNT

System Diagram

INFOID:0000000006391901



System Description

INFOID:0000000006391902

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed	Engine mount control	Electronic controlled engine mount control solenoid valve
Unified meter and A/C amp.	Vehicle speed*		

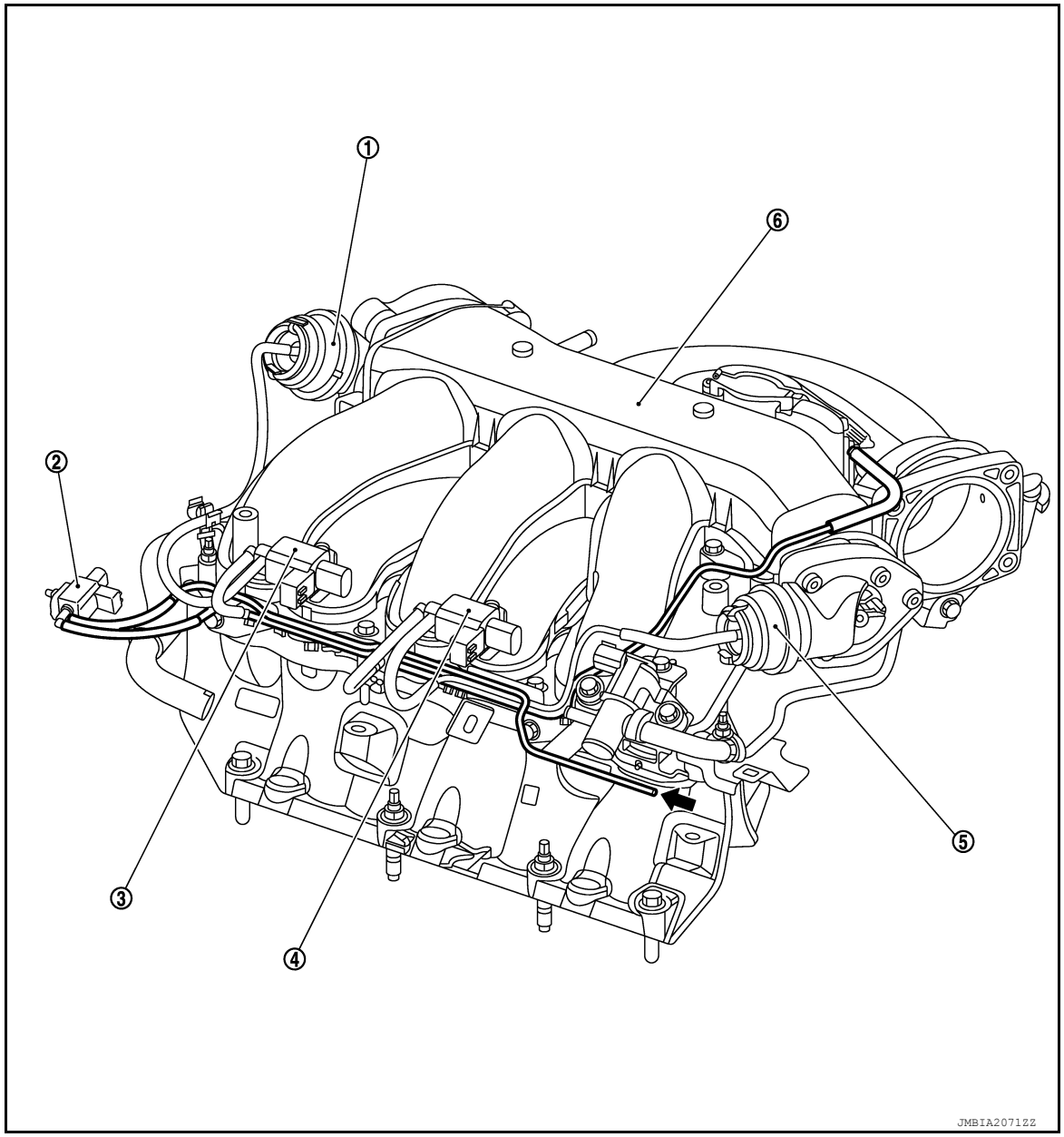
*: This signal is sent to the ECM via the CAN communication line.

SYSTEM DESCRIPTION

The ECM controls the engine mount operation corresponding to the engine speed. The control system has a 2-step control [Soft/Hard]

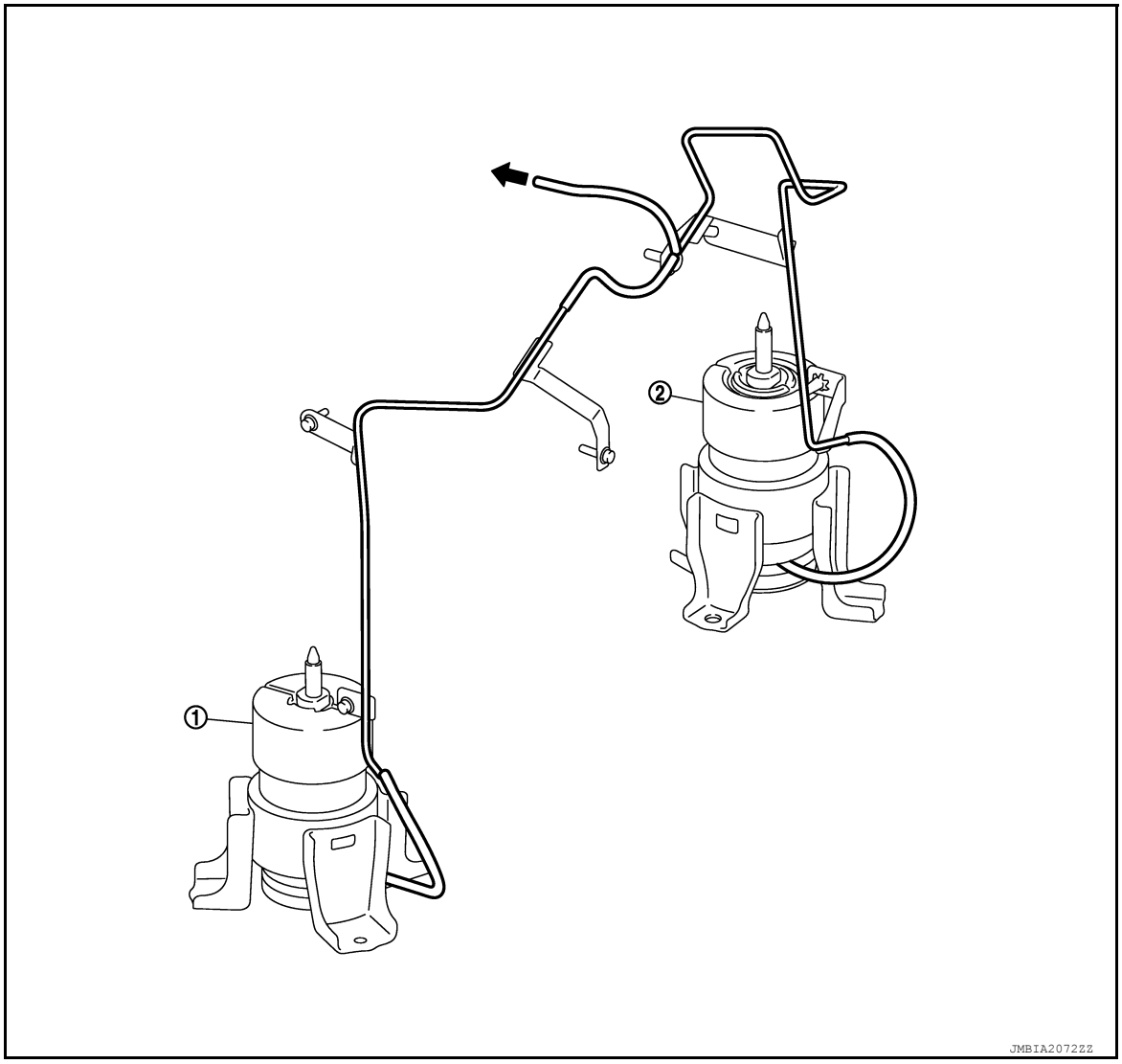
Vehicle condition	Engine mount control
Idle (With vehicle stopped)	Soft
Except above conditions	Hard

ELECTRONIC CONTROLLED ENGINE MOUNT LINE DRAWING



1. Power valve actuator 1
2. Electronic controlled engine mount control solenoid valve
3. VIAS control solenoid valve 1
4. VIAS control solenoid valve 2
5. Power valve actuator 2
6. Intake manifold collector

⬅ : From next figure



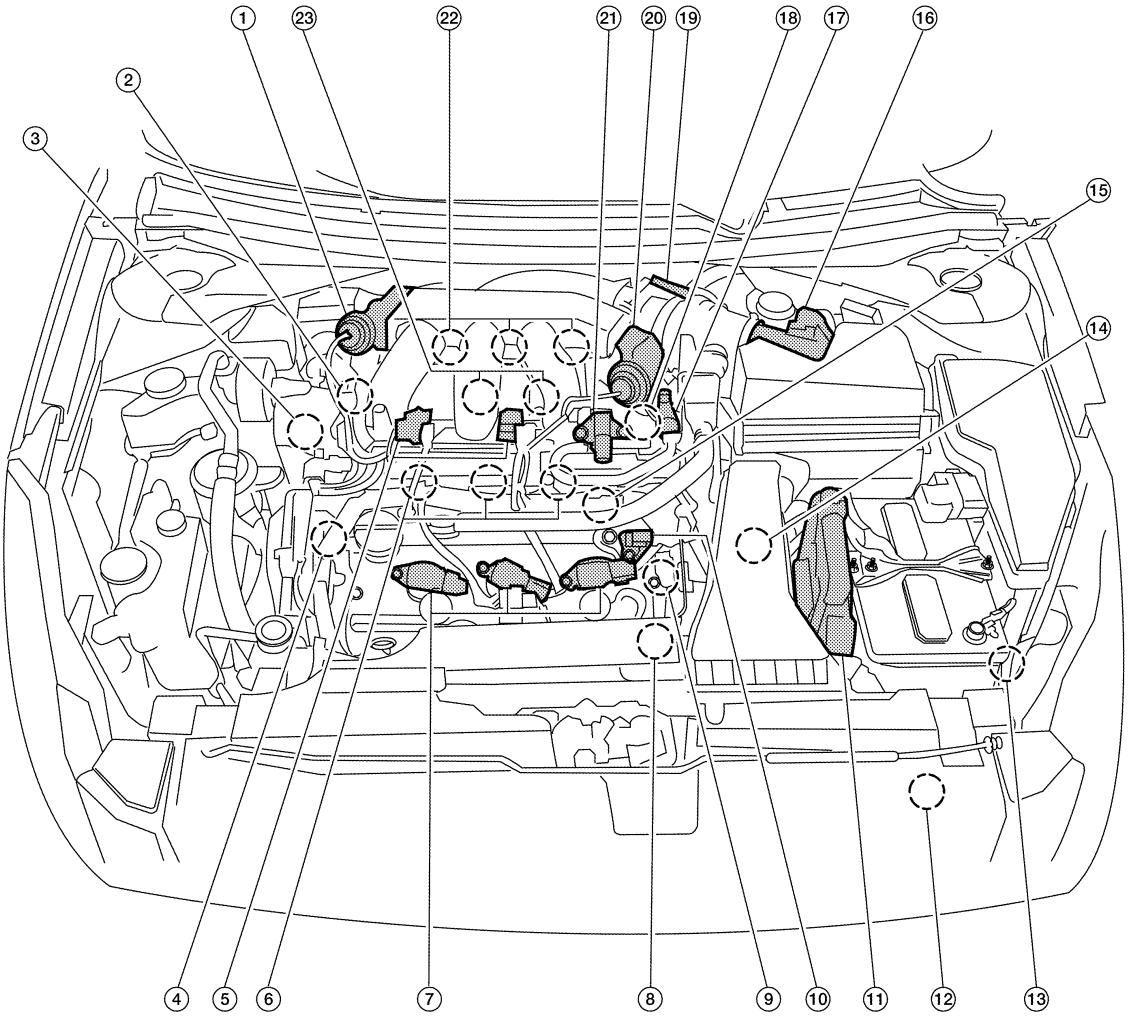
1. Front electronic controlled engine mount
2. Rear electronic controlled engine mount

⬅ : To previous figure

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

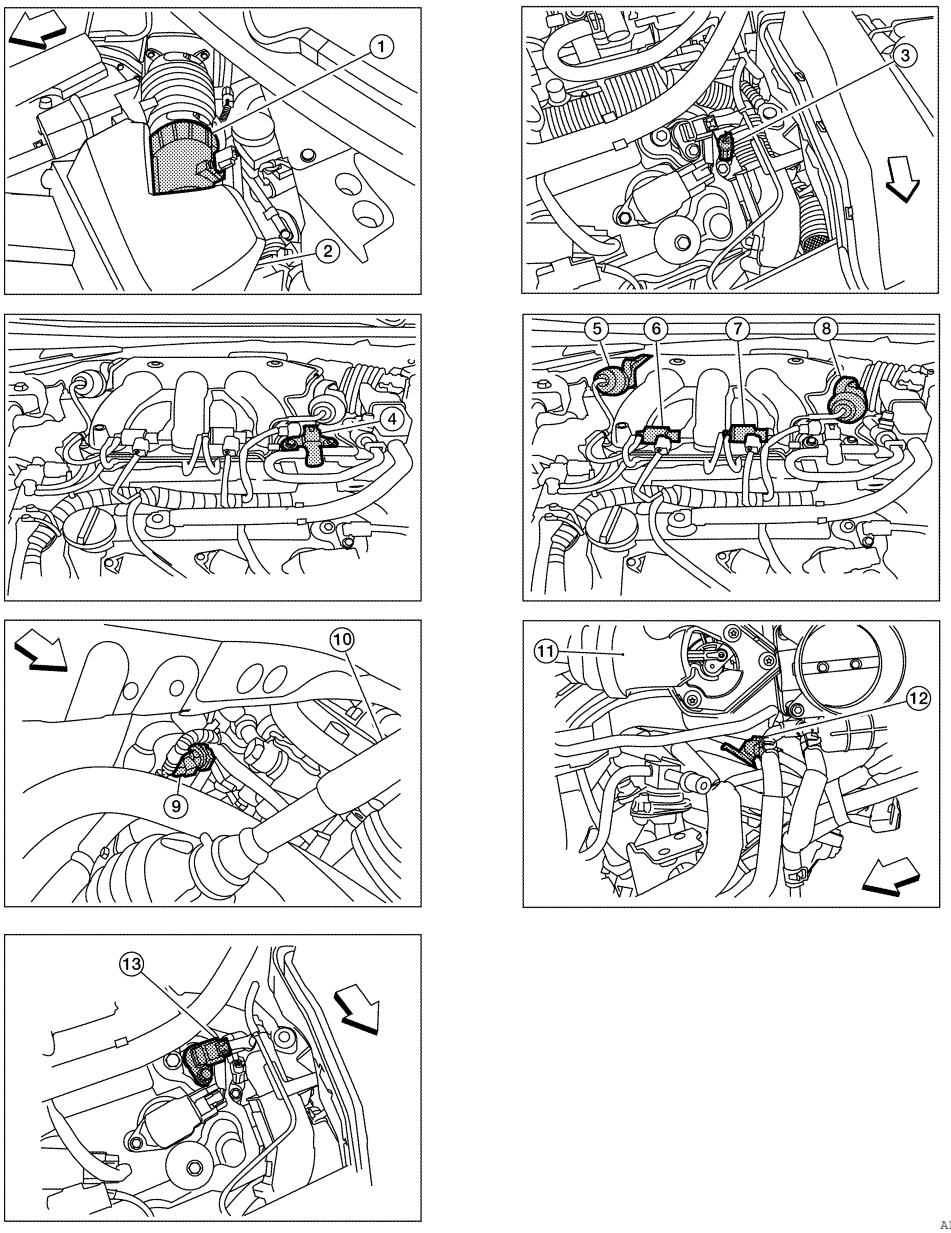
Component Parts Location

INFOID:0000000006391903



ALBIA0110ZZ

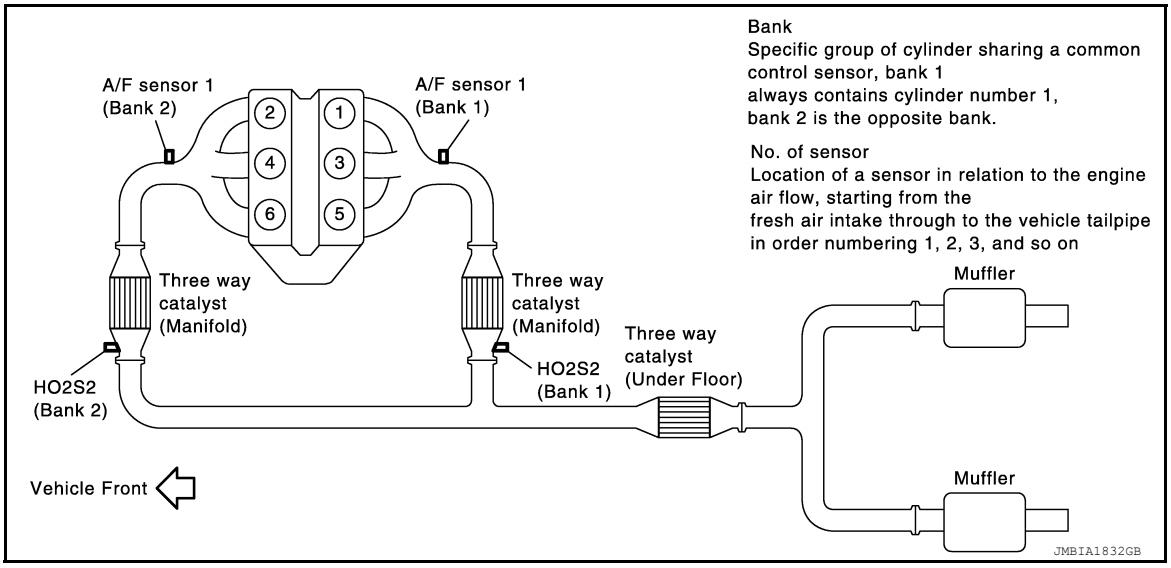
1. Power valve actuator 1
2. Intake valve timing control solenoid valve (bank 1)
3. Power steering pressure sensor
4. Intake valve timing control solenoid valve (bank 2)
5. VIAS control solenoid valves 1 and 2
6. Fuel injector (bank 2)
7. Ignition coil (with power transistor) and spark plug (bank 2)
8. Crankshaft position sensor (POS)
9. Engine coolant temperature sensor
10. Camshaft position sensor (PHASE) (bank 2)
11. ECM
12. Refrigerant pressure sensor
13. Battery current sensor
14. Transmission range switch
15. Condenser-2
16. Mass air flow sensor (with intake air temperature sensor)
17. EVAP service port
18. Camshaft position sensor (PHASE) (bank 1)
19. Electric throttle control actuator
20. Power valve actuator 2
21. EVAP canister purge volume control solenoid valve
22. Ignition coil (with power transistor) and spark plug (bank 1)
23. Knock sensor

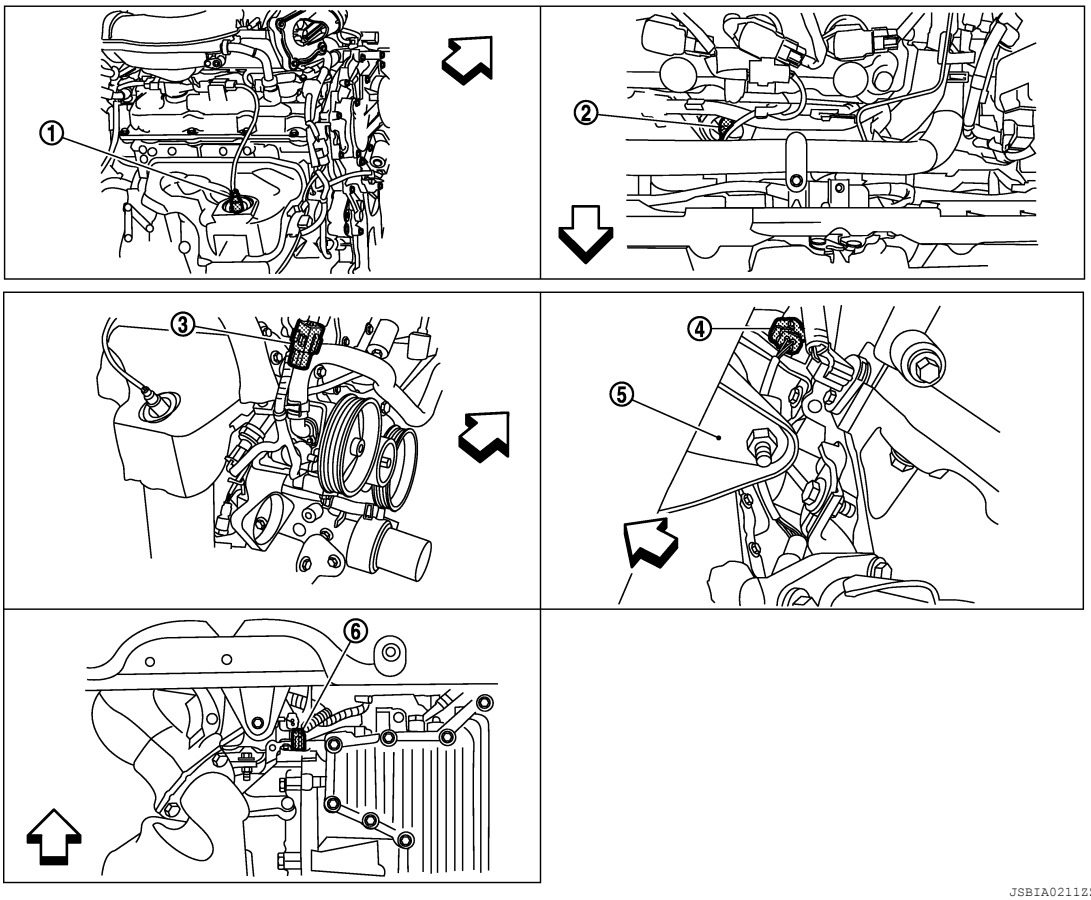


ALBIA0101ZZ

1. Mass air flow sensor (with intake air temperature sensor)
2. Air cleaner case
3. Engine coolant temperature sensor
4. EVAP canister purge volume control solenoid valve
5. Power valve actuator 1
6. VIAS control solenoid valve 1
7. VIAS control solenoid valve 2
8. Power valve actuator 2
9. Power steering pressure sensor
10. Tie rod (RH)
11. Power valve actuator 2
12. Camshaft position sensor (PHASE) (bank 1)
13. Camshaft position sensor (PHASE) (bank 2)

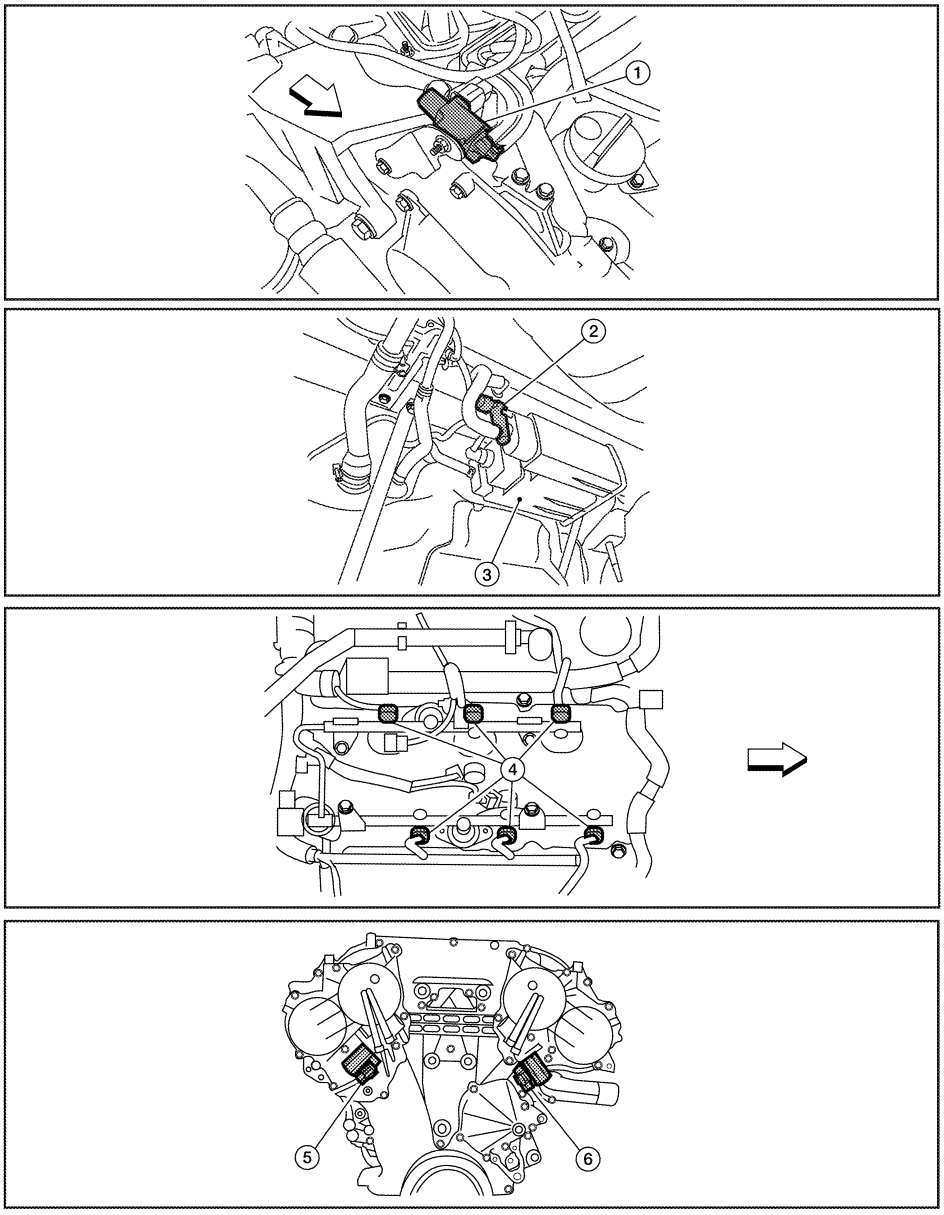
⇦ : Vehicle front





1. A/F sensor 1 (bank 1)
2. A/F sensor 1 (bank 2)
3. HO2S2 (bank 1) harness connector
4. HO2S2 (bank 2) harness connector
5. Front engine mount
6. Crankshaft position sensor (POS)

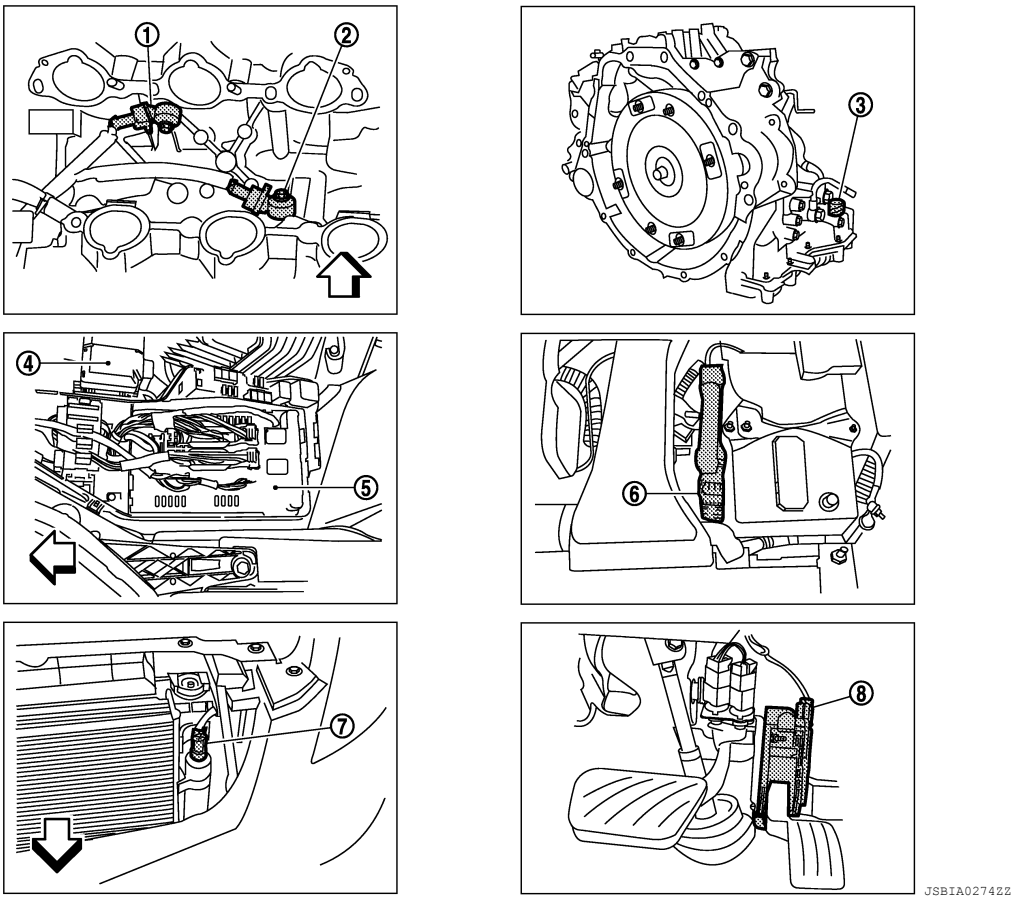
⇦ : Vehicle front



ALBIA0519ZZ

1. Electronic controlled engine mount control solenoid valve
2. EVAP canister vent control valve (view with rear suspension member removed)
3. EVAP canister
4. Fuel injector harness connector
5. Intake valve timing control solenoid valve (bank 1)
6. Intake valve timing control solenoid valve (bank 2)

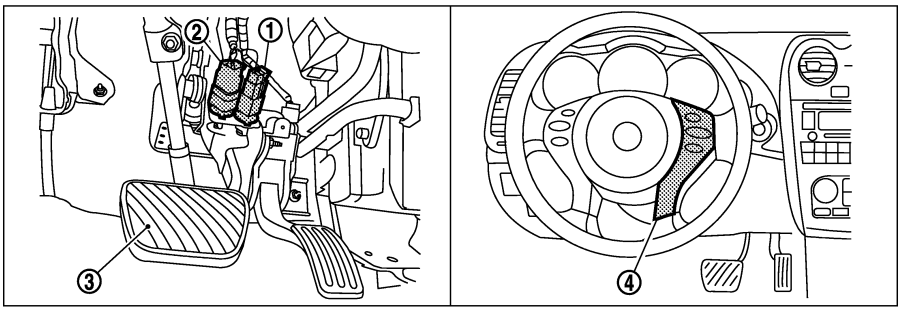
⇦ : Vehicle front



JSBIA0274ZZ

1. Knock sensor (bank 2)
2. Knock sensor (bank 1)
3. Transmission range switch
4. Battery
5. IPDM E/R
6. ECM
7. Refrigerant pressure sensor (shown with front grill removed)
8. Accelerator pedal position sensor

⇦ : Vehicle front



JSBIA0212ZZ

1. ASCD brake switch
2. Stop lamp switch
3. Brake pedal
4. ASCD steering switch

Component Description

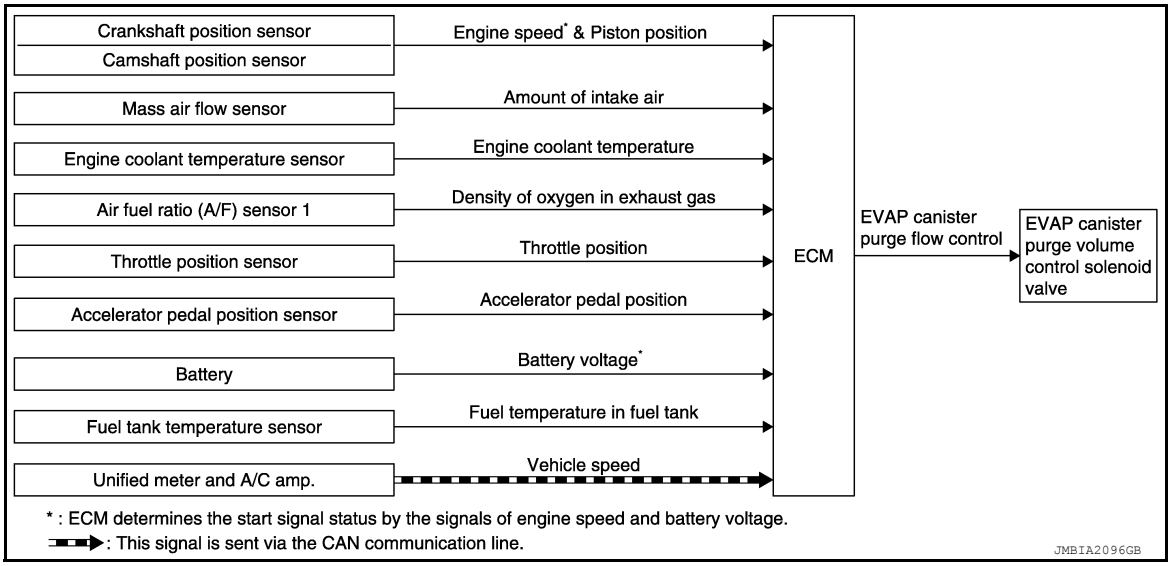
INFOID:0000000006391904

Component	Reference
Camshaft position sensor (PHASE)	EC-504, "Description"
Crankshaft position sensor (POS)	EC-500, "Description"
Electronic controlled engine mount control solenoid valve	EC-610, "Description"

EVAPORATIVE EMISSION SYSTEM

System Diagram

INFOID:0000000006391905



System Description

INFOID:0000000006391906

INPUT/OUTPUT SIGNAL CHART

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

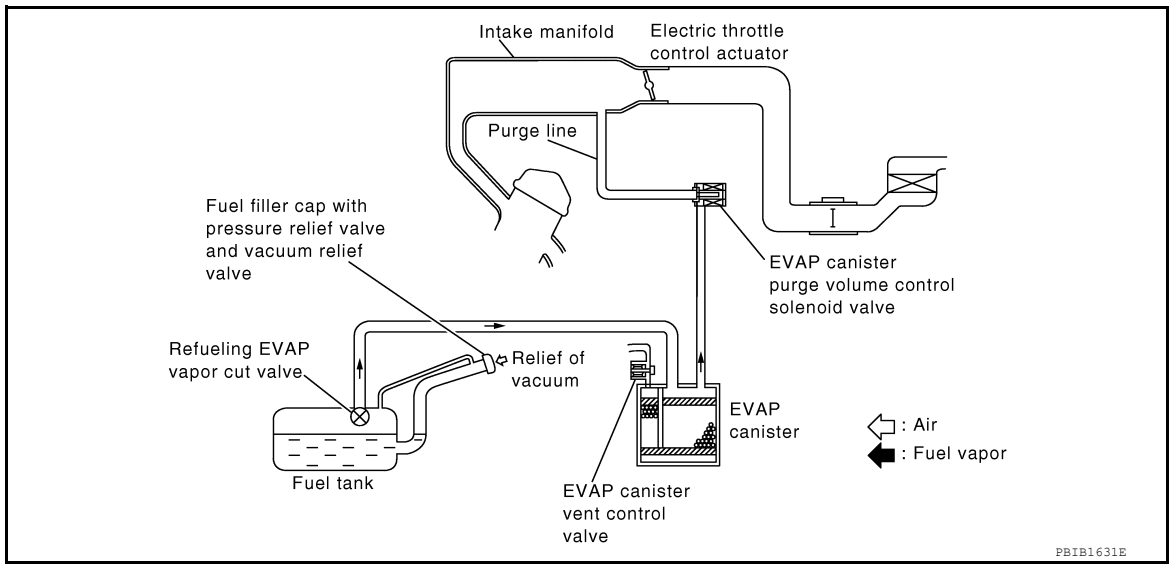
*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

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

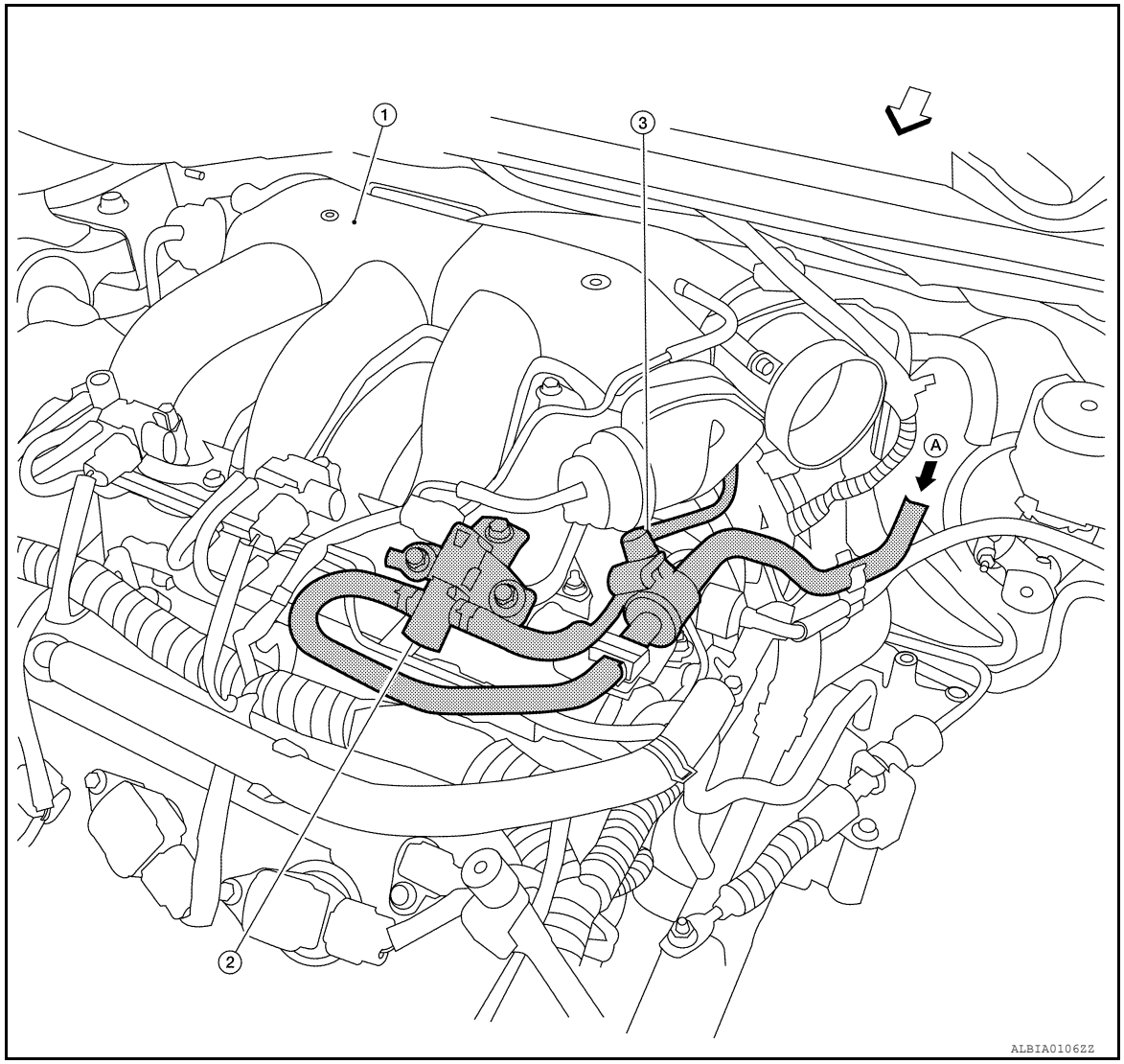
SYSTEM DESCRIPTION

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

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



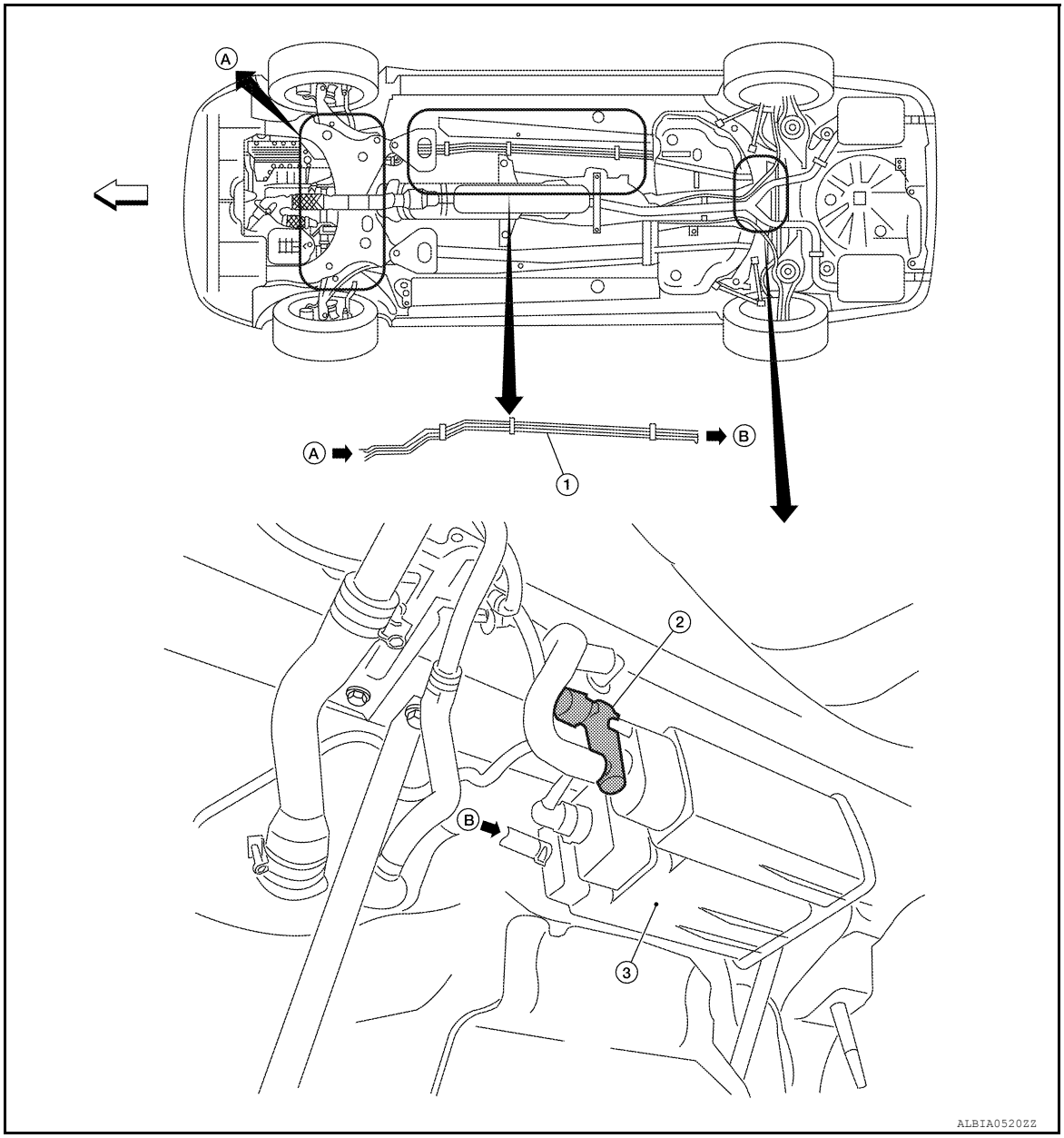
EVAPORATIVE EMISSION LINE DRAWING



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

A. From EVAP canister

⇦ : Vehicle front



1. EVAP vapor purge line
2. EVAP canister vent control valve (view with rear suspension member removed)
3. EVAP canister

A. To previous figure
B. To/From B in this figure

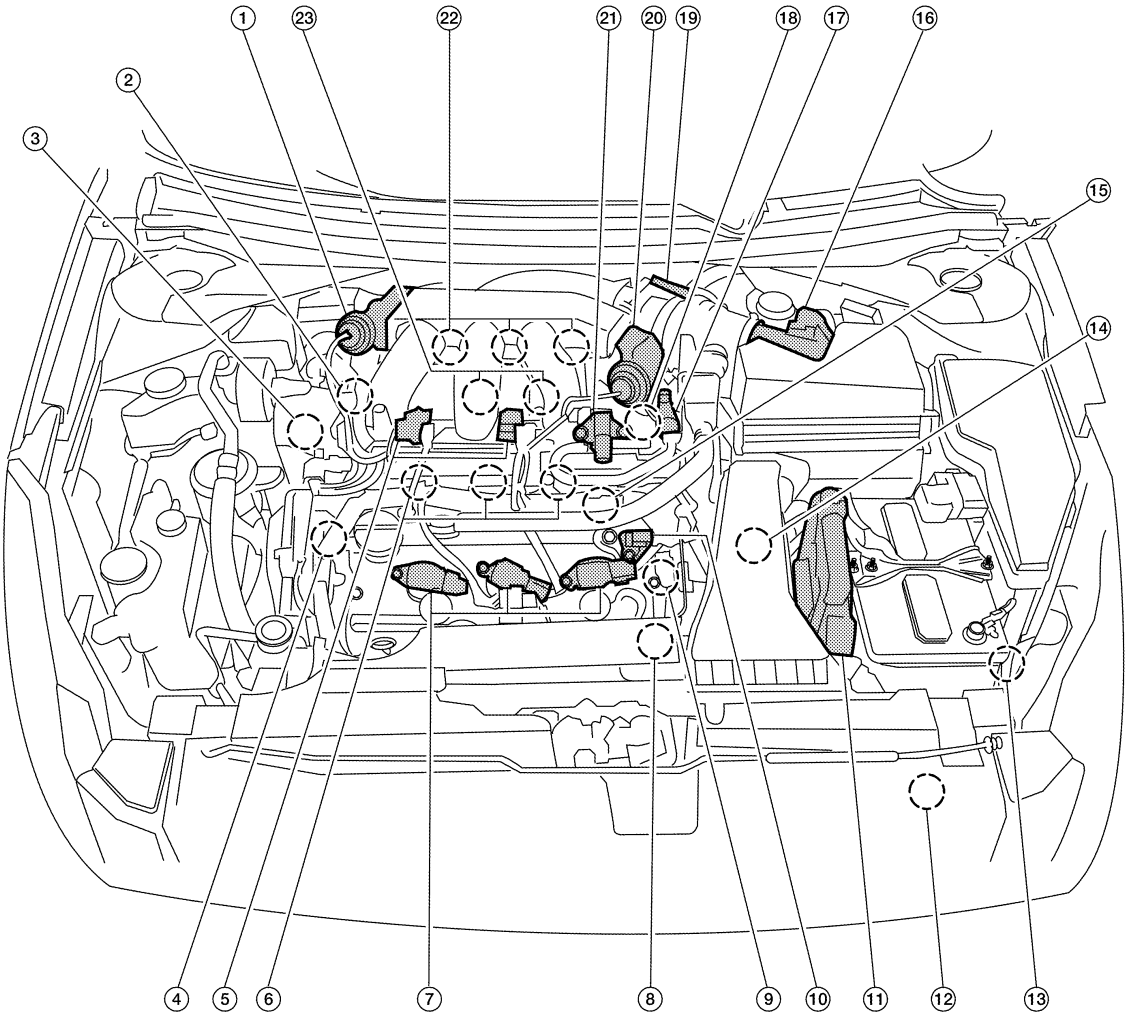
⇦ : Vehicle front

⬅ : To previous figure

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

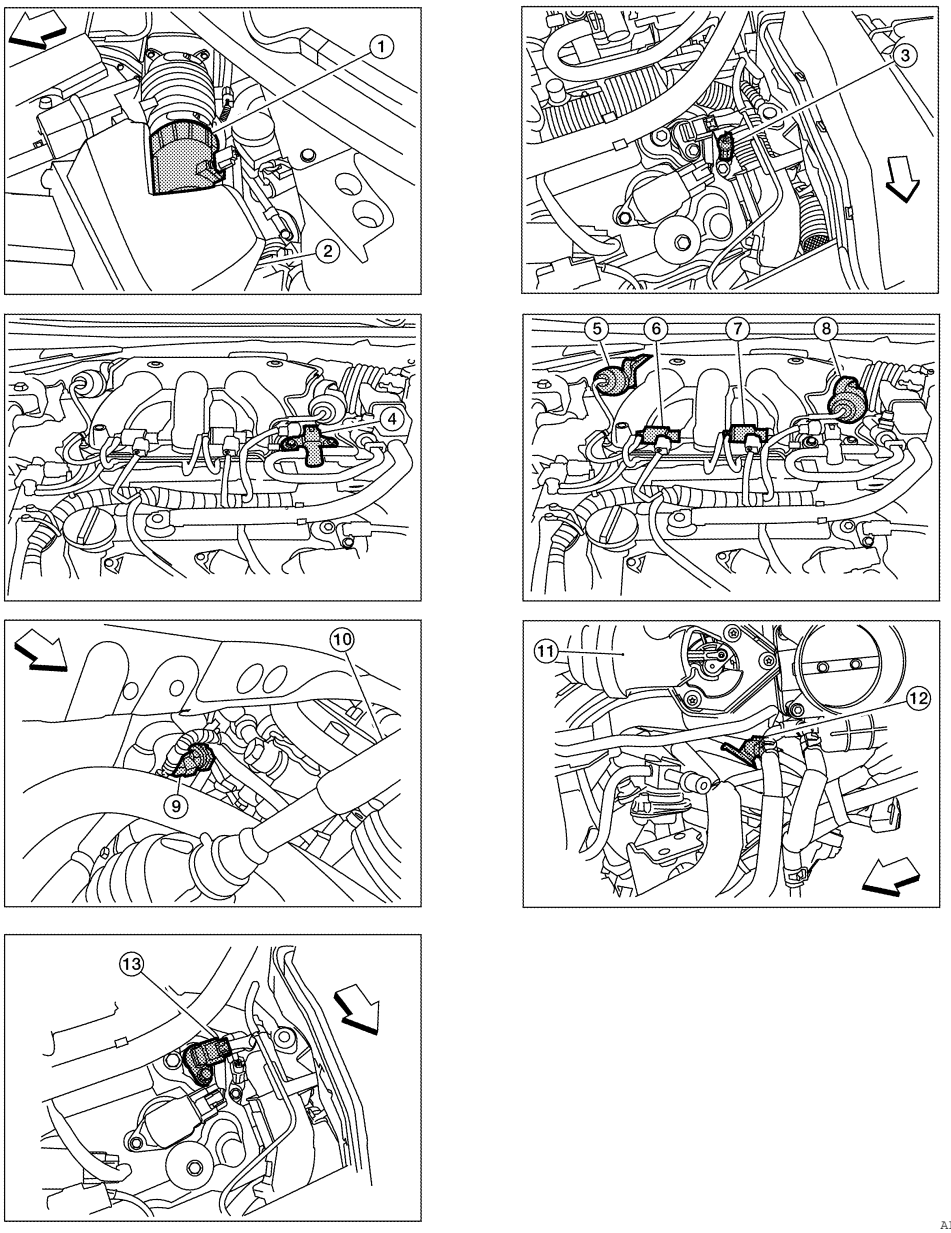
Component Parts Location

INFOID:0000000006391907



ALBIA0110ZZ

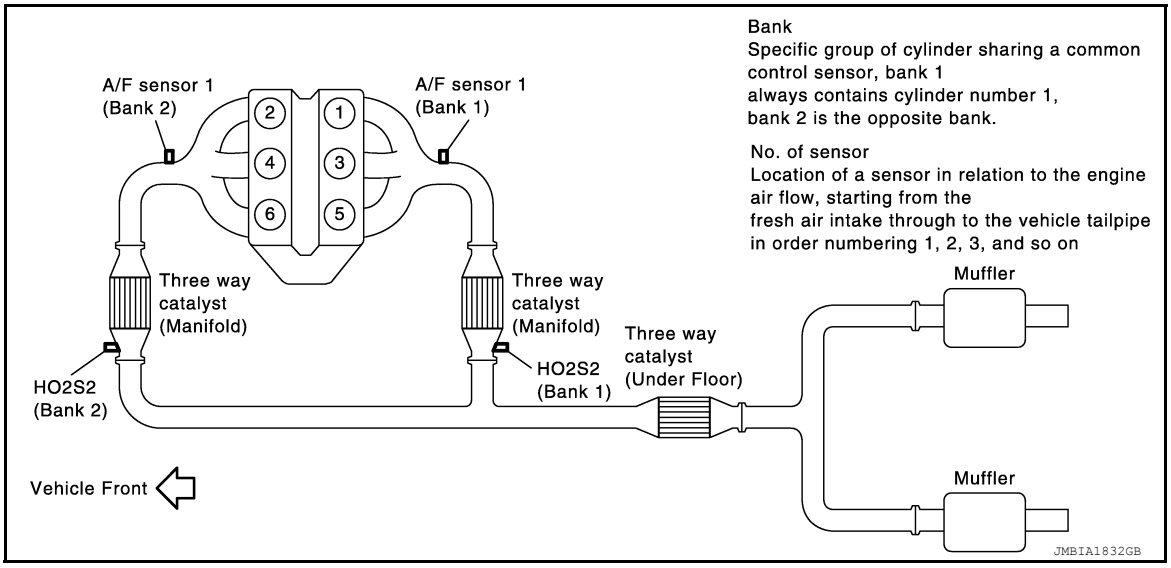
1. Power valve actuator 1
2. Intake valve timing control solenoid valve (bank 1)
3. Power steering pressure sensor
4. Intake valve timing control solenoid valve (bank 2)
5. VIAS control solenoid valves 1 and 2
6. Fuel injector (bank 2)
7. Ignition coil (with power transistor) and spark plug (bank 2)
8. Crankshaft position sensor (POS)
9. Engine coolant temperature sensor
10. Camshaft position sensor (PHASE) (bank 2)
11. ECM
12. Refrigerant pressure sensor
13. Battery current sensor
14. Transmission range switch
15. Condenser-2
16. Mass air flow sensor (with intake air temperature sensor)
17. EVAP service port
18. Camshaft position sensor (PHASE) (bank 1)
19. Electric throttle control actuator
20. Power valve actuator 2
21. EVAP canister purge volume control solenoid valve
22. Ignition coil (with power transistor) and spark plug (bank 1)
23. Knock sensor

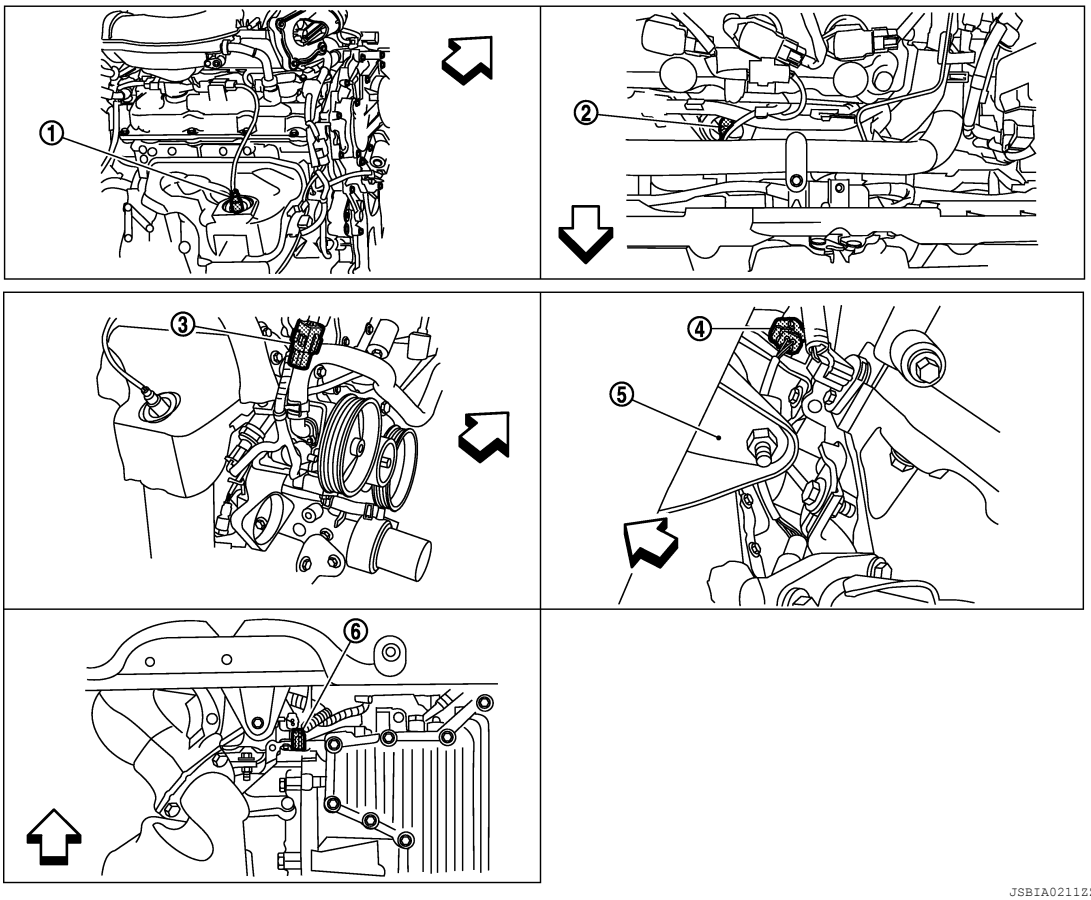


ALBIA0101ZZ

1. Mass air flow sensor (with intake air temperature sensor)
2. Air cleaner case
3. Engine coolant temperature sensor
4. EVAP canister purge volume control solenoid valve
5. Power valve actuator 1
6. VIAS control solenoid valve 1
7. VIAS control solenoid valve 2
8. Power valve actuator 2
9. Power steering pressure sensor
10. Tie rod (RH)
11. Power valve actuator 2
12. Camshaft position sensor (PHASE) (bank 1)
13. Camshaft position sensor (PHASE) (bank 2)

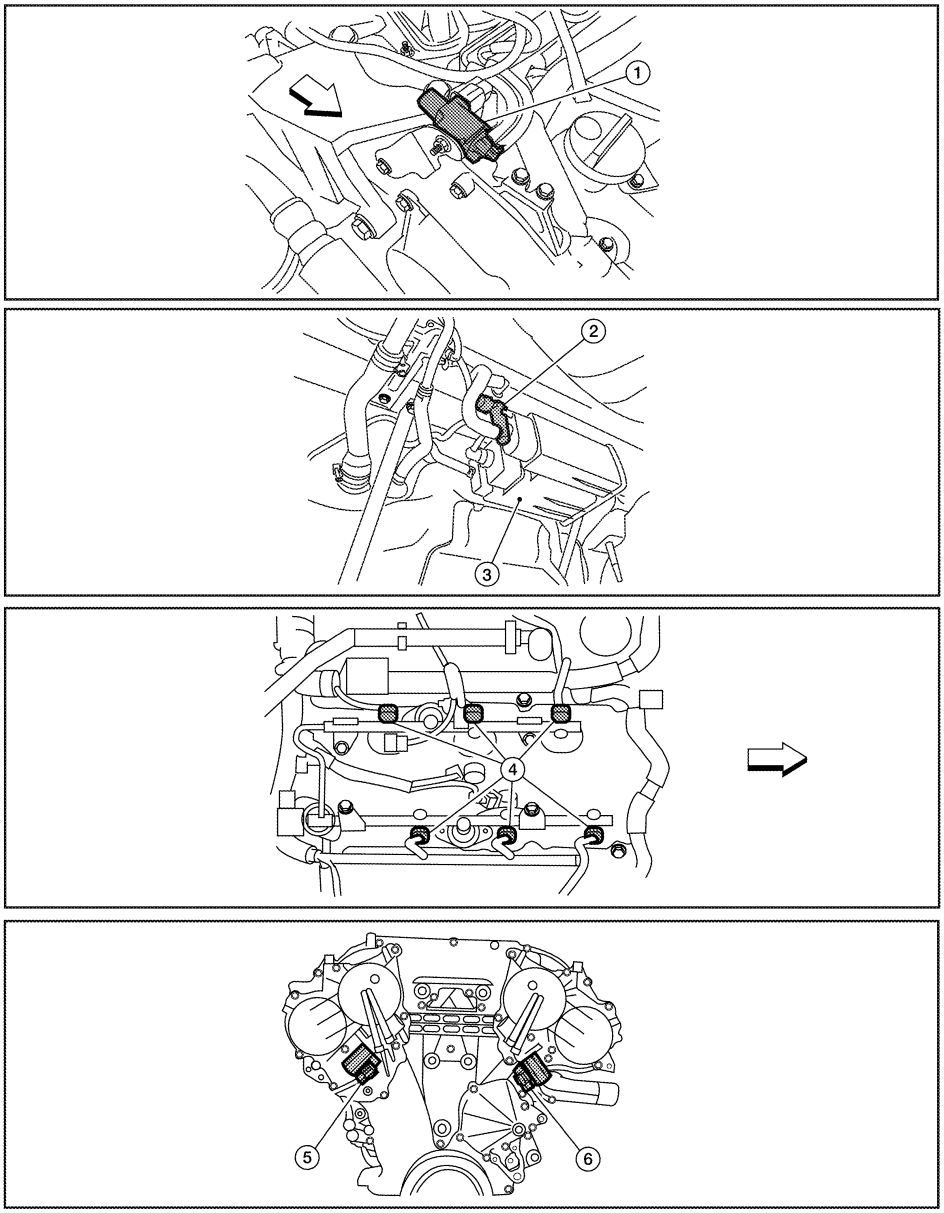
⇦ : Vehicle front





1. A/F sensor 1 (bank 1)
2. A/F sensor 1 (bank 2)
3. HO2S2 (bank 1) harness connector
4. HO2S2 (bank 2) harness connector
5. Front engine mount
6. Crankshaft position sensor (POS)

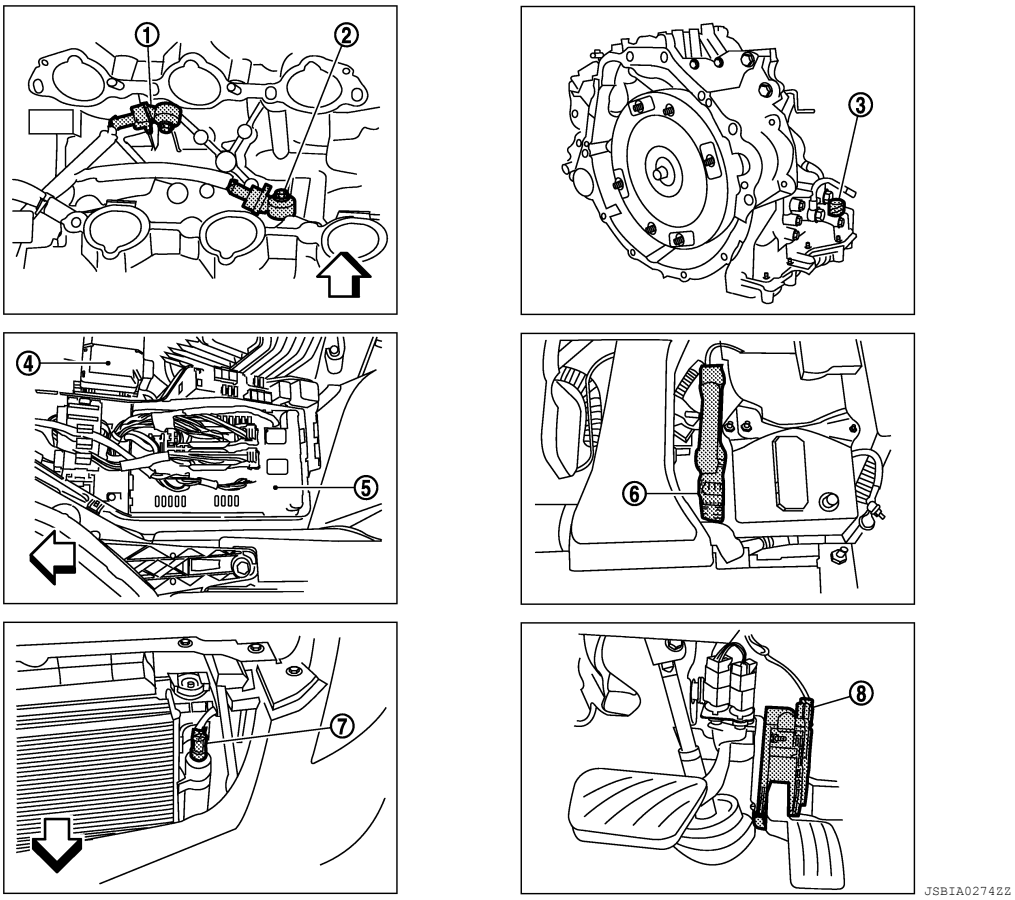
⇦ : Vehicle front



ALBIA0519ZZ

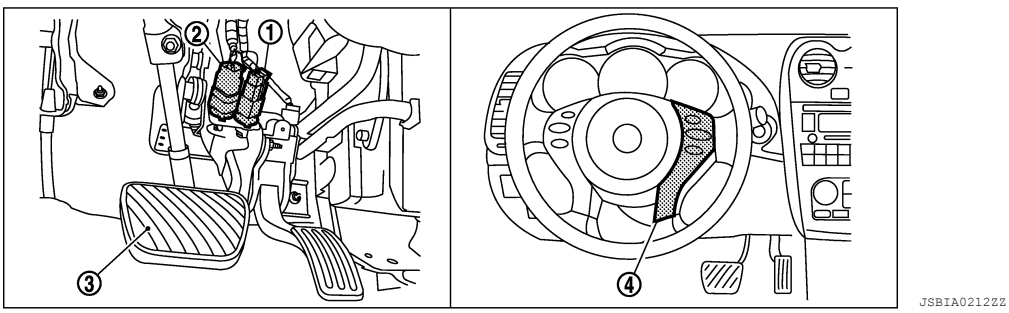
1. Electronic controlled engine mount control solenoid valve
2. EVAP canister vent control valve (view with rear suspension member removed)
3. EVAP canister
4. Fuel injector harness connector
5. Intake valve timing control solenoid valve (bank 1)
6. Intake valve timing control solenoid valve (bank 2)

⇦ : Vehicle front



1. Knock sensor (bank 2)
2. Knock sensor (bank 1)
3. Transmission range switch
4. Battery
5. IPDM E/R
6. ECM
7. Refrigerant pressure sensor (shown with front grill removed)
8. Accelerator pedal position sensor

⇦ : Vehicle front



1. ASCD brake switch
2. Stop lamp switch
3. Brake pedal
4. ASCD steering switch

Component Description

INFOID:0000000006391908

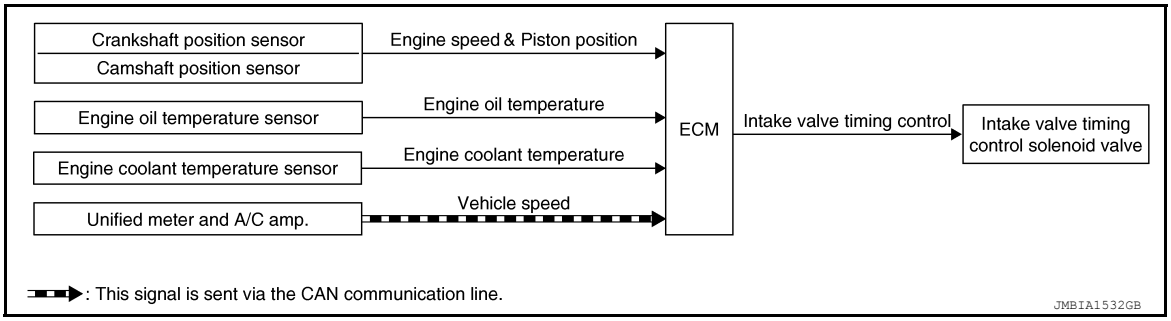
Component	Reference
A/F sensor 1	EC-471, "Description"
Accelerator pedal position sensor	EC-585, "Description"
Camshaft position sensor (PHASE)	EC-504, "Description"

Component	Reference
Crankshaft position sensor (POS)	EC-500, "Description"
Engine coolant temperature sensor	EC-465, "Description"
EVAP canister purge volume control solenoid valve	EC-508, "Description"
Mass air flow sensor	EC-456, "Description"
Throttle position sensor	EC-468, "Description"

INTAKE VALVE TIMING CONTROL

System Diagram

INFOID:0000000006391909



System Description

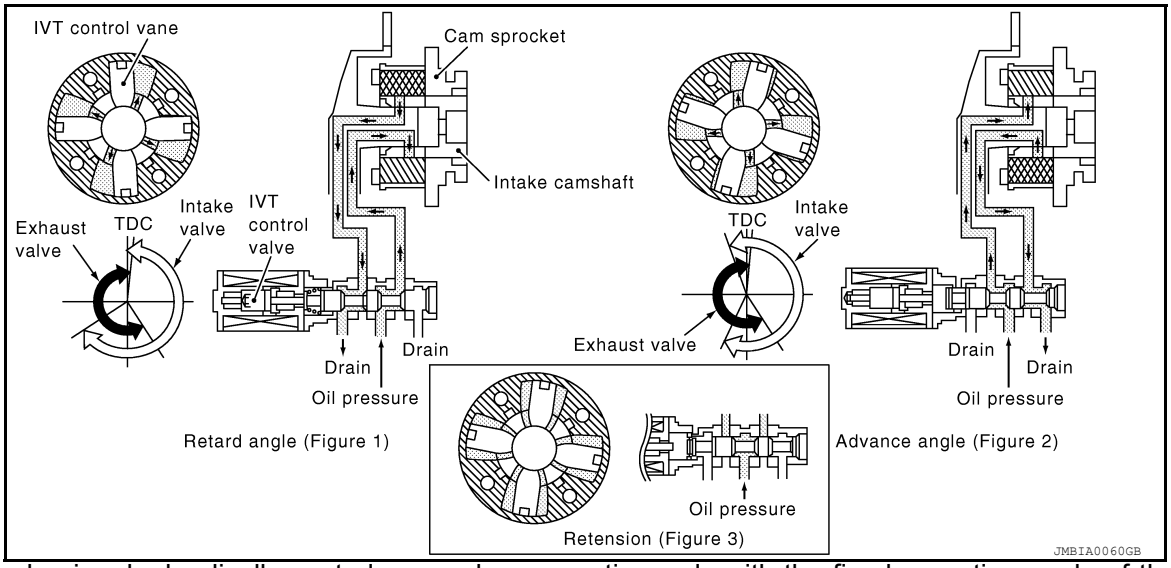
INFOID:0000000006391910

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 oil temperature sensor	Engine oil temperature		
Engine coolant temperature sensor	Engine coolant temperature		
Unified meter and A/C amp.	Vehicle speed*		

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

SYSTEM DESCRIPTION

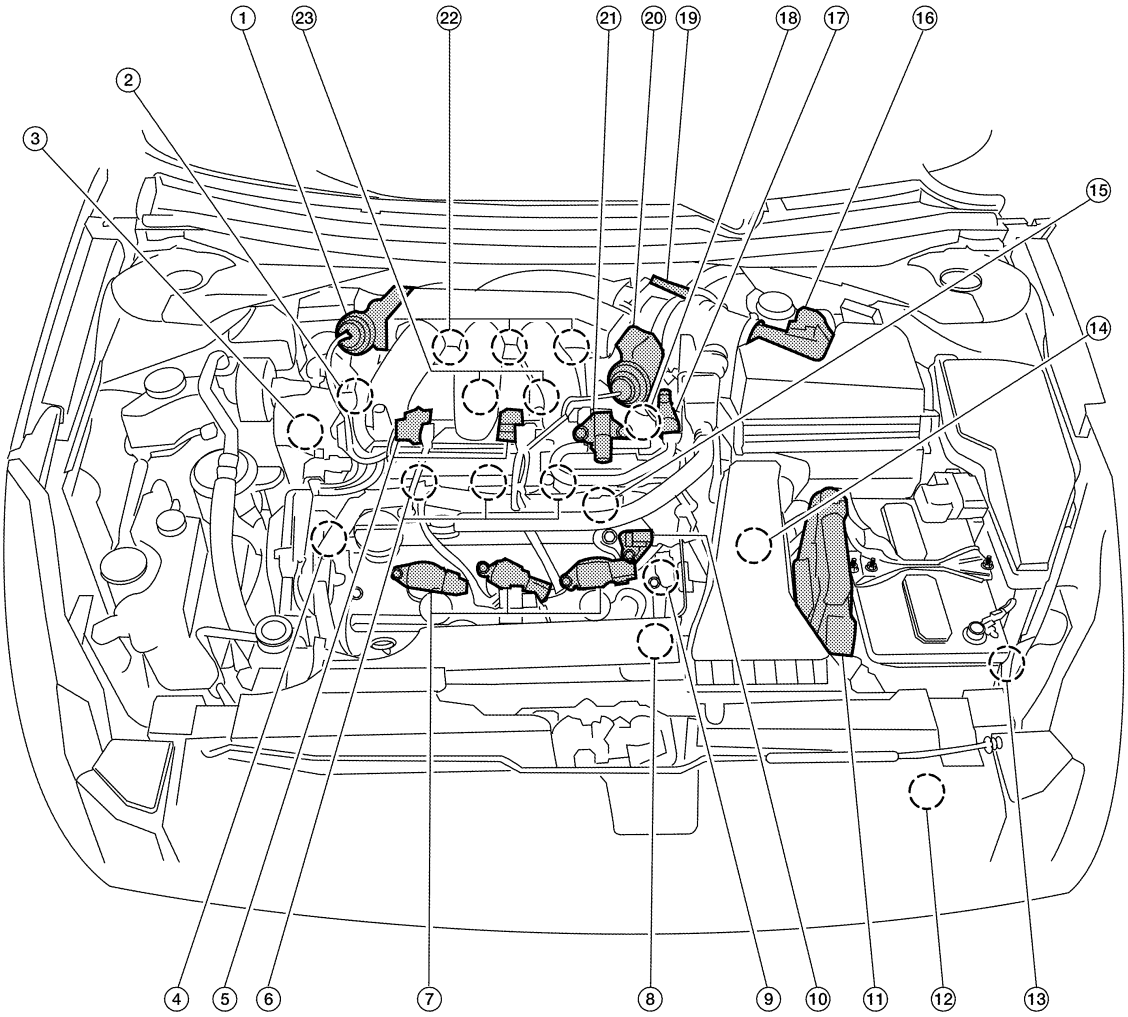


This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

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

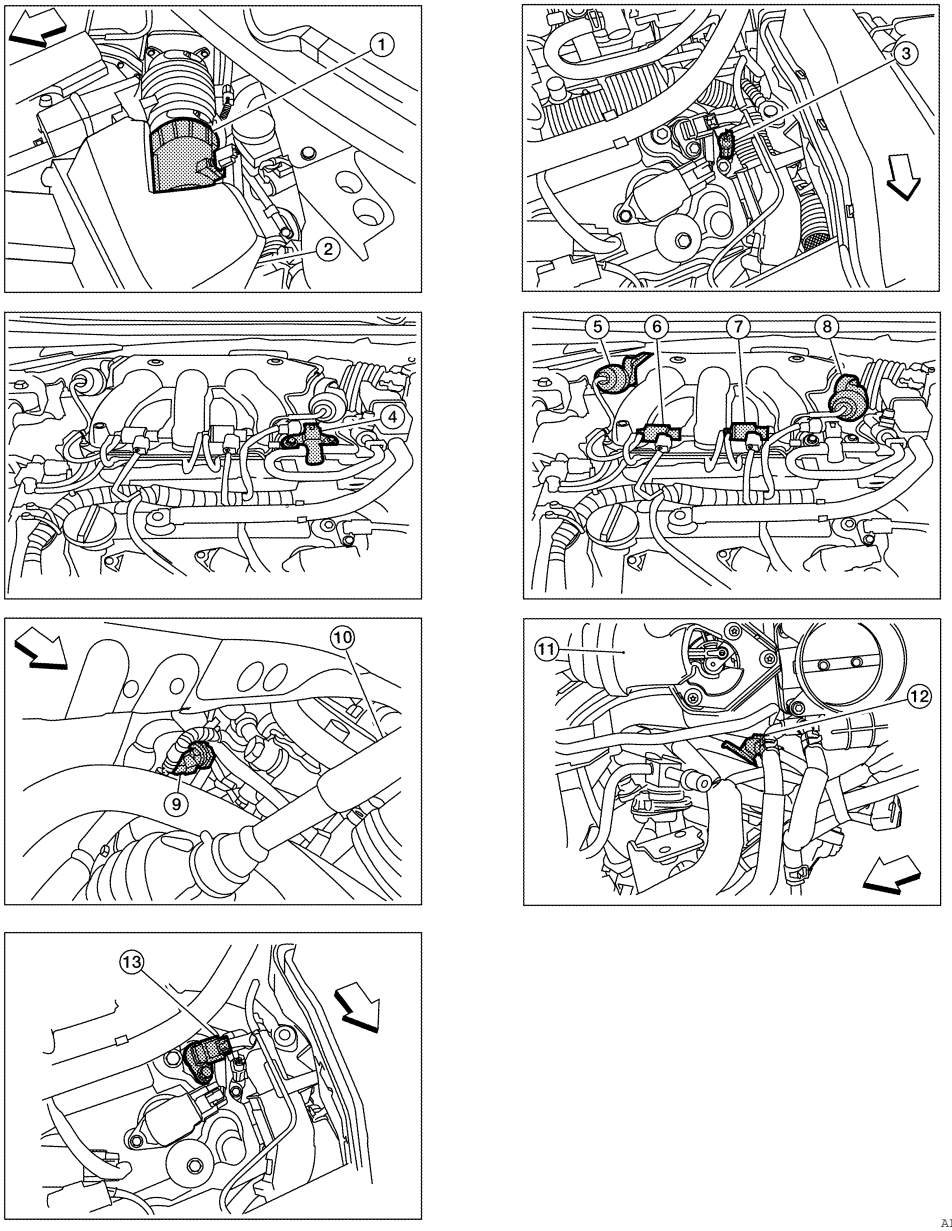
Component Parts Location

INFOID:0000000006391911



ALBIA0110ZZ

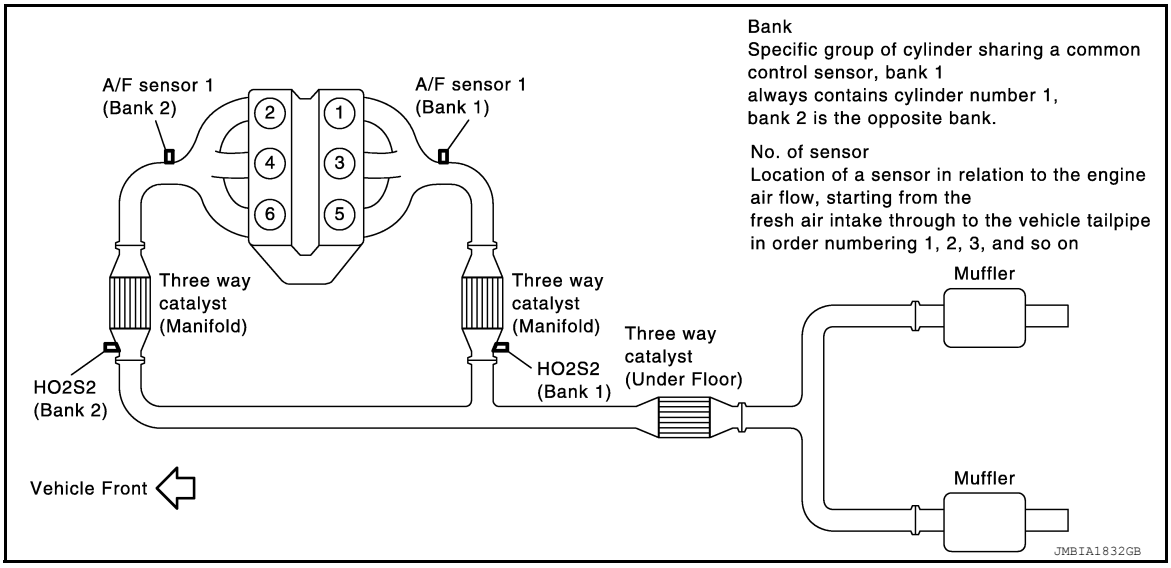
1. Power valve actuator 1
2. Intake valve timing control solenoid valve (bank 1)
3. Power steering pressure sensor
4. Intake valve timing control solenoid valve (bank 2)
5. VIAS control solenoid valves 1 and 2
6. Fuel injector (bank 2)
7. Ignition coil (with power transistor) and spark plug (bank 2)
8. Crankshaft position sensor (POS)
9. Engine coolant temperature sensor
10. Camshaft position sensor (PHASE) (bank 2)
11. ECM
12. Refrigerant pressure sensor
13. Battery current sensor
14. Transmission range switch
15. Condenser-2
16. Mass air flow sensor (with intake air temperature sensor)
17. EVAP service port
18. Camshaft position sensor (PHASE) (bank 1)
19. Electric throttle control actuator
20. Power valve actuator 2
21. EVAP canister purge volume control solenoid valve
22. Ignition coil (with power transistor) and spark plug (bank 1)
23. Knock sensor

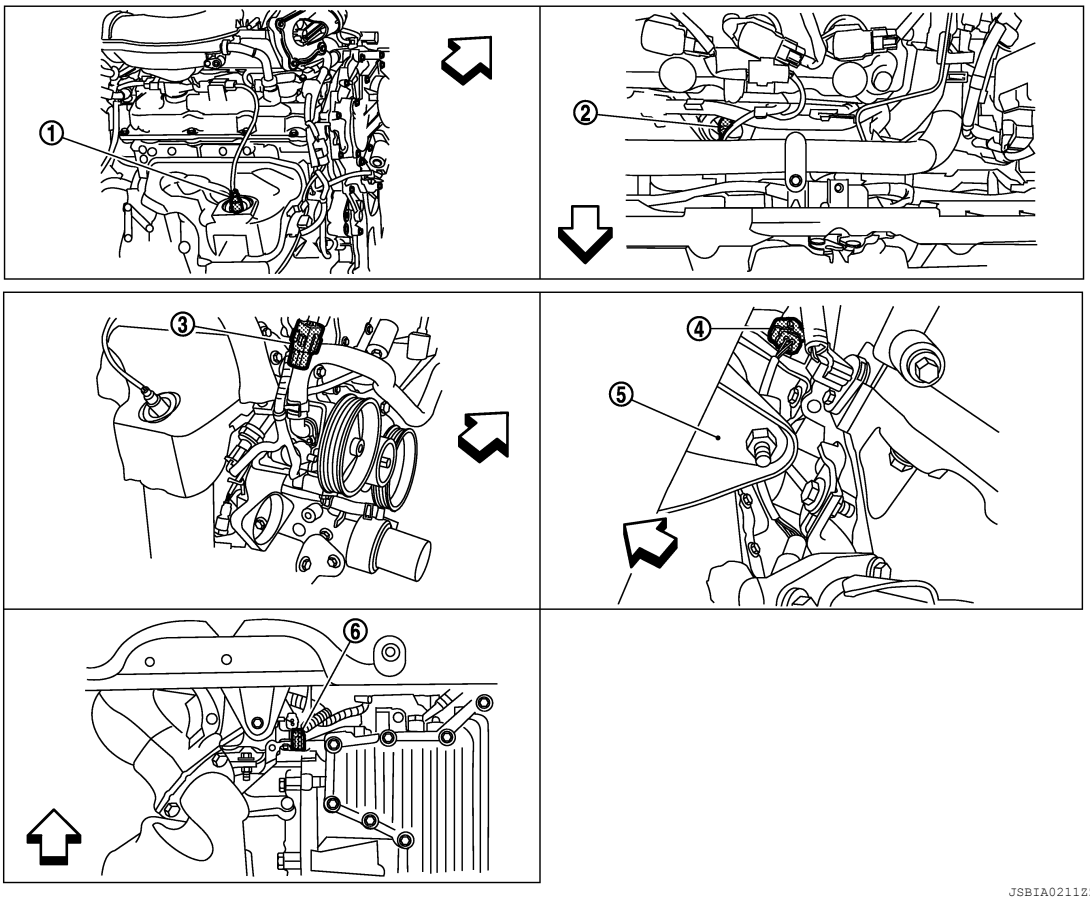


ALBIA0101ZZ

1. Mass air flow sensor (with intake air temperature sensor)
2. Air cleaner case
3. Engine coolant temperature sensor
4. EVAP canister purge volume control solenoid valve
5. Power valve actuator 1
6. VIAS control solenoid valve 1
7. VIAS control solenoid valve 2
8. Power valve actuator 2
9. Power steering pressure sensor
10. Tie rod (RH)
11. Power valve actuator 2
12. Camshaft position sensor (PHASE) (bank 1)
13. Camshaft position sensor (PHASE) (bank 2)

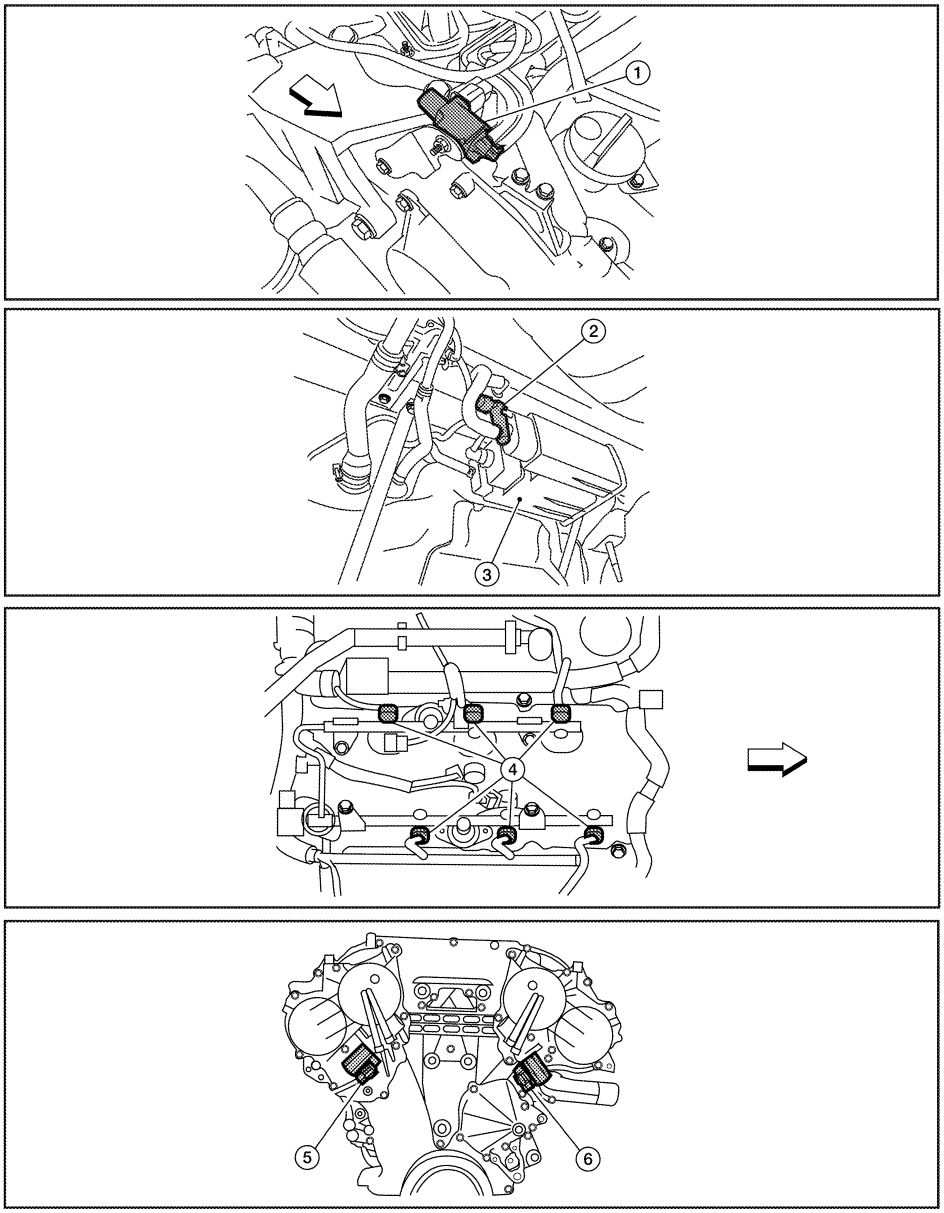
⇦ : Vehicle front





1. A/F sensor 1 (bank 1)
2. A/F sensor 1 (bank 2)
3. HO2S2 (bank 1) harness connector
4. HO2S2 (bank 2) harness connector
5. Front engine mount
6. Crankshaft position sensor (POS)

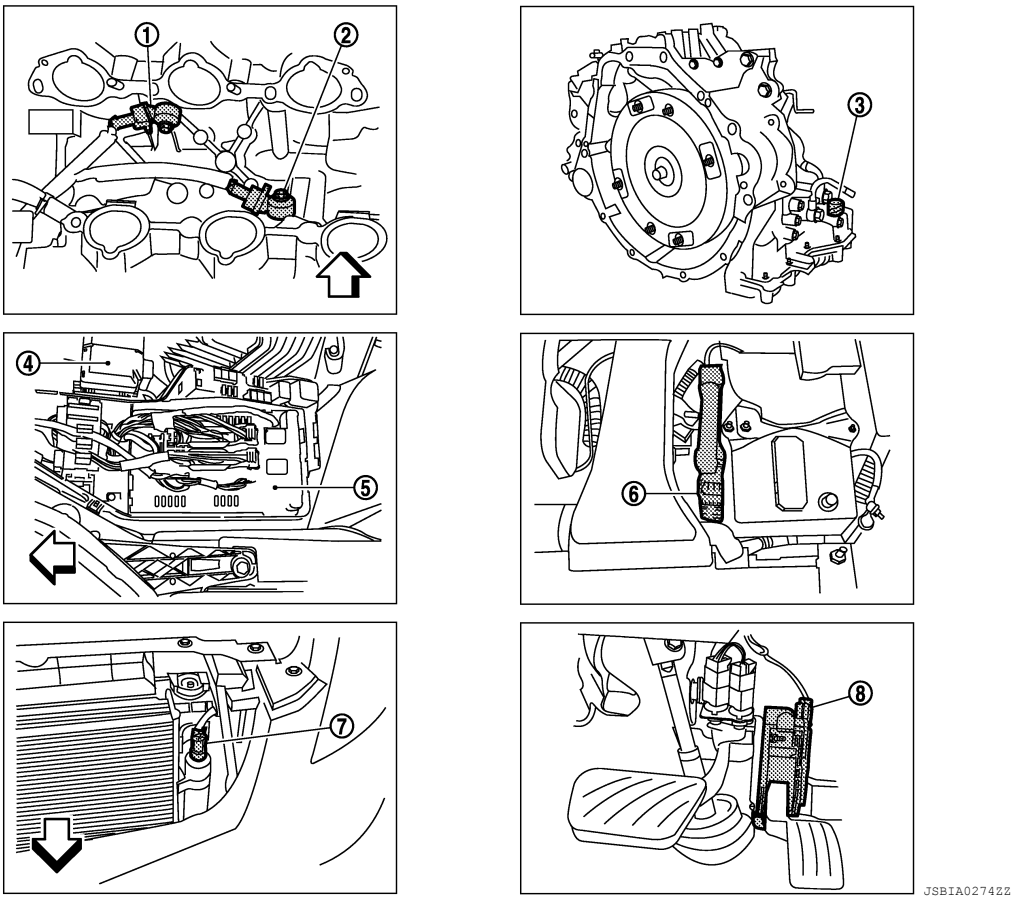
⇦ : Vehicle front



ALBIA0519ZZ

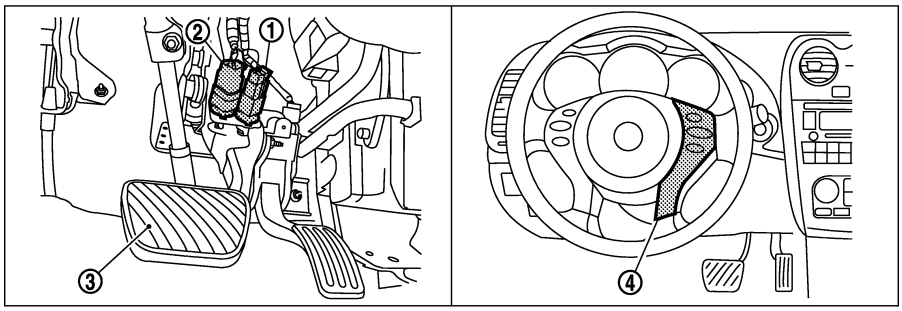
1. Electronic controlled engine mount control solenoid valve
2. EVAP canister vent control valve (view with rear suspension member removed)
3. EVAP canister
4. Fuel injector harness connector
5. Intake valve timing control solenoid valve (bank 1)
6. Intake valve timing control solenoid valve (bank 2)

⇦ : Vehicle front



1. Knock sensor (bank 2)
2. Knock sensor (bank 1)
3. Transmission range switch
4. Battery
5. IPDM E/R
6. ECM
7. Refrigerant pressure sensor (shown with front grill removed)
8. Accelerator pedal position sensor

⇦ : Vehicle front



1. ASCD brake switch
2. Stop lamp switch
3. Brake pedal
4. ASCD steering switch

Component Description

INFOID:0000000006391912

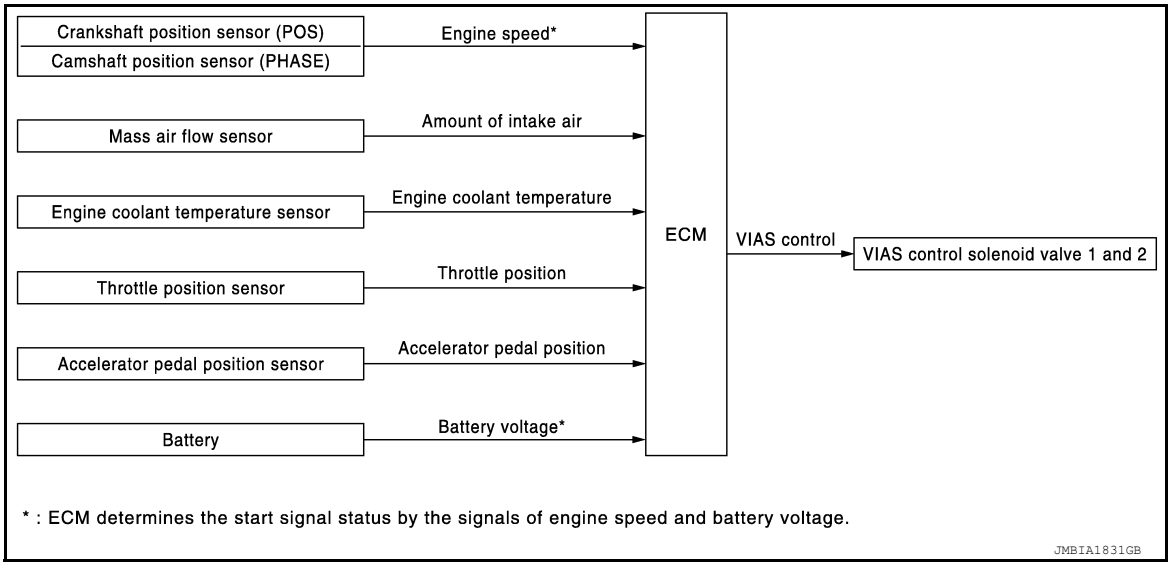
Component	Reference
Camshaft position sensor (PHASE)	EC-504, "Description"
Crankshaft position sensor (POS)	EC-500, "Description"

Component	Reference
Engine coolant temperature sensor	EC-465, "Description"
Intake valve timing control solenoid valve	EC-453, "Description"

VARIABLE INDUCTION AIR SYSTEM

System Diagram

INFOID:0000000006391913



System Description

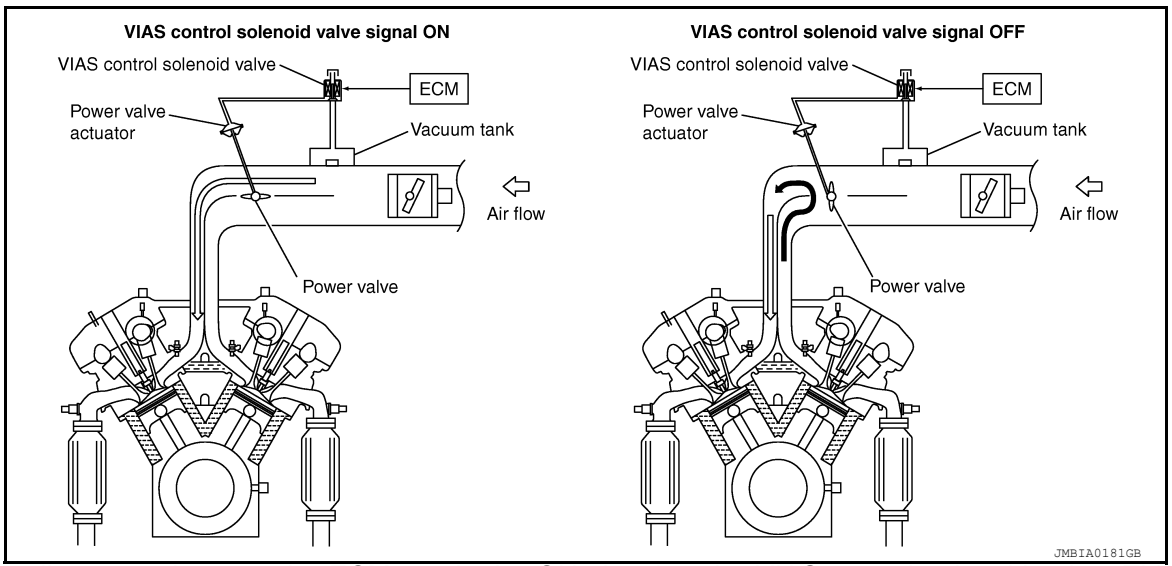
INFOID:0000000006391914

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	VIAS control	VIAS control solenoid valve 1 VIAS control solenoid valve 2
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*		

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

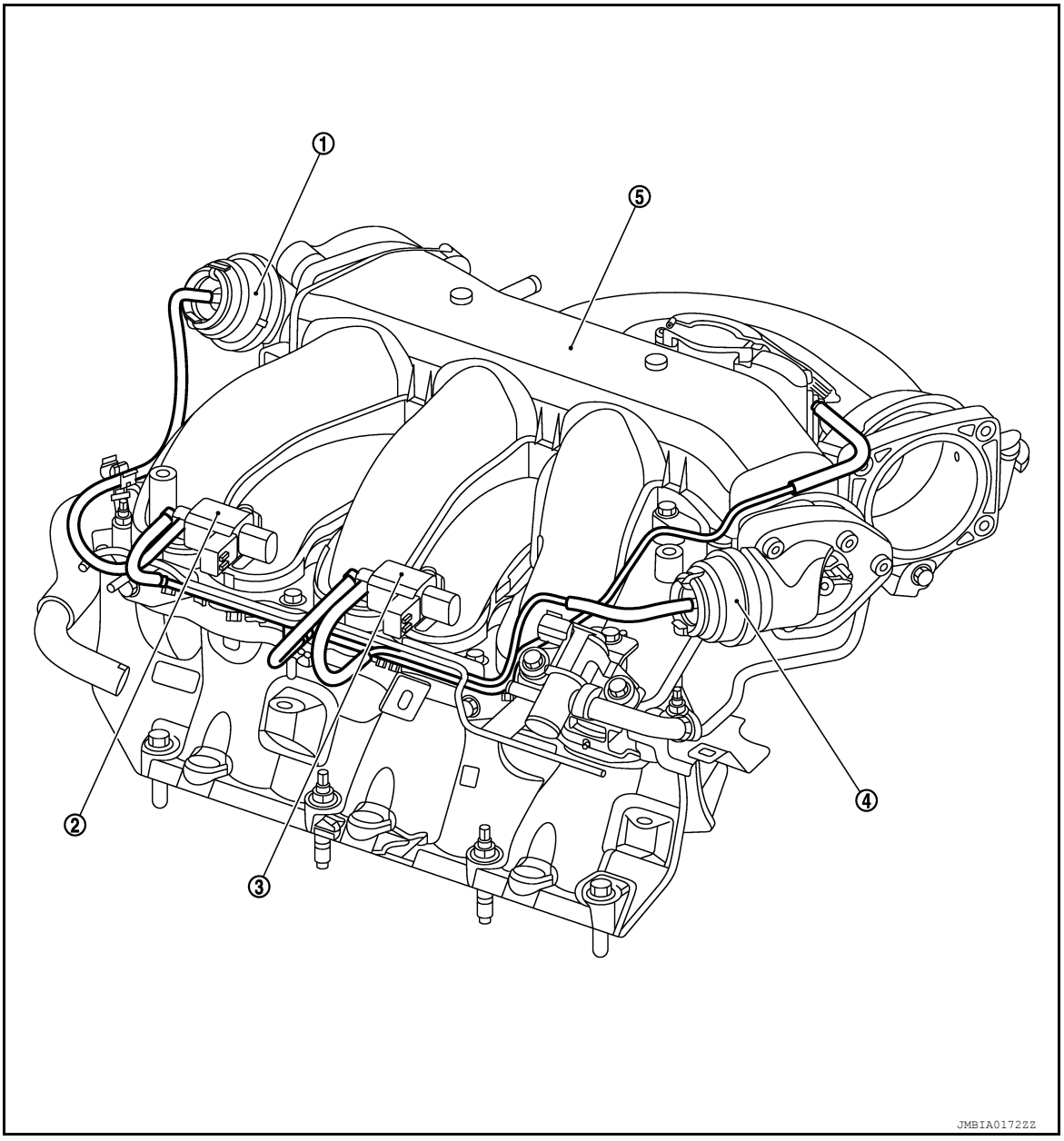
SYSTEM DESCRIPTION



In the medium speed range, the ECM sends the ON signal to the VIAS control solenoid valve. This signal introduces the intake manifold vacuum into the power valve actuator and therefore closes the power valve.

Under this condition, the pressure waves of the exhaust stroke do not disturb the pressure waves of the intake stroke of each opposite bank. Therefore, charging efficiency is increased together with the effect of the long intake passage.
However, in the high speed range, the ECM sends the OFF signal to the VIAS control solenoid valve and the power valves is opened. Under this condition, the pressure waves of intake stroke are resonant with those of each opposite bank exhaust stroke. Therefore, charging efficiency is also increased.
In addition, both valves 1 and 2 are opened or closed in other ranges mentioned above. Thus maximum charging efficiency is obtained for the various driving conditions.

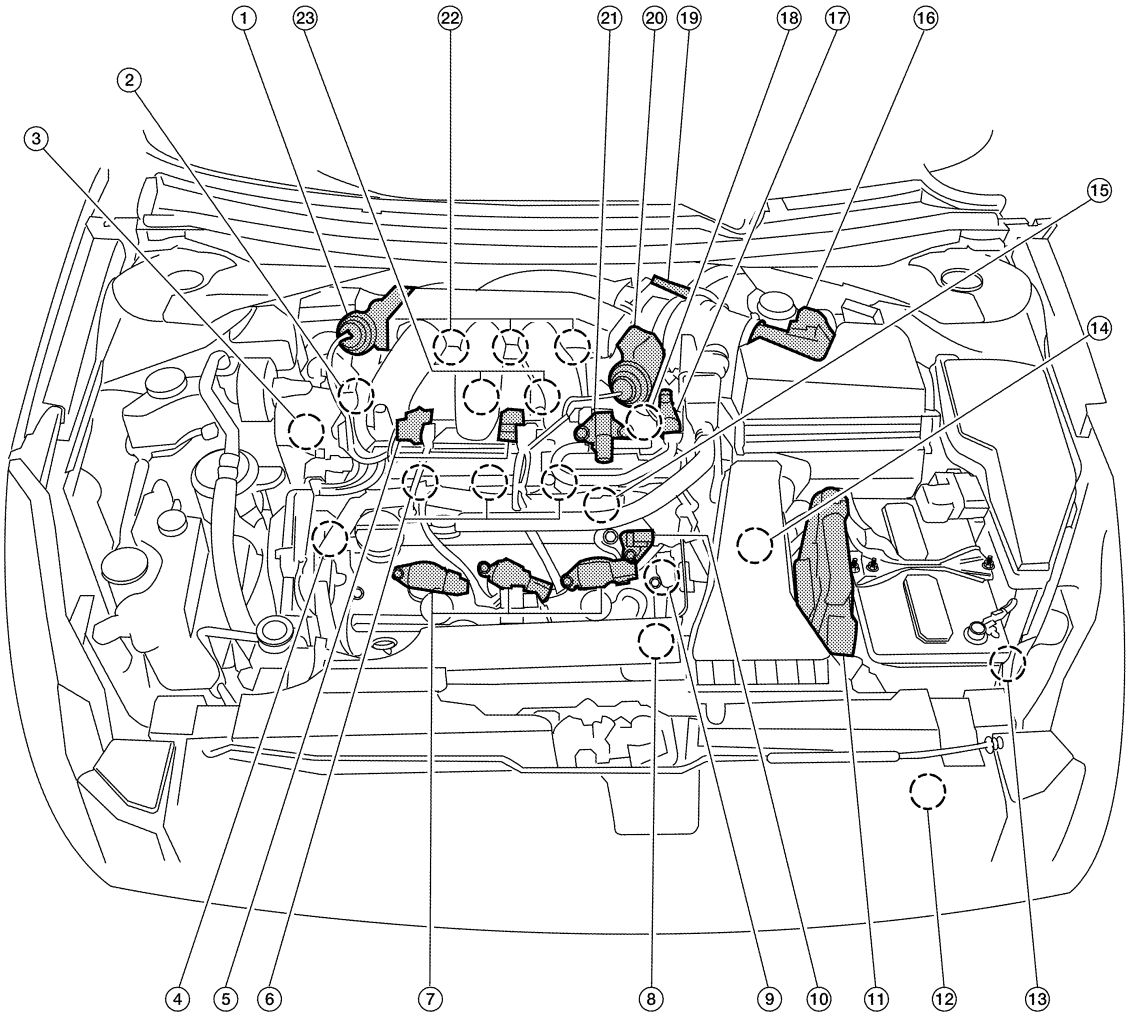
VACUUM HOSE DRAWING



1. Power valve actuator 1
2. VIAS control solenoid valve 1
3. VIAS control solenoid valve 2
4. Power valve actuator 2
5. Intake manifold collector

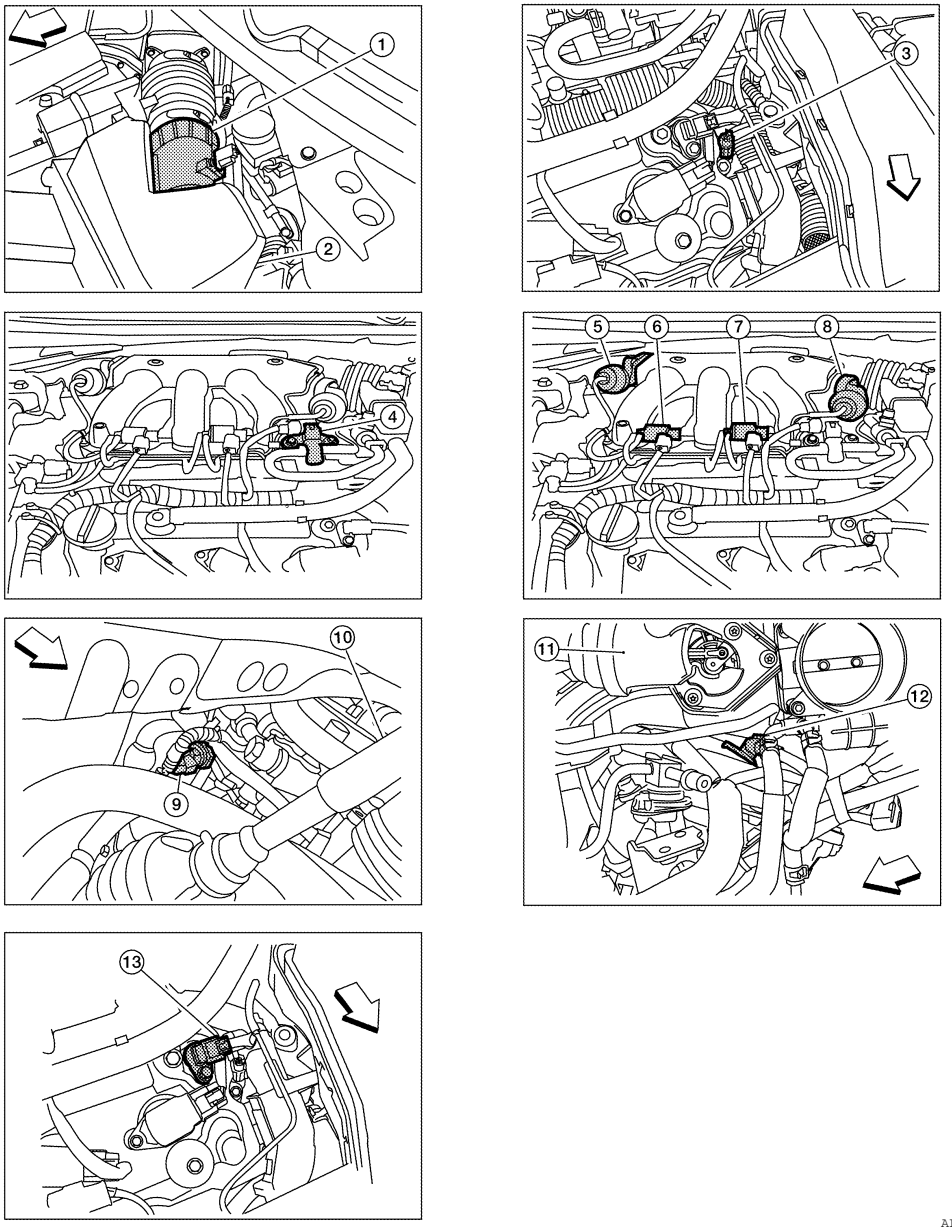
Component Parts Location

INFOID:0000000006391915



ALBIA0110ZZ

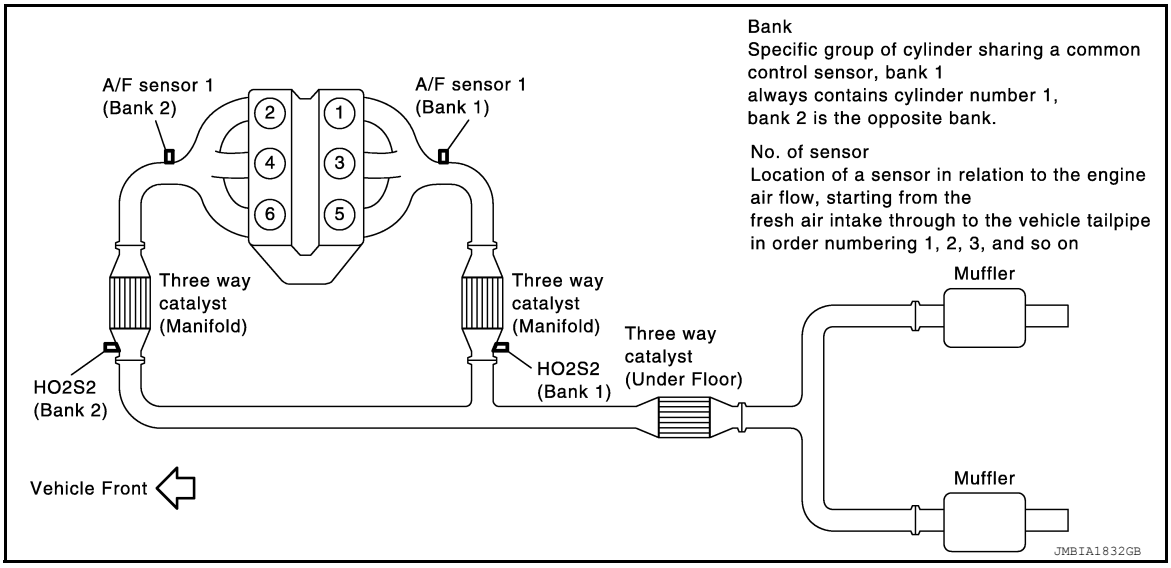
1. Power valve actuator 1
2. Intake valve timing control solenoid valve (bank 1)
3. Power steering pressure sensor
4. Intake valve timing control solenoid valve (bank 2)
5. VIAS control solenoid valves 1 and 2
6. Fuel injector (bank 2)
7. Ignition coil (with power transistor) and spark plug (bank 2)
8. Crankshaft position sensor (POS)
9. Engine coolant temperature sensor
10. Camshaft position sensor (PHASE) (bank 2)
11. ECM
12. Refrigerant pressure sensor
13. Battery current sensor
14. Transmission range switch
15. Condenser-2
16. Mass air flow sensor (with intake air temperature sensor)
17. EVAP service port
18. Camshaft position sensor (PHASE) (bank 1)
19. Electric throttle control actuator
20. Power valve actuator 2
21. EVAP canister purge volume control solenoid valve
22. Ignition coil (with power transistor) and spark plug (bank 1)
23. Knock sensor

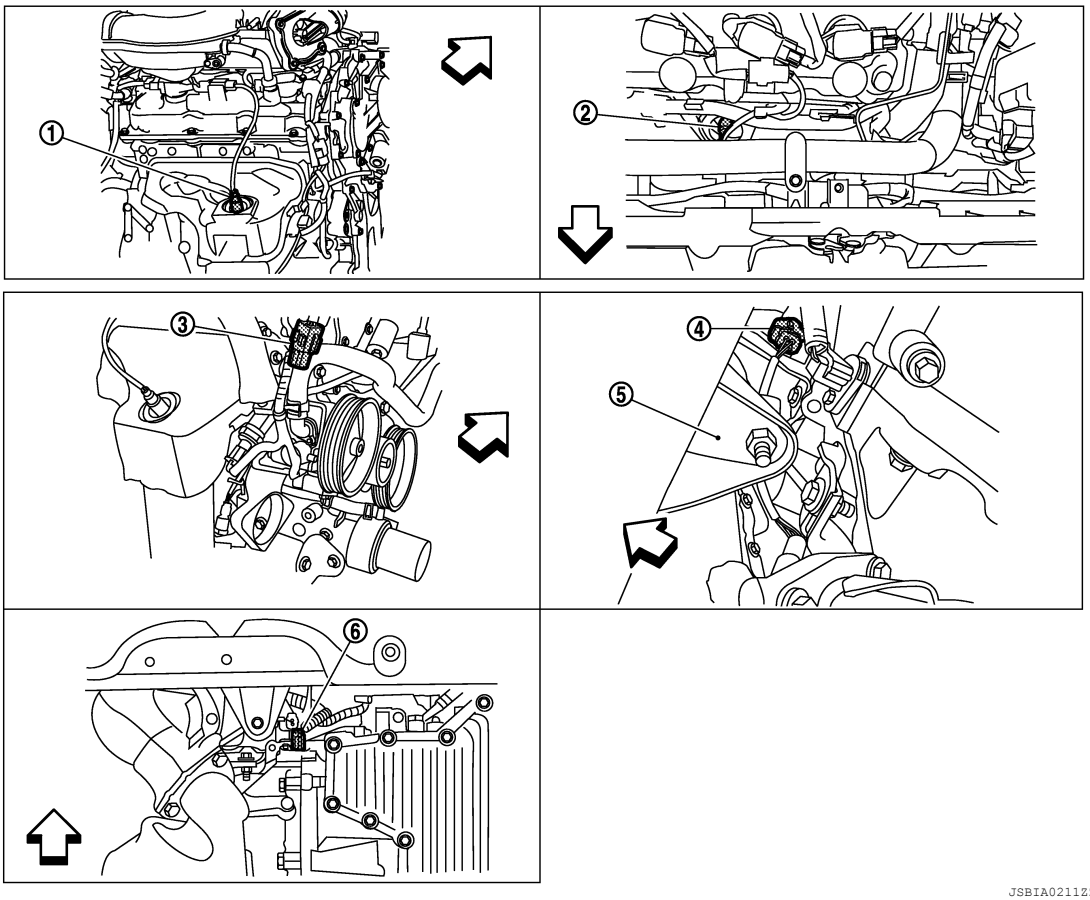


ALBIA0101ZZ

1. Mass air flow sensor (with intake air temperature sensor)
2. Air cleaner case
3. Engine coolant temperature sensor
4. EVAP canister purge volume control solenoid valve
5. Power valve actuator 1
6. VIAS control solenoid valve 1
7. VIAS control solenoid valve 2
8. Power valve actuator 2
9. Power steering pressure sensor
10. Tie rod (RH)
11. Power valve actuator 2
12. Camshaft position sensor (PHASE) (bank 1)
13. Camshaft position sensor (PHASE) (bank 2)

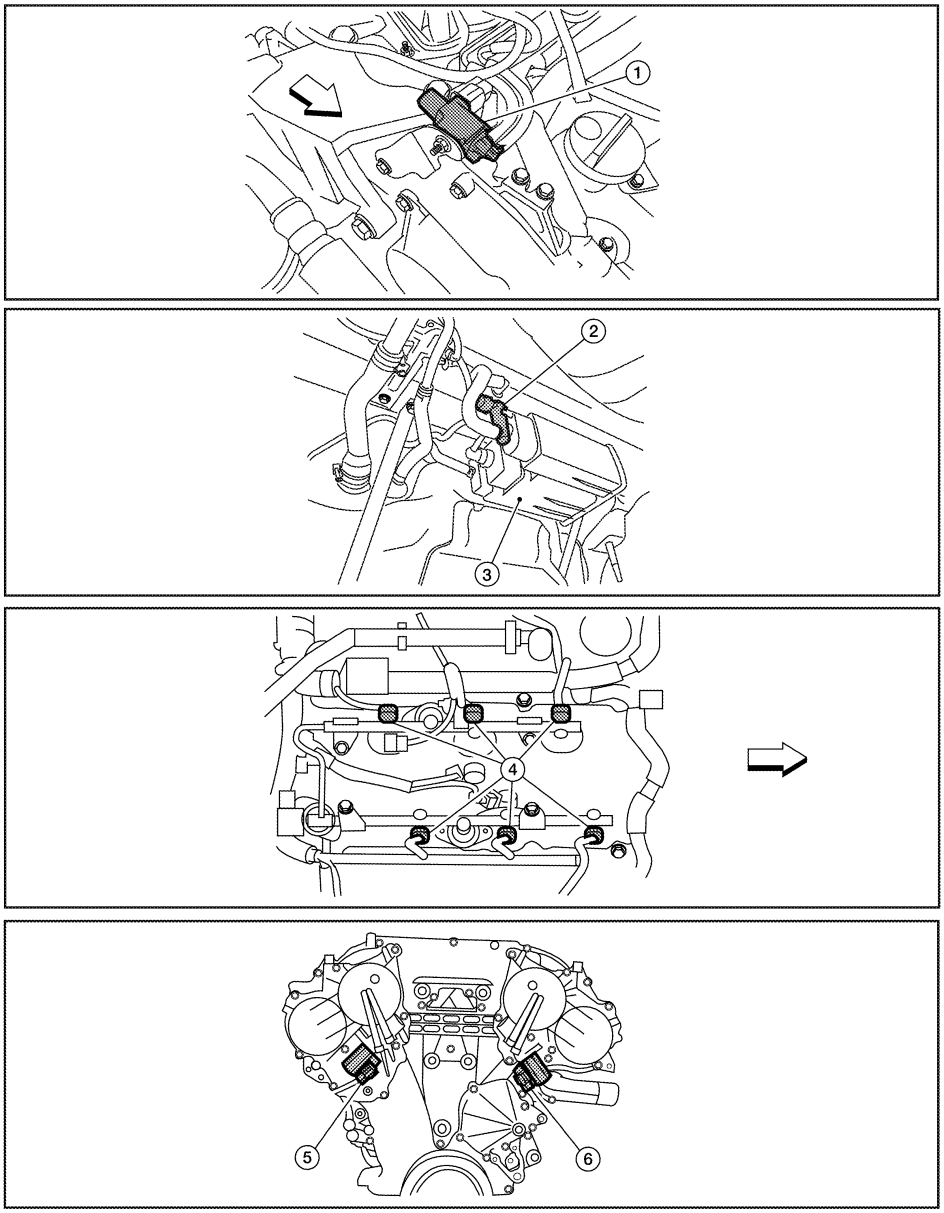
⇦ : Vehicle front





1. A/F sensor 1 (bank 1)
2. A/F sensor 1 (bank 2)
3. HO2S2 (bank 1) harness connector
4. HO2S2 (bank 2) harness connector
5. Front engine mount
6. Crankshaft position sensor (POS)

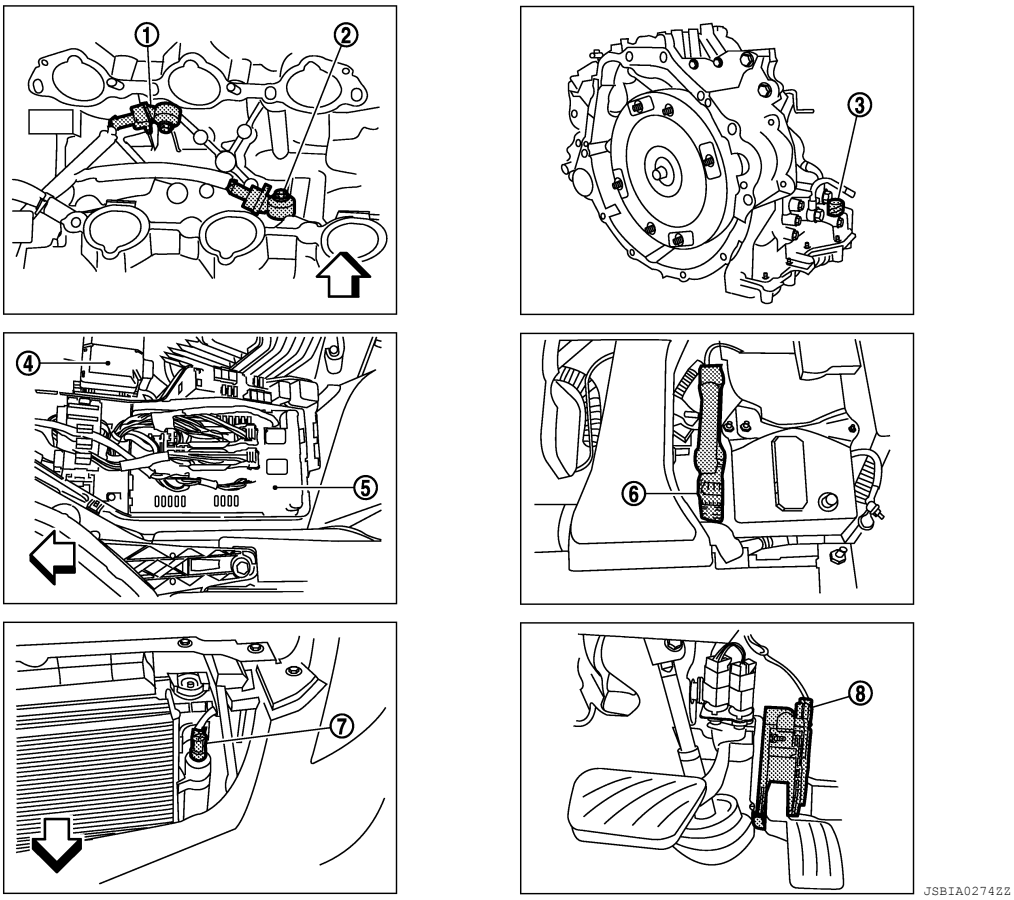
⇦ : Vehicle front



ALBIA0519ZZ

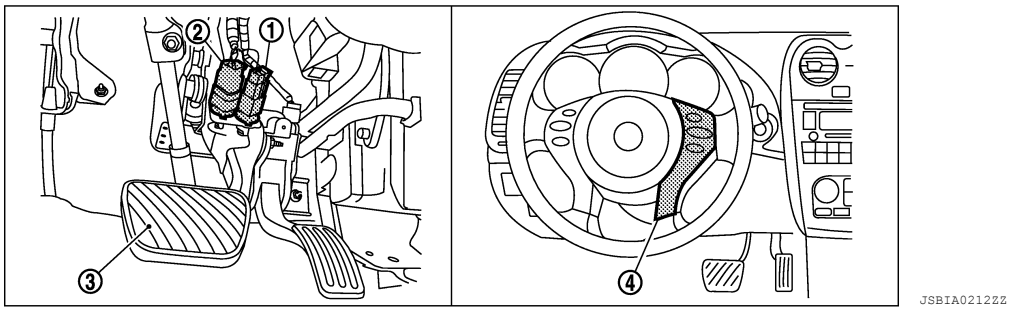
1. Electronic controlled engine mount control solenoid valve
2. EVAP canister vent control valve (view with rear suspension member removed)
3. EVAP canister
4. Fuel injector harness connector
5. Intake valve timing control solenoid valve (bank 1)
6. Intake valve timing control solenoid valve (bank 2)

⇦ : Vehicle front



1. Knock sensor (bank 2)
2. Knock sensor (bank 1)
3. Transmission range switch
4. Battery
5. IPDM E/R
6. ECM
7. Refrigerant pressure sensor (shown with front grill removed)
8. Accelerator pedal position sensor

⇦ : Vehicle front



1. ASCD brake switch
2. Stop lamp switch
3. Brake pedal
4. ASCD steering switch

Component Description

INFOID:0000000006391916

Component	Reference
Accelerator pedal position sensor	EC-585, "Description"
Camshaft position sensor (PHASE)	EC-504, "Description"
Crankshaft position sensor (POS)	EC-500, "Description"

Component	Reference
Engine coolant temperature sensor	EC-465, "Description"
Mass air flow sensor	EC-456, "Description"
Power valve 1 and 2	EC-639, "Description"
Throttle position sensor	EC-468, "Description"
VIAS control solenoid valve 1	EC-565, "Description"
VIAS control solenoid valve 2	EC-567, "Description"

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000006896771

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

DIAGNOSIS SYSTEM (ECM)
DIAGNOSIS DESCRIPTION
DIAGNOSIS DESCRIPTION : 1st Trip Detection Logic and Two Trip Detection Logic

INFOID:0000000006896772

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not illuminate at this stage. <1st trip>
If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL illuminates. The MIL illuminates at the same time when the DTC is stored. <2nd trip> The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to illuminate or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Illuminate	Blinking	Illuminate				
One trip detection diagnoses (Refer to EC-659, "DTC Index".)	—	×	—	—	×	—	—	—
Two trip detection diagnoses (Refer to EC-659, "DTC Index".)	—	—	—	×	—	×	×	—

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

INFOID:0000000006896773

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not recur, the 1st trip DTC will not be displayed.
If a malfunction is detected during the 1st trip, the 1st trip DTC is saved in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are saved in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.
For malfunctions in which 1st trip DTCs are displayed, refer to EC-659, "DTC Index". These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-III.
1st trip DTC is specified in Service $07 of SAE J1979/ISO 15031-5. 1st trip DTC detection occurs without illuminating the MIL and therefore does not warn the driver of a malfunction.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to EC-327, "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.
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

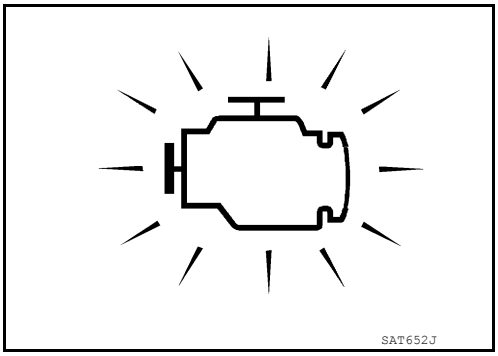
Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0308
2		Except the above items
3	1st trip freeze frame data	

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

DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)

INFOID:0000000006896776

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



1. The MIL illuminates when ignition switch is turned ON (engine is not running).
   NOTE:
   Check the MIL circuit if MIL does not illuminate. Refer to EC-634, "Component Function Check".
2. When the engine is started, the MIL should go off.
   NOTE:
   If MIL continues to illuminate/blink, perform self-diagnoses and inspect/repair accordingly because an emission related ECU has detected a malfunction in the emission control systems components and/or the powertrain control components (which affect vehicle emissions).

On Board Diagnosis Function

INFOID:0000000006896781

ON BOARD DIAGNOSIS ITEM

The on board diagnostic system has the following functions.

Diagnostic test mode	Function
Bulb check	MIL can be checked.
Malfunction warning	If ECM detects a malfunction, it illuminates or blinks MIL to inform the driver that a malfunction has been detected.
Self-diagnostic results	DTCs or 1st trip DTCs stored in ECM can be read.
Accelerator pedal released position learning	ECM can learn the accelerator pedal released position. Refer to EC-335, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description".
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to EC-336, "THROTTLE VALVE CLOSED POSITION LEARNING : Description".
Idle air volume learning	ECM can learn the idle air volume. Refer to EC-336, "IDLE AIR VOLUME LEARNING : Description".
Mixture ratio self-learning value clear	Mixture ratio self-learning value can be erased. Refer to EC-338, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description".

BLUB CHECK MODE

Description

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

Operation Procedure

1. Turn ignition switch ON.

2. The MIL on the instrument panel should stay ON.
   If it remains OFF, check MIL circuit. Refer to EC-634, "Diagnosis Procedure".

MALFUNCTION WARNING MODE

Description

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

Operation Procedure

1. Turn ignition switch ON.
2. Check that MIL illuminates.
   If it remains OFF, check MIL circuit. Refer to EC-634, "Diagnosis Procedure".
3. Start engine and let it idle.
   - For two trip detection logic diagnoses, ECM turns on MIL when it detects the same malfunction twice in the two consecutive driving cycles.
   - For 1st trip detection logic diagnoses, ECM turns on MIL when it detects a malfunction in one driving cycle.
   - ECM blinks MIL when it detects a malfunction that may damage the three way catalyst (misfire).

SELF-DIAGNOSTIC RESULTS MODE

Description

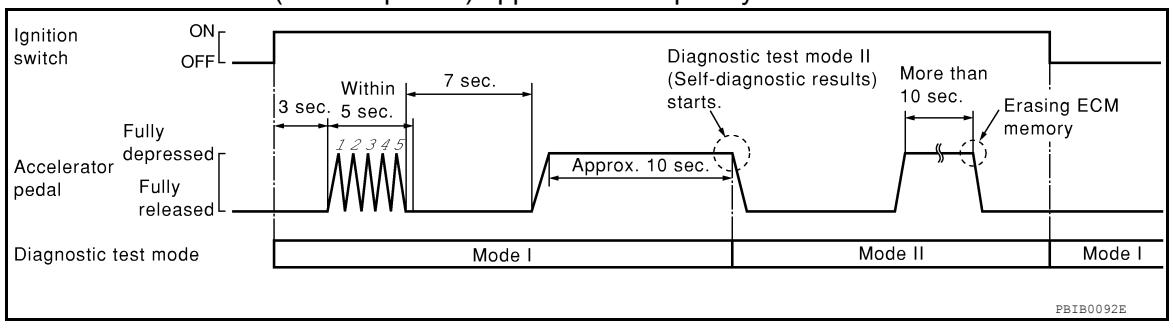
This function allows to indicate DTCs or 1st trip DTCs stored in ECM according to the number of times MIL is blinking.

How to Set Self-diagnostic Results Mode

NOTE:

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- After ignition switch is turned off, ECM is always released from the “Self-diagnostic results” mode.

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.
   - Fully depress the accelerator pedal.
   - Fully release the accelerator pedal.
3. Wait 7 seconds, fully depress the accelerator pedal and keep it depressed for approx. 10 seconds until the MIL starts blinking.
   NOTE:
   Do not release the accelerator pedal for 10 seconds if MIL starts blinking during this period. This blinking is displaying SRT status and is continued for another 10 seconds.
4. Fully release the accelerator pedal.
   ECM has entered to Self-diagnostic results mode.
   NOTE:
   Wait until the same DTC (or 1st trip DTC) appears to completely confirm all DTCs.

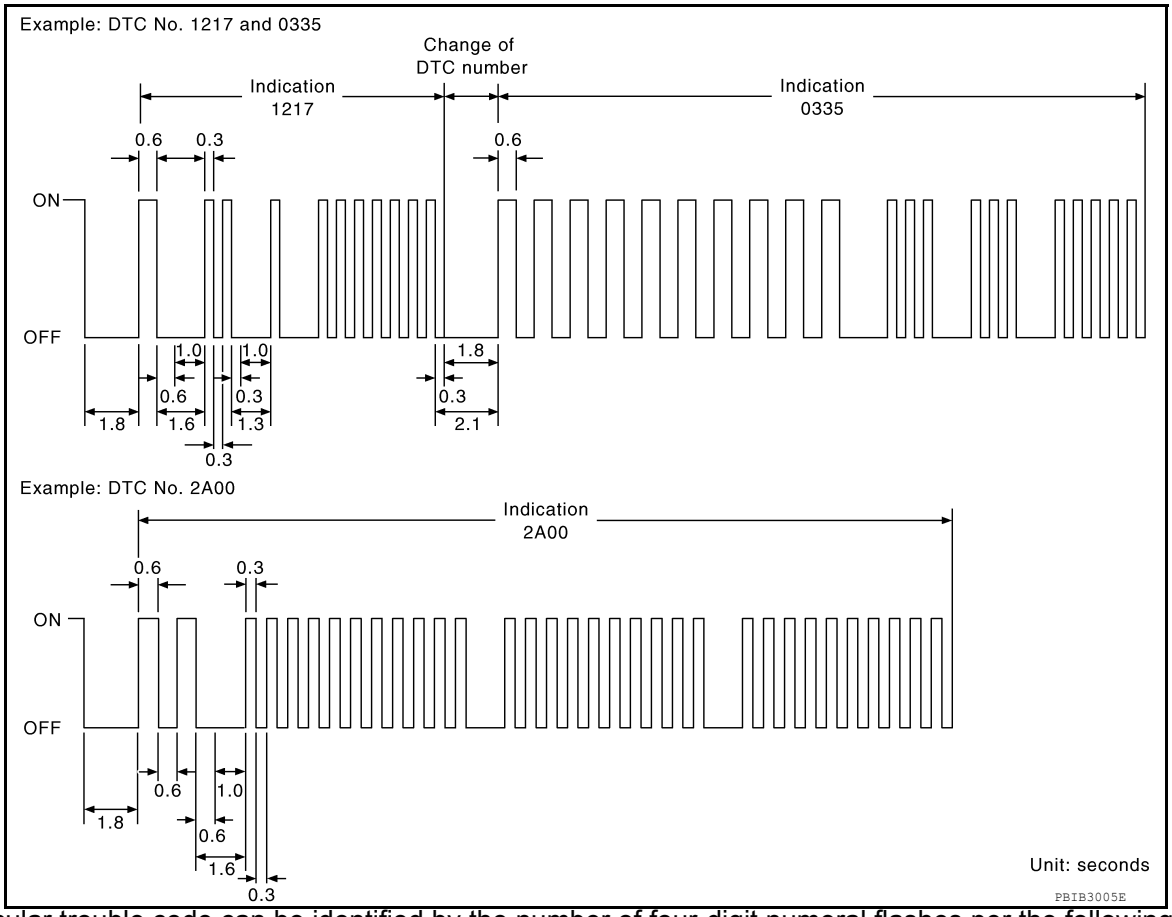


How to Read Self-diagnostic Results

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

The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL illuminates in “malfunction warning” mode, it is a DTC; if two or more codes are displayed, they may be either

DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT-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 per the following.

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-seconds) - OFF (0.6-seconds) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-seconds ON and 0.3-seconds OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-seconds OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. Refer to EC-659, "DTC Index".

How to Erase Self-diagnostic Results

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

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- Test values

NOTE:

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

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

5. Set ECM in Self-diagnostic results.
6. The diagnostic information has been erased from the backup memory in the ECM.
   Fully depress the accelerator pedal and keep it depressed for more than 10 seconds.
7. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

CONSULT-III Function

INFOID:0000000006391918

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 Identification	ECM part number can be read.

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

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data

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-659, "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-659, "DTC Index".)

Freeze frame data item*	Description
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
FUEL SYS-B2	
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.
L-FUEL TRM-B2 [%]	
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.
S-FUEL TRM-B2 [%]	
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]	These items are displayed but are not applicable to this model.
COMBUST CONDITION	

*: 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	ms	• "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	• When engine is running specification range is indicated in "SPEC".
A/F ALPHA-B1	%	• The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • This data also includes the data for the air-fuel ratio learning control. • When engine is running specification range is indicated in "SPEC".
A/F ALPHA-B2			
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.

Monitored item	Unit	Description	Remarks
A/F SEN1 (B1)	V	• The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed.	
A/F SEN1 (B2)			
HO2S2 (B1)	V	• The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S2 (B2)			
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.
HO2S2 MNTR(B2)			
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			
FUEL T/TMP SE	°C or °F	• The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.	
INT/A TEMP SE	°C or °F	• The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
EVAP SYS PRES	V	• The signal voltage of EVAP control system pressure sensor is displayed.	
START SIGNAL	ON/OFF	• Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	• After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS	ON/OFF	• Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG	ON/OFF	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW	ON/OFF	• Indicates [ON/OFF] condition from the park/neutral position (PNP) signal.	
PW/ST SIGNAL	ON/OFF	• [ON/OFF] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor) 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.	

Monitored item	Unit	Description	Remarks
INJ PULSE-B1 INJ PULSE-B2	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.
MASS AIRFLOW	g/s	• Indicates the mass air flow computed by ECM according to the signal voltage of the mass air flow sensor.	
PURG VOL C/V	%	• Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
INT/V TIM (B1) INT/V TIM (B2)	°CA	• Indicates [°CA] of intake camshaft advance angle.	
INT/V SOL(B1) INT/V SOL(B2)	%	• 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.	
VIAS S/V-1	ON/OFF	• The control condition of the VIAS control solenoid valve 1 (determined by ECM according to the input signals) is indicated. ON: VIAS control solenoid valve 1 is operating. OFF: VIAS control solenoid valve 1 is not operating.	
VIAS S/V-2	ON/OFF	• The control condition of the VIAS control solenoid valve 2 (determined by ECM according to the input signals) is indicated. ON: VIAS control solenoid valve 2 is operating. OFF: VIAS control solenoid valve 2 is not operating.	
AIR COND RLY	ON/OFF	• The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
ENGINE MOUNT	IDLE/TRVL	• The control condition of the electronic controlled engine mount (determined by ECM according to the input signals) is indicated. IDLE: Engine speed is below 950 rpm TRVL: Engine speed is above 950 rpm	
FUEL PUMP RLY	ON/OFF	• Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
VENT CONT/V	ON/OFF	• The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. ON: Closed OFF: Open	
THRTL RELAY	ON/OFF	• Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
COOLING FAN	HI/MID/LOW/OFF	• The control condition of the cooling fan (determined by ECM according to the input signals) is indicated. HI: High speed operation MID: Middle speed operation LOW: Low speed operation OFF: Stop	

Monitored item	Unit	Description	Remarks
HO2S2 HTR (B1) HO2S2 HTR (B2)	ON/OFF	• Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
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.	
ENG OIL TEMP	°C or °F	• The engine oil temperature (determined by the signal voltage of the engine oil temperature sensor) is displayed.	
TRVL AFTER MIL	km or mile	• Distance traveled while MIL is activated.	
A/F S1 HTR(B1) A/F S1 HTR(B2)	%	• Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals. • The current flow to the heater becomes larger as the value increases.	
AC PRESS SEN	V	• The signal voltage from the refrigerant pressure sensor is displayed.	
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
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 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 [ON/OFF] condition of A/T O/D according to the input signal from the TCM.	
AT OD CANCEL	ON/OFF	• Indicates [ON/OFF] condition of A/T O/D cancel request signal.	
CRUISE LAMP	ON/OFF	• Indicates [ON/OFF] condition of CRUISE 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.	

Monitored item	Unit	Description	Remarks
ALT DUTY SIG	ON/OFF	• The control condition of the power generation voltage variable control (determined by ECM according to the input signals) is indicated. ON: Power generation voltage variable control is active. OFF: Power generation voltage variable control is inactive.	
A/F ADJ-B1	—	• Indicates the correction of factor stored in ECM. The factor is calculated from the difference between the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 signal.	
A/F ADJ-B2			
ALT DUTY	%	• Indicates the duty ratio of the power generation command value. The ratio is calculated by ECM based on the battery current sensor signal.	
I/P PULLY SPD	rpm	• Indicates the engine speed computed from the input speed sensor signal.	

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

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Fuel injector • Air fuel ratio (A/F) sensor 1
IGNITION TIMING	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Perform Idle Air Volume Learning.
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch OFF • Selector lever: P or N • Cut off each 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 “HI”, “MID”, “LOW” and “OFF” using CONSULT-III.	Cooling fan moves and stops.	• Harness and connectors • Cooling fan motor • IPDM E/R
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
VIAS SOL VALVE	• Ignition switch: ON • Turn solenoid valve “ON” and “OFF” using CONSULT-III and listen to operating sound.	Solenoid valve makes the operating sound.	• Harness and connectors • Solenoid valve

TEST ITEM	CONDITION	JUDGMENT	CHECK ITEM (REMEDY)
VIAS S/V-B2	• Ignition switch: ON • Turn solenoid valve “ON” and “OFF” using CONSULT-III and listen to operating sound.	Solenoid valve makes the operating sound.	• Harness and connectors • Solenoid valve
ENGINE MOUNTING	• Ignition switch: ON • Turn electronic controlled engine mount “IDLE” and “TRVL” with the CONSULT-III.	Electronic controlled engine mount makes the operating sound.	• Harness and connectors • Electronic controlled engine mount
PURG VOL CONT/V	• Engine: After warming up, run engine at 1,500 rpm. • Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-III.	Engine speed changes according to the opening percent.	• Harness and connectors • Solenoid valve
FUEL/T TEMP SEN	• Change the fuel tank temperature using CONSULT-III.		
VENT CONTROL/V	• Ignition switch: ON (Engine stopped) • Turn solenoid valve “ON” and “OFF” with the CONSULT-III and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connectors • Solenoid valve
V/T ASSIGN ANGLE	• Engine: Return to the original trouble condition • Change intake valve timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Intake valve timing control solenoid valve
ALTERNATOR DUTY	• Engine: Idle • Change duty ratio using CONSULT-III.	Battery voltage changes.	• Harness and connectors • IPDM E/R • Alternator

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

DTC/CIRCUIT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:0000000006391919

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” in “DATA MONITOR” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.
The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.
The SP value will be displayed for the following three items:
- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Component Function Check

INFOID:0000000006391920

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 until “ATF TEMP SEN” in “DATA MONITOR” mode of “CVT” system indicates less than 0.9 V.
- Electrical load: Not applied
- Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.
- Engine speed: Idle

>> GO TO 2.

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

With CONSULT-III
NOTE:
Perform “SPEC” in “DATA MONITOR” mode in maximum scale display.
1. Perform “EC-331, "BASIC INSPECTION : Special Repair Requirement"”.
2. Select “B/FUEL SCHDL”, “A/F ALPHA-B1”, “A/F ALPHA-B2” and “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode with CONSULT-III.
3. Make sure that monitor items are within the SP value.

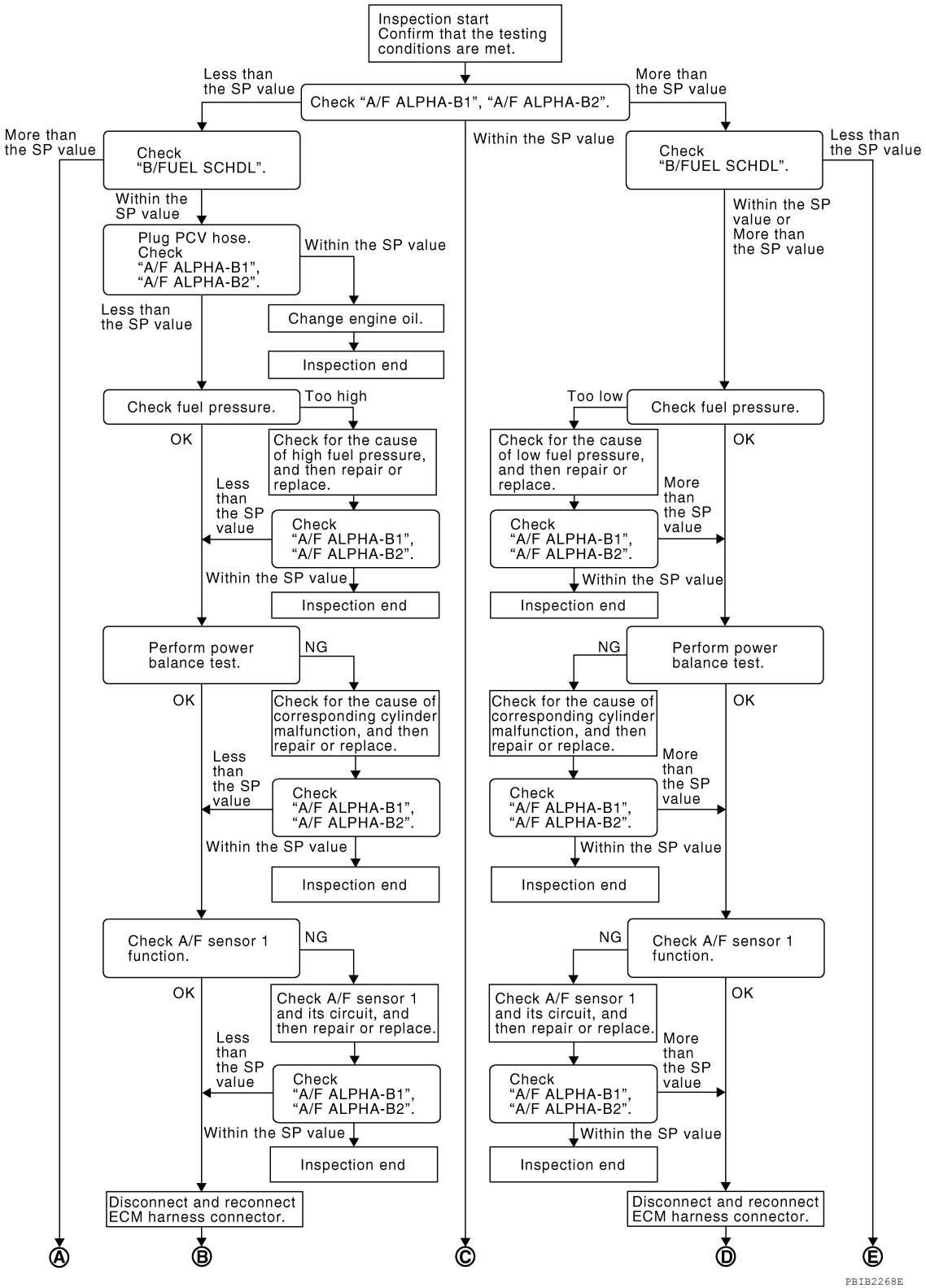
Is the measurement value within the SP value?

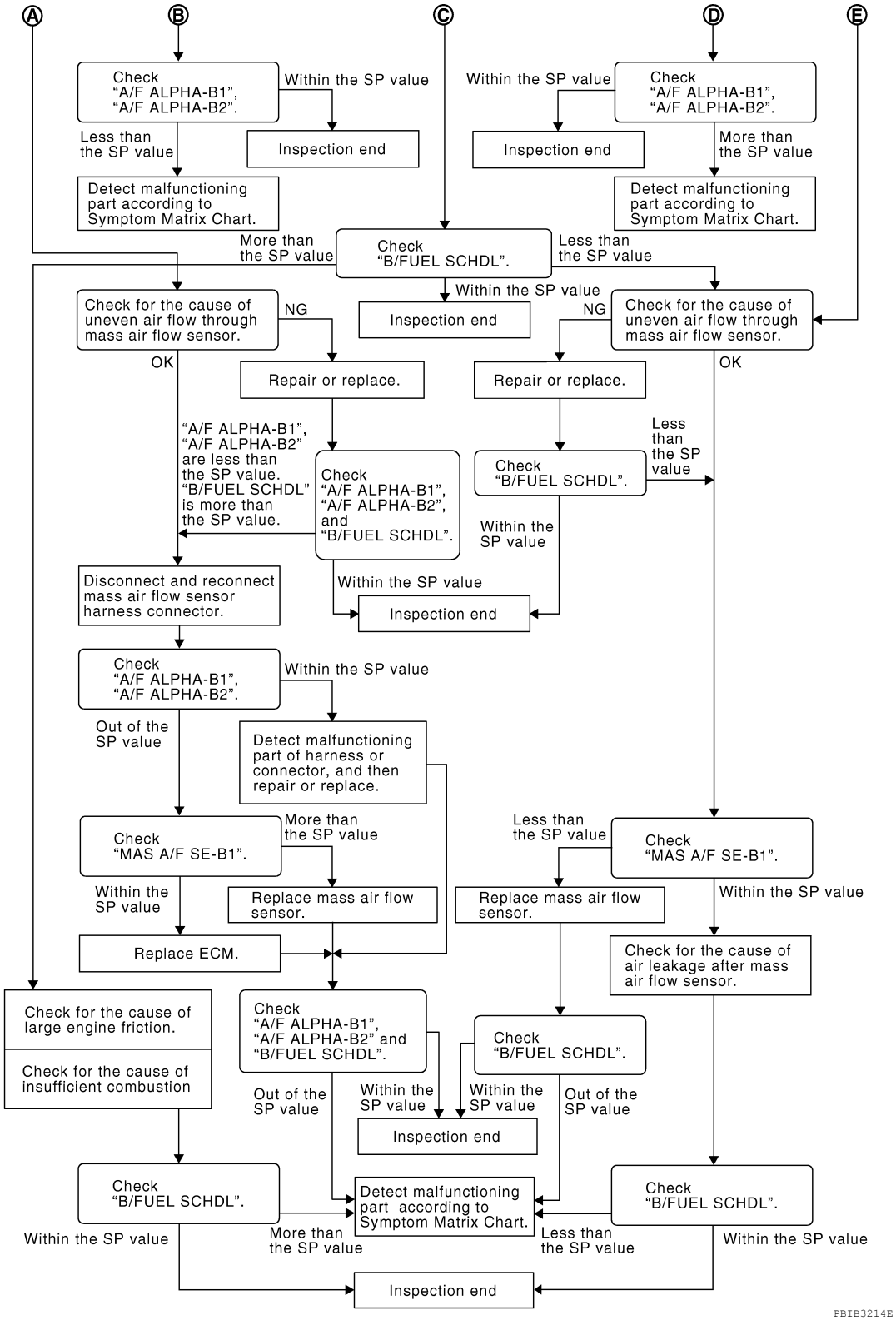
YES >> INSPECTION END
NO >> Go to EC-431, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006391921

OVERALL SEQUENCE





DETAILED PROCEDURE

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

With CONSULT-III

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-430, "Component Function Check".
3. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and make sure that the each indication is within the SP value.

NOTE:
Check “A/F ALPHA-B1”, “A/F ALPHA-B2” for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.

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”, “A/F ALPHA-B2”

1. Stop the engine.
2. Disconnect PCV hose, and then plug it.
3. Start engine.
4. Select “A/F ALPHA-B1”, “A/F ALPHA-B2” 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 >> GO TO 5.
NO >> GO TO 6.

5. CHANGE ENGINE OIL

1. Stop the engine.
2. Change engine oil. Refer to LU-26, "Changing 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-701, "Inspection".)

Is the inspection result normal?

YES >> GO TO 9.
NO-1 >> Fuel pressure is too high: Replace “fuel filter and fuel pump assembly”, refer to FL-7, "Exploded View", 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”, refer to FL-7, "Exploded View", and then GO TO 8.
NO >> Repair or replace and then GO TO 8.

8. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 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.
- Ignition coil and its circuit (Refer to EC-629, "Component Function Check".)
- Fuel injector and its circuit (Refer to EC-616, "Component Function Check".)
- Intake air leakage
- Low compression pressure (Refer to EM-130, "On-Vehicle Service".)

Is the inspection result normal?

YES >> Replace fuel injector, refer to EM-148, "Removal and Installation", and then GO TO 11.
NO >> Repair or replace malfunctioning part and then GO TO 11.

11. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 12.

12. CHECK A/F SENSOR 1 FUNCTION

Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1.
- For DTC P0130, P0150, refer to EC-471, "DTC Logic".
- For DTC P0131, P0151, refer to EC-475, "DTC Logic".
- For DTC P0132, P0152, refer to EC-479, "DTC Logic".

Is any DTC detected?

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

13. CHECK A/F SENSOR 1 CIRCUIT

Perform Diagnostic Procedure according to corresponding DTC.

>> GO TO 14.

14. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

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

Is the measurement value within the SP value?

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

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

1. Stop the engine.

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

>> GO TO 16.

16. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

1. Start engine.
2. Select “A/F ALPHA-B1”, “A/F ALPHA-B2” 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 >> Detect malfunctioning part according to EC-689, "Symptom Table".

17. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO-1 >> More than the SP value: GO TO 18.
NO-2 >> Less than the SP value: GO TO 25.

18. DETECT MALFUNCTIONING PART

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

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

19. CHECK INTAKE SYSTEM

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

Is the inspection result normal?

YES >> GO TO 21.
NO >> Repair or replace malfunctioning part, and then GO TO 20.

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

Select “A/F ALPHA-B1”, “A/F ALPHA-B2”, and “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and 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”, “A/F ALPHA-B2” are less than the SP value: GO TO 21.

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

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

>> GO TO 22.

22. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

1. Start engine.
2. Select “A/F ALPHA-B1”, “A/F ALPHA-B2” 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 >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-457, "Diagnosis Procedure". 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, refer to EM-131, "Removal and Installation", and then GO TO 29.

24. REPLACE ECM

1. Replace ECM.
2. Refer to EC-334, "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, refer to EM-131, "Removal and Installation", 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”, “A/F ALPHA-B2”, AND “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-689, "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-689, "Symptom Table".

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000006391922

1.CHECK GROUND CONNECTION

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

Is the inspection result normal?

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

2.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

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

ECM		Ground	Continuity
Connector	Terminal		
F14	12	Ground	Existed
	16		
E10	107		
	108		
	111		
	112		

3. Also check harness for short to power.

is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

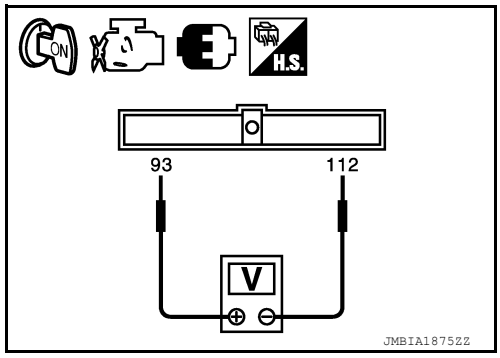
Check the following.
- Harness connectors E11, F2
- Harness for open or short between ECM and ground

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

4.CHECK ECM POWER SUPPLY CIRCUIT-I

1. Reconnect ECM harness connector.
2. Turn ignition switch OFF and then ON.
3. Check the voltage between ECM harness connectors.

ECM			Voltage
Connector	+	–	
	Terminal	Terminal	
E10	93	112	Battery voltage



Is the inspection result normal?

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

5.DETECT MALFUNCTIONING PART

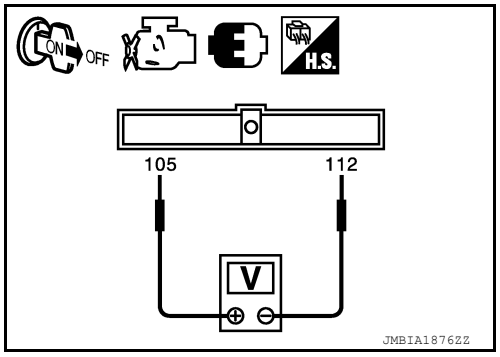
Check the following.
- IPDM E/R connector E18
- 10 A fuse (No. 35)
- Harness for open or short between ECM and IPDM E/R

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

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 connectors.

ECM			Voltage
Connector	+	–	
	Terminal	Terminal	
E10	105	112	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0 V.



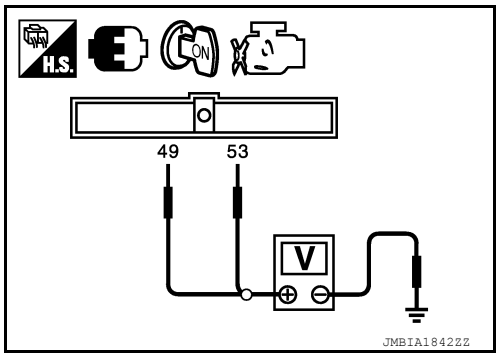
Is the inspection result normal?

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

7. CHECK ECM POWER SUPPLY CIRCUIT-III

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

IPDM E/R		Ground	Voltage
Connector	Terminal		
F10	49	Ground	Battery voltage
	53		



Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace IPDM E/R. Refer to PCS-45, "Removal and Installation".

8. CHECK INTERMITTENT INCIDENT

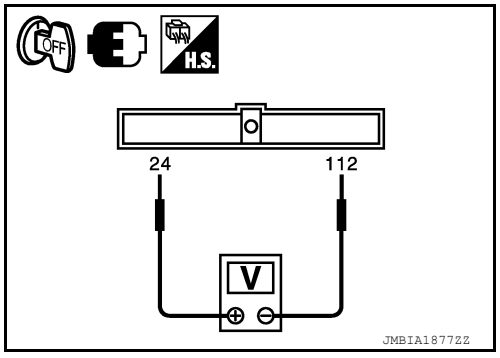
Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

9. CHECK ECM POWER SUPPLY CIRCUIT-IV

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

ECM				Voltage
+		–		
Connector	Terminal	Connector	Terminal	
F14	24	E10	112	Battery voltage



Is the inspection result normal?

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

10. CHECK ECM POWER SUPPLY CIRCUIT-V

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

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

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

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

11. CHECK 15 A FUSE

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

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace 15 A fuse.

12. 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	
E10	105	E18	10	Existed

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

Is the inspection result normal?

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

13. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-45, "Removal and Installation".
NO >> Repair or replace harness or connectors.

U1000, U1001 CAN COMM CIRCUIT

Description

INFOID:0000000006391923

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:0000000006391924

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> EC-441, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391925

Go to LAN-15, "Trouble Diagnosis Flow Chart".

P0011, P0021 IVT CONTROL

DTC Logic

INFOID:0000000006391926

DTC DETECTION LOGIC

NOTE:
If DTC P0011 or P0021 is displayed with DTC P0075, P0081, first perform the trouble diagnosis for EC-453, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0011	intake valve timing control performance (bank 1)	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
P0021	Intake valve timing control performance (bank 2)		

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Will CONSULT-III be used?

Will CONSULT-III be used?

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

2.PRECONDITIONING

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

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

>> GO TO 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.

VHCL SPEED SE	100 - 120 km/h (63 - 75 mph)
ENG SPEED	1,200 - 4,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 7.3 msec
Selector lever	D position

CAUTION:
Always drive at a safe speed.

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-444, "Diagnosis Procedure"
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

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

ENG SPEED	1,400 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:
Always drive at a safe speed.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-444, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-443, "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-444, "Diagnosis Procedure".

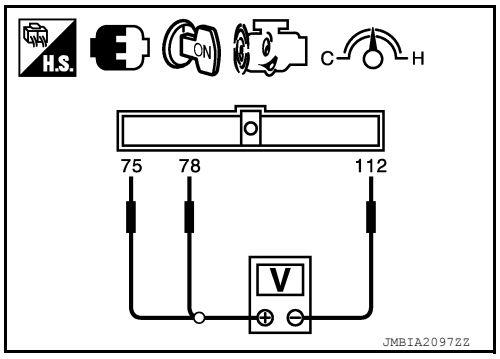
Component Function Check

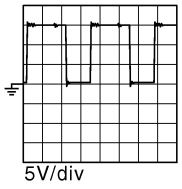
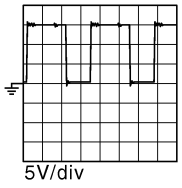
INFOID:0000000006391927

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.



DTC	ECM				Condition	Voltage signal
	Connector	Terminal	Connector	Terminal		
P0011	F13	78 [IVT control solenoid valve (bank 1)]	E10	112	At idle	BATTERY VOLTAGE (11 - 14 V)
					When revving engine up to 2,000 rpm	7 - 12 V★ 
P0021		75 [IVT control solenoid valve (bank 2)]			At idle	BATTERY VOLTAGE (11 - 14 V)
					When revving engine up to 2,000 rpm	7 - 12 V★ 

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Is the inspection result normal?

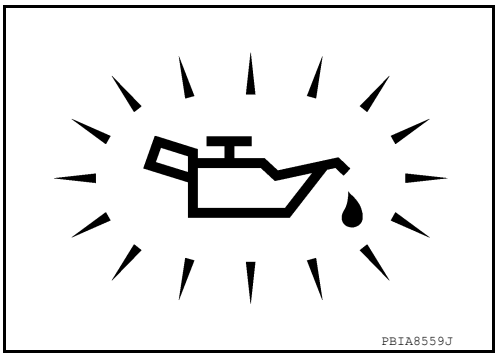
YES >> INSPECTION END
NO >> Go to EC-444, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006391928

1. CHECK OIL PRESSURE WARNING LAMP

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



Is oil pressure warming lamp illuminated?

YES >> Go to LU-25, "Inspection".
NO >> GO TO 2.

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-445, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-159, "Removal and Installation".

3. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-503, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace crankshaft position sensor (POS). Refer to EM-141, "Exploded View".

4. CHECK CAMSHAFT POSITION SENSOR (PHASE)

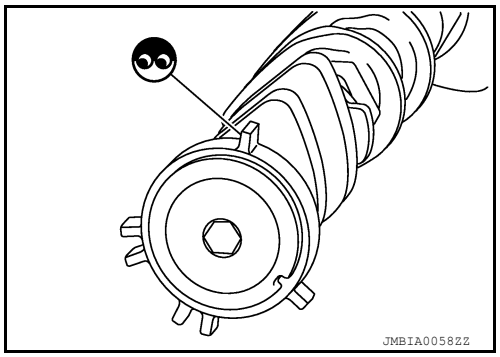
Refer to EC-506, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-153, "Exploded View".

5. CHECK CAMSHAFT (INTAKE)

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



Is the inspection result normal?

YES >> GO TO 6.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-180, "Removal and Installation".

6. CHECK TIMING CHAIN INSTALLATION

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

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

YES >> Check timing chain installation. Refer to EM-170, "Installation".
NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to EM-188, "Inspection after Installation".

Is the inspection result normal?

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

8. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006391929

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve terminals as follows.

Terminals	Resistance
1 and 2	7.1 - 7.7Ω [at 20°C (68°F)]
1 or 2 and ground	∞Ω (Continuity should not exist)

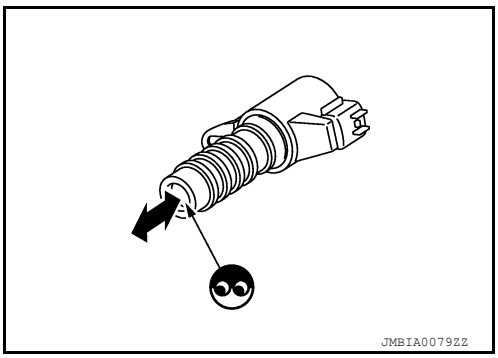
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-159, "Removal and Installation".

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve. Refer to EM-159, "Removal and Installation".

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:
   Never apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.
   NOTE:
   Always replace O-ring when intake valve timing control solenoid valve is removed.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-159, "Removal and Installation".

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

Description

INFOID:0000000006391930

SYSTEM DESCRIPTION

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

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

DTC Logic

INFOID:0000000006391931

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031	Air fuel ratio (A/F) sensor 1 heater (bank 1) control circuit low	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)	• Harness or connectors (The A/F sensor 1 heater circuit is open or shorted.) • A/F sensor 1 heater
P0032	Air fuel ratio (A/F) sensor 1 heater (bank 1) control circuit high	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)	• Harness or connectors (The A/F sensor 1 heater circuit is shorted.) • A/F sensor 1 heater
P0051	Air fuel ratio (A/F) sensor 1 heater (bank 2) control circuit low	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)	• Harness or connectors (The A/F sensor 1 heater circuit is open or shorted.) • A/F sensor 1 heater
P0052	Air fuel ratio (A/F) sensor 1 heater (bank 2) control circuit high	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)	• Harness or connectors (The A/F sensor 1 heater circuit is shorted.) • A/F sensor 1 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 11 V 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-447, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391932

1.CHECK GROUND CONNECTION

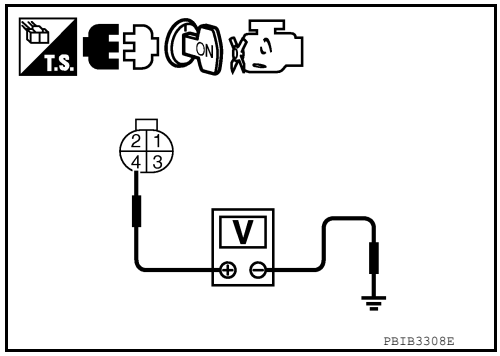
1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-38, "Work Flow".

Is the inspection result normal?

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

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

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.



DTC	A/F sensor 1			Ground	Voltage (V)
	Bank	Connector	Terminal		
P0031, P0032	1	F12	4	Ground	Battery voltage
P0051, P0052	2	F61	4		

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

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

>> Repair or replace harness or connectors.

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

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

DTC	A/F sensor 1			ECM		Bank
	Bank	Connector	Terminal	Connector	Terminal	
P0031, P0032	1	F12	3	F14	4	Existed
P0051, P0052	2	F61	3		8	

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

Is the inspection result normal?

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

5.CHECK A/F SENSOR 1 HEATER

Refer to EC-449, "Component Inspection".

Is the inspection result normal?

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

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

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-138, "Removal and Installation".

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

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

>> Repair or replace.

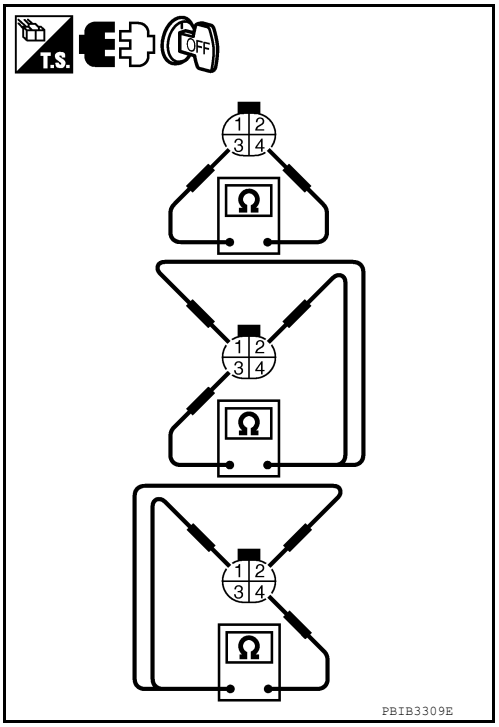
Component Inspection

INFOID:0000000006391933

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

Check resistance between A/F sensor terminals as follows.

Terminal No.	Resistance
3 and 4	1.8 - 2.44 Ω at 25°C (77°F)
3 and 1, 2	∞ Ω (Continuity should not exist)
4 and 1, 2	



Is the inspection result normal?

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

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

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-138, "Removal and Installation".

CAUTION:

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

>> INSPECTION END

P0037, P0038, P0057, P0058 HO2S2 HEATER

Description

INFOID:0000000006391934

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	Heated oxygen sensor 2 heater
Above 3,600 rpm	OFF
Below 3,600 rpm after the following conditions are met. • Engine: After warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

DTC Logic

INFOID:0000000006391935

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037	Heated oxygen sensor 2 heater (bank 1) control circuit low	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	• Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) • Heated oxygen sensor 2 heater
P0038	Heated oxygen sensor 2 heater (bank 1) control circuit high	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	• Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.) • Heated oxygen sensor 2 heater
P0057	Heated oxygen sensor 2 heater (bank 2) control circuit low	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	• Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) • Heated oxygen sensor 2 heater
P0058	Heated oxygen sensor 2 heater (bank 2) control circuit high	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	• Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.) • Heated oxygen sensor 2 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

>> 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 1 minute.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-451, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391936

1.CHECK GROUND CONNECTION

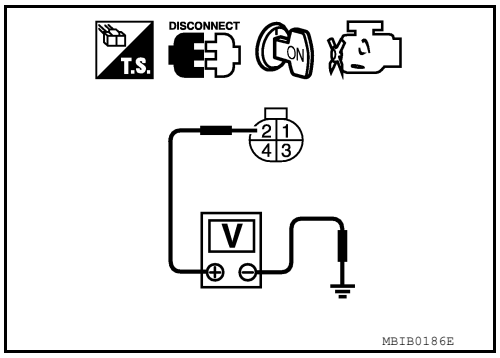
1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-38, "Work Flow".

Is the inspection result normal?

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

2.CHECK HO2S2 POWER SUPPLY CIRCUIT

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



DTC	HO2S2			Ground	Voltage (V)
	Bank	Connector	Terminal		
P0037, P0038	1	F62	2	Ground	Battery voltage
P0057, P0058	2	F56	2		

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

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

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

4.CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	HO2S2			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0037, P0038	1	F62	3	F14	13	Existed
P0057, P0058	2	F56	3		17	

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

Is the inspection result normal?

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

5.CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-452, "Component Inspection".

Is the inspection result normal?

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

6. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to EM-138, "Removal and Installation".

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 [commercial service tool (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

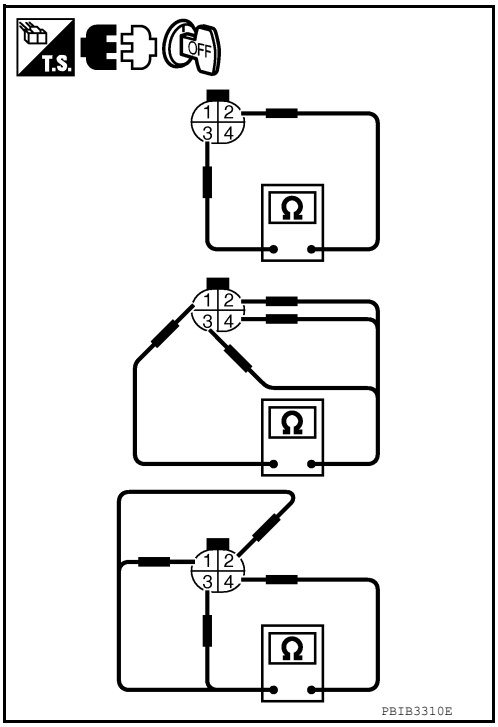
Component Inspection

INFOID:0000000006391937

1. CHECK HEATED OXYGEN SENSOR 2 HEATER

Check resistance between heated oxygen sensor 2 terminals as follows.

Terminal No.	Resistance
2 and 3	3.4 - 4.4 Ω [at 25°C (77°F)]
1 and 2, 3, 4	∞Ω (Continuity should not exist)
4 and 1, 2, 3	



Is the inspection result normal?

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

2. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to EM-138, "Removal and Installation".

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 [commercial service tool (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (commercial service tool).**

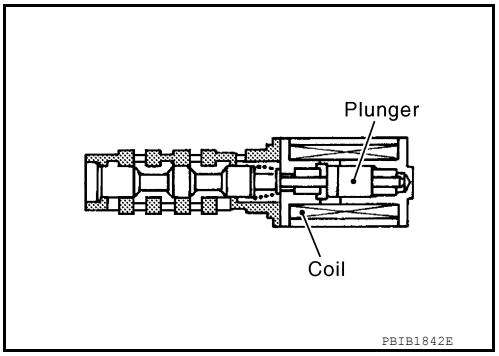
>> INSPECTION END

P0075, P0081 IVT CONTROL SOLENOID VALVE

Description

INFOID:0000000006391938

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:0000000006391939

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0075	Intake valve timing control solenoid valve (bank 1) 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
P0081	Intake valve timing control solenoid valve (bank 2) circuit		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

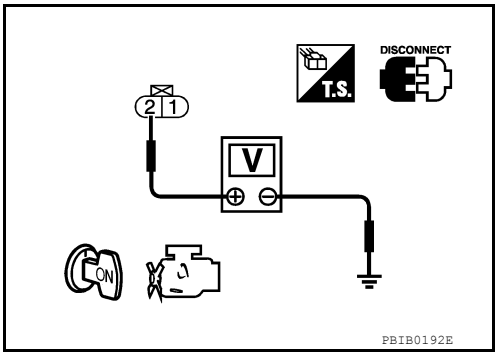
YES >> Go to EC-453, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391940

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 with CONSULT-III or tester.



DTC	IVT control solenoid valve			Ground	Voltage (V)
	Bank	Connector	Terminal		
P0075	1	F67	2	Ground	Battery voltage
P0081	2	F66	2		

Is the inspection result normal?

YES >> GO TO 2.

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

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake valve timing control solenoid valve harness connector and ECM harness connector.

DTC	IVT control solenoid valve			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0075	1	F67	1	F13	78	Existed
P0081	2	F66	1		75	

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, short to ground or short to power in harness or connectors.

3.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-454, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-159, "Removal and Installation".

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006391941

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve terminals as follows.

Terminals	Resistance
1 and 2	7.1 - 7.7Ω [at 20°C (68°F)]
1 or 2 and ground	∞Ω (Continuity should not exist)

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-159, "Removal and Installation".

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve. Refer to EM-159, "Removal and Installation".

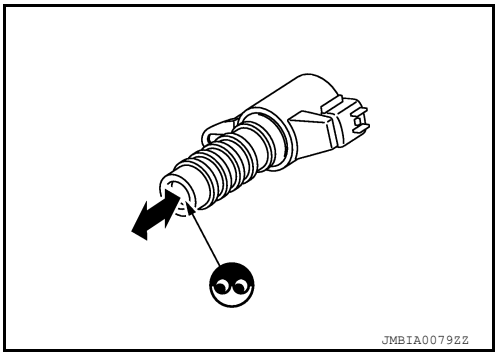
2. Provide 12V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:

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

NOTE:

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



Is the inspection result normal?

YES >> INSPECTION END

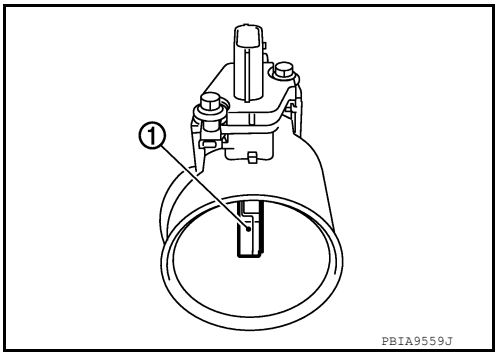
NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-159, "Removal and Installation".

P0102, P0103 MAF SENSOR

Description

INFOID:0000000006391942

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



DTC Logic

INFOID:0000000006391943

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-457, "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-457, "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-457, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391944

1.INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

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

2.CHECK INTAKE SYSTEM

Check the following for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold

Is the inspection result normal?

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

3.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-38, "Work Flow".

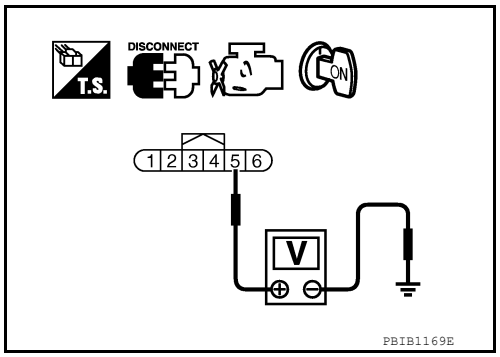
Is the inspection result normal?

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 (V)
Connector	Terminal		
F31	2	Ground	Battery voltage



Is the inspection result normal?

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

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E11, F2
- Harness for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and IPDM E/R

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

6.CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	3	F13	56	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, short to ground or short to power in harness or connectors.

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

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	4	F13	58	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, short to ground or short to power in harness or connectors.

8.CHECK MASS AIR FLOW SENSOR

Refer to EC-458, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace mass air flow sensor. Refer to EM-131, "Removal and Installation".

9.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006391945

1.CHECK MASS AIR FLOW SENSOR-I

With CONSULT-III

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

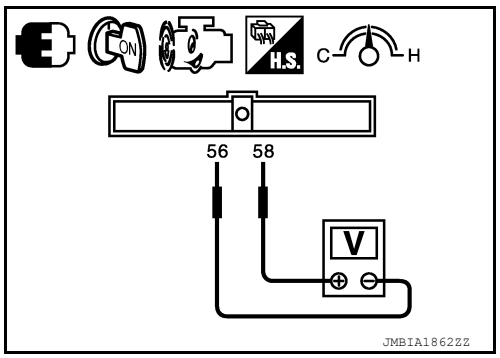
Monitor item	Condition	MAS A/F SE-B1 (V)
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9
	Idle to approximately 4,000 rpm	0.9 - 1.2 to Approx. 2.4*

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

Without CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.

3. Check the voltage between ECM harness connector terminals under the following conditions.



ECM			Condition	Voltage (V)
Connector	+	–		
	Terminal	Terminal		
F13	58 (MAF sensor signal)	56 (Sensor ground)	Ignition switch ON (Engine stopped.)	Approx. 0.4
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9
			Idle to approximately 4,000 rpm	0.9 - 1.2 to Approx. 2.4*

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

Is the inspection result normal?

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

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

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

Is the inspection result normal?

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

3. CHECK MASS AIR FLOW SENSOR-II

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 under the following conditions.

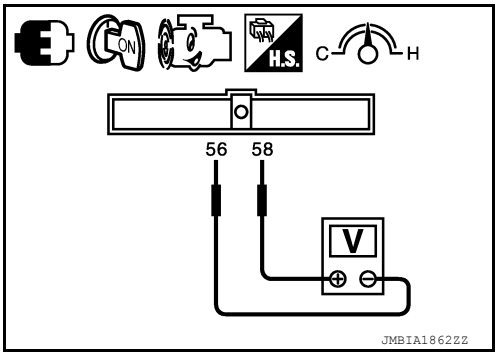
Monitor item	Condition	MAS A/F SE-B1 (V)
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9
	Idle to approximately 4,000 rpm	0.9 - 1.2 to Approx. 2.4*

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

Without CONSULT-III

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.

3. Check the voltage between ECM harness connector terminals under the following conditions.



ECM			Condition	Voltage (V)
Connector	+ Terminal	– Terminal		
F13	58 (MAF sensor signal)	56 (Sensor ground)	Ignition switch ON (Engine stopped.)	Approx. 0.4
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9
			Idle to approximately 4,000 rpm	0.9 - 1.2 to Approx. 2.4*

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

Is the inspection result normal?

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

4. CHECK MASS AIR FLOW SENSOR-III

With CONSULT-III

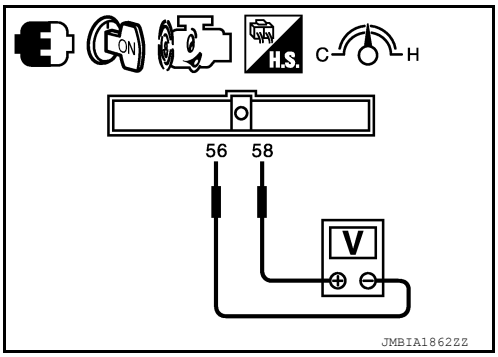
1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT-III and select “DATA MONITOR” mode.
5. Select “MAS A/F SE-B1” and check indication under the following conditions.

Monitor item	Condition	MAS A/F SE-B1 (V)
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9
	Idle to approximately 4,000 rpm	0.9 - 1.2 to Approx. 2.4*

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

Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect 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 under the following conditions.



ECM			Condition	Voltage (V)
Connector	+ Terminal	– Terminal		
F13	58 (MAF sensor signal)	56 (Sensor ground)	Ignition switch ON (Engine stopped.)	Approx. 0.4
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9
			Idle to approximately 4,000 rpm	0.9 - 1.2 to Approx. 2.4*

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

Is the inspection result normal?

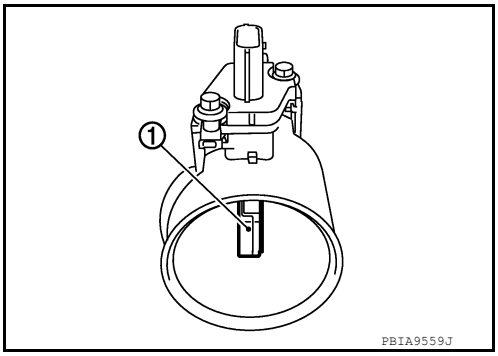
YES >> INSPECTION END
NO >> Clean or replace mass air flow sensor. Refer to EM-131, "Removal and Installation".

P0112, P0113 IAT SENSOR

Description

INFOID:0000000006391946

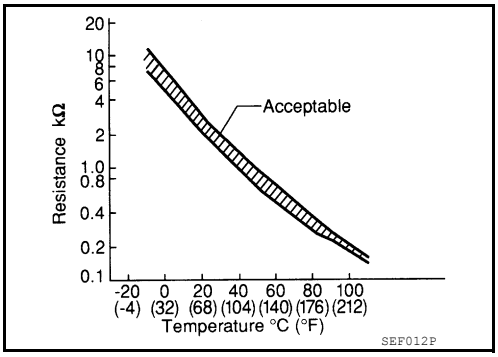
The intake air temperature sensor is built-into the mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the 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 50 (Intake air temperature sensor) and 56 (Sensor ground).



DTC Logic

INFOID:0000000006391947

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-463, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391948

1.CHECK GROUND CONNECTION

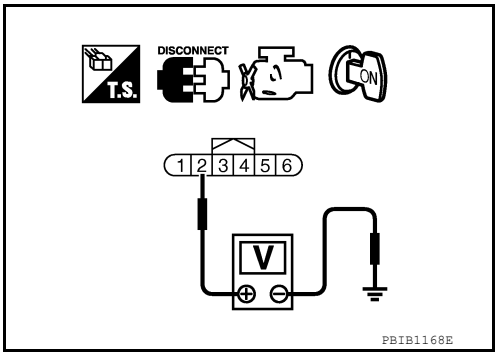
1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-38, "Work Flow".

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 (V)
Connector	Terminal		
F31	5	Ground	Approx. 5V

Is the inspection result normal?

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

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

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	6	F13	56	Existed

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

Is the inspection result normal?

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

4.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-463, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to EM-131, "Removal and Installation".

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

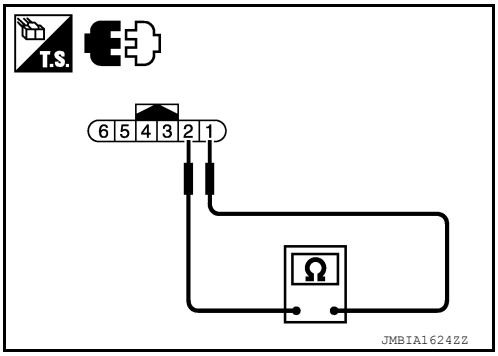
INFOID:0000000006391949

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.

Terminal	Condition		Resistance (kΩ)
1 and 2	Temperature [°C (°F)]	25 (77)	1.800 - 2.200



Is the inspection result normal?

YES >> INSPECTION END

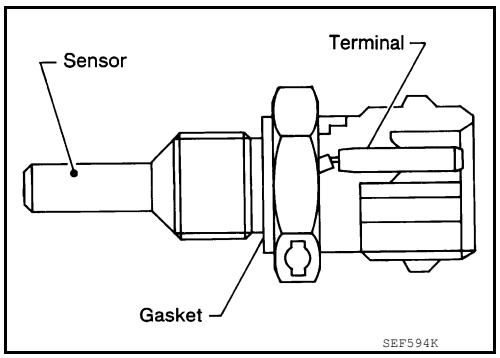
NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to EM-131, "Removal and Installation".

P0117, P0118 ECT SENSOR

Description

INFOID:0000000006391950

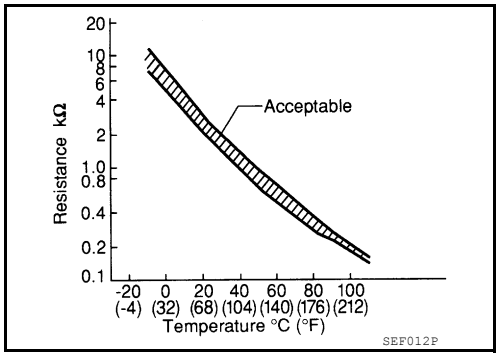
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The 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 46 (Engine coolant temperature sensor) and 52 (Sensor ground).



DTC Logic

INFOID:0000000006391951

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-466, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391952

1.CHECK GROUND CONNECTION

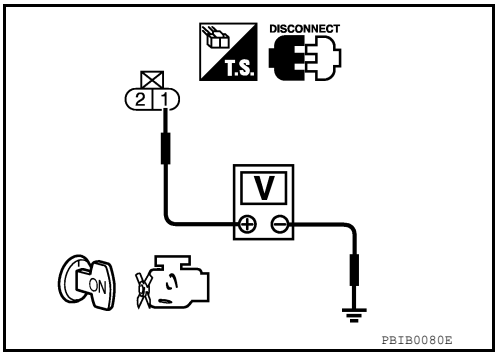
1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-38, "Work Flow".

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 (V)
Connector	Terminal		
F11	1	Ground	Approx. 5 V

Is the inspection result normal?

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

3.CHECK 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	
F11	2	F13	52	Existed

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

Is the inspection result normal?

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

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-466, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace engine coolant temperature sensor. Refer to CO-49, "Exploded View".

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

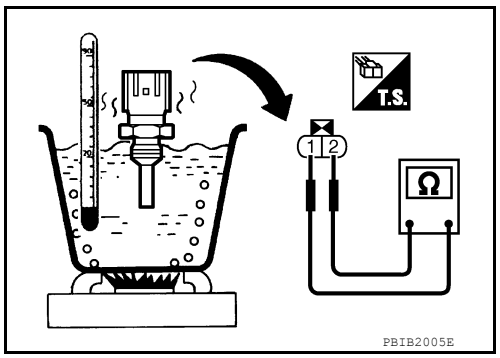
Component Inspection

INFOID:0000000006391953

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Remove engine coolant temperature sensor. Refer to CO-49, "Exploded View".

4. Check resistance between engine coolant temperature sensor terminals as follows.



Terminals	Condition		Resistance (kΩ)
1 and 2	Temperature [°C (°F)]	20 (68)	2.1 - 2.9
		50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END

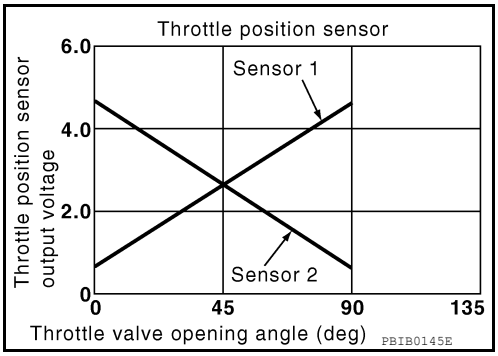
NO >> Replace engine coolant temperature sensor. Refer to CO-49, "Exploded View".

P0122, P0123 TP SENSOR

Description

INFOID:0000000006391954

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. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving condition via the throttle control motor.



DTC Logic

INFOID:0000000006391955

DTC DETECTION LOGIC

NOTE:
If DTC P0122 or P0123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-521, "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 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to EC-468, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391956

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-38, "Work Flow".

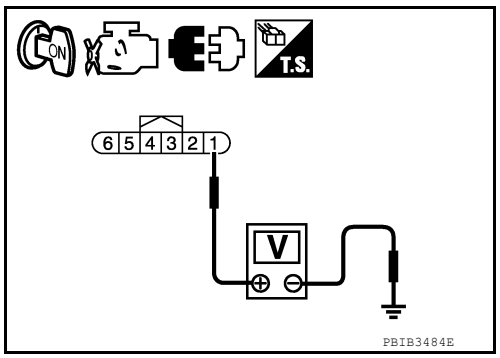
Is the inspection result normal?

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 (V)
Connector	Terminal		
F57	1	Ground	5 V

Is the inspection result normal?

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

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

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	
F57	4	F13	36	Existed

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

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit, 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	
F51	3	F13	38	Existed

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

Is the inspection result normal?

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

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-470, "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. Refer to EM-132, "Removal and Installation".
2. Refer to EC-470, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

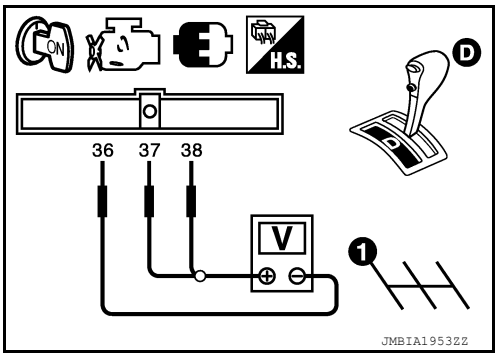
>> INSPECTION END

Component Inspection

INFOID:0000000006391957

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-470, "Special Repair Requirement".
4. Turn ignition switch ON.
5. Set selector lever position to D position.
6. Check the voltage between ECM harness connector terminals under the following conditions.



ECM			Condition		Voltage
Connector	+	–			
	Terminal	Terminal			
F13	37 (TP sensor 1 signal)	36 (Sensor ground)	Accelerator pedal	Fully released	More than 0.36 V
				Fully depressed	Less than 4.75 V
	38 (TP sensor 2 signal)			Fully released	Less than 4.75 V
				Fully depressed	More than 0.36 V

Is the inspection result normal?

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

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator. Refer to EM-132, "Removal and Installation".
2. Go to EC-470, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006391958

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-336, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-336, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

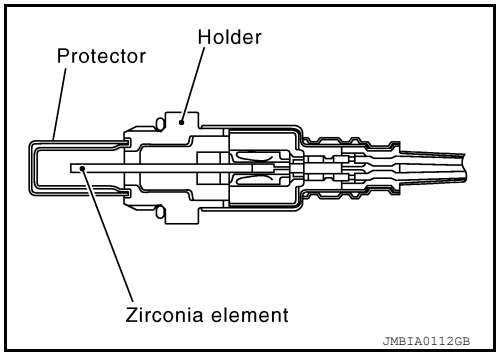
>> END

P0130, P0150 A/F SENSOR 1

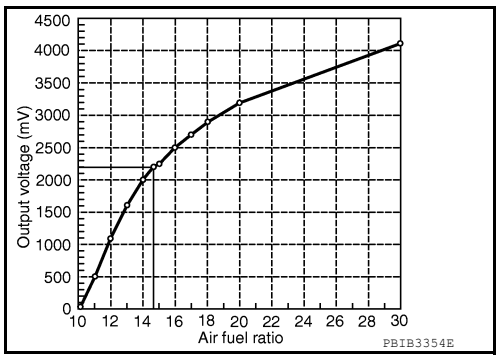
Description

INFOID:0000000006391959

The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.
The sensor is capable of precise measurement λ = 1, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.
The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of approximately 800°C (1,472°F).



DTC Logic

INFOID:0000000006391960

DTC DETECTION LOGIC

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0130	Air fuel ratio (A/F) sensor 1 (bank 1) circuit	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2V.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • A/F sensor 1
P0150	Air fuel ratio (A/F) sensor 1 (bank 2) circuit		

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-471, "Component Function Check".
NOTE:
Use component function check to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-472, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006391961

1.INSPECTION START

Will CONSULT-III be used?

Will CONSULT-III be used?

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

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

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” or “A/F SEN1 (B2)” in “DATA MONITOR” mode with CONSULT-III.
3. Check “A/F SEN1 (B1)” or “A/F SEN1 (B2)” indication.

Does the indication fluctuates around 2.2V?

YES >> GO TO 3.
NO >> Go to EC-472, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and warm it up to normal operating temperature.
3. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
4. Shift the selector lever to the D position, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (31 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
   NOTE:
   Never apply brake during releasing the accelerator pedal.
5. Repeat steps 3 to 4 for five times.
6. Stop the vehicle and turn ignition switch OFF.
7. Wait at least 10 seconds and restart engine.
8. Repeat steps 3 to 4 for five times.
9. Stop the vehicle.
10. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-472, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391962

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-38, "Work Flow".

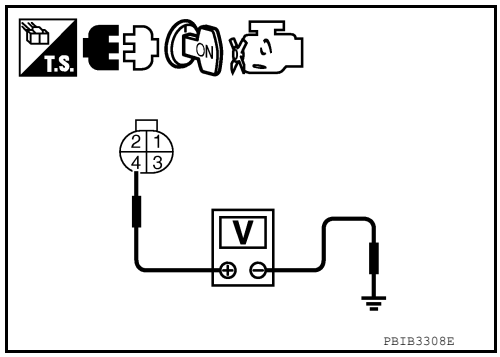
Is the inspection result normal?

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

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

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

DTC	A/F sensor 1			Ground	Voltage
	Bank	Connector	Terminal		
P0130	1	F12	4	Ground	Battery voltage
P0150	2	F61	4		



Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R harness connector F10
- 15 A fuse (No. 37)

- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

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

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

DTC	A/F sensor 1			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0130	1	F12	1	F13	45	Existed
			2		49	
P0150	2	F61	1		53	
			2		57	

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

DTC	A/F sensor 1			Ground	Continuity
	Bank	Connector	Terminal		
P0130	1	F12	1	Ground	Not existed
			2		
P0150	2	F61	1		
			2		

DTC	ECM		Ground	Continuity
	Connector	Terminal		
P0130	F13	45	Ground	Not existed
		49		
P0150		53		
		57		

5. Also check harness for short to power.

Is the inspection result normal?

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

5. CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

Is the inspection result normal?

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

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

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-138, "Removal and Installation".

CAUTION:

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

>> INSPECTION END

P0131, P0151 A/F SENSOR 1

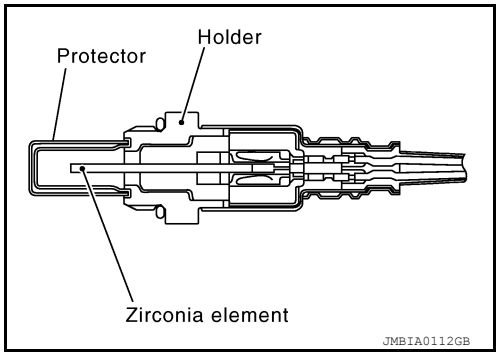
Description

INFOID:0000000006391963

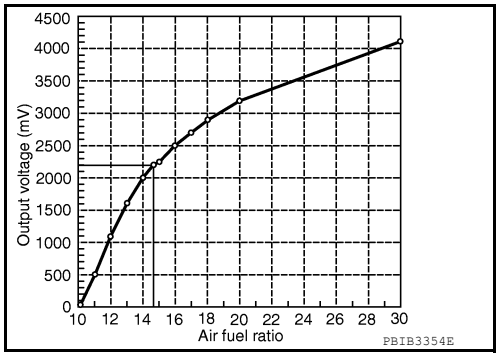
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement λ = 1, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of approximately 800°C (1,472°F).



DTC Logic

INFOID:0000000006391964

DTC DETECTION LOGIC

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0131	Air fuel ratio (A/F) sensor 1 (bank 1) circuit low voltage	• The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0V.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • A/F sensor 1
P0151	Air fuel ratio (A/F) sensor 1 (bank 2) circuit low voltage		

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 more than 10.5 V at idle.

>> GO TO 3.

3. CHECK A/F SENSOR FUNCTION

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” or “A/F SEN1 (B2)” in “DATA MONITOR” mode with CONSULT-III.
3. Check “A/F SEN1 (B1)” or “A/F SEN1 (B2)” indication.

Is the indication constantly approx. 0 V?

YES >> Go to EC-477, "Diagnosis Procedure".
NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
   CAUTION:
   Always drive vehicle at a safe speed.
3. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	Suitable position

NOTE:
- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 1, return to step 1.**

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-477, "Diagnosis Procedure".
NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-476, "Component Function Check".

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-477, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006391965

1. PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
3. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
   CAUTION:
   Always drive vehicle at a safe speed.
4. Maintain the following conditions for about 20 consecutive seconds.

Engine speed	1,000 - 3,200 rpm
Vehicle speed	More than 40 km/h (25 MPH)
Selector lever	Suitable position
Driving condition	Driving at level road (To avoid overloading will help maintain the driving conditions required for this test.)

NOTE:
- Keep the accelerator pedal as steady as possible during the cruising.

• If this procedure is not completed within 1 minute after restarting engine at step 2, return to step 2.

5. Repeat steps 2 to 4.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-477, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391966

1. CHECK GROUND CONNECTION

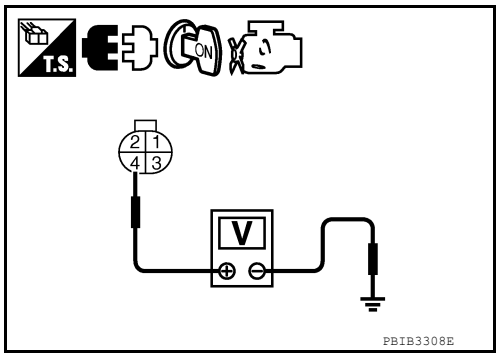
1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

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

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

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.



DTC	A/F sensor 1			Ground	Voltage
	Bank	Connector	Terminal		
P0131	1	F12	4	Ground	Battery voltage
P0151	2	F61	4		

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

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

>> Repair or replace harness or connectors.

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

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

DTC	A/F sensor 1			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0131	1	F12	1	F13	45	Existed
			2		49	
P0151	2	F61	1		53	
			2		57	

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

DTC	A/F sensor 1			Ground	Continuity
	Bank	Connector	Terminal		
P0131	1	F12	1	Ground	Not existed
			2		
P0151	2	F61	1		
			2		

DTC	ECM		Ground	Continuity
	Connector	Terminal		
P0131	F13	45	Ground	Not existed
		49		
P0151		53		
		57		

5. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

Is the inspection result normal?

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

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

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-138, "Removal and Installation".

CAUTION:

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

>> INSPECTION END

P0132, P0152 A/F SENSOR 1

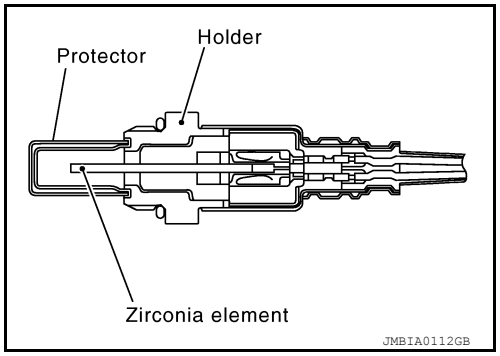
Description

INFOID:0000000006391967

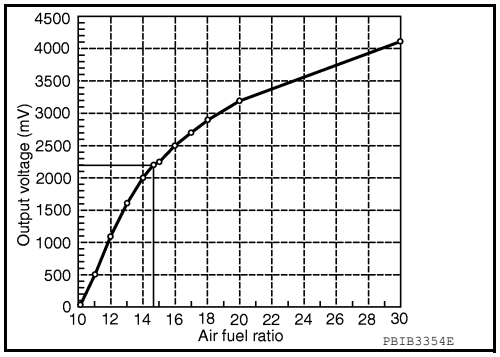
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement λ = 1, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of approximately 800°C (1,472°F).



DTC Logic

INFOID:0000000006391968

DTC DETECTION LOGIC

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132	Air fuel ratio (A/F) sensor 1 (bank 1) circuit high voltage	• The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5V.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • A/F sensor 1
P0152	Air fuel ratio (A/F) sensor 1 (bank 2) circuit high voltage		

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 more than 10.5 V at idle.

>> GO TO 3.

3.CHECK A/F SENSOR FUNCTION

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” or “A/F SEN1 (B2)” in “DATA MONITOR” mode with CONSULT-III.
3. Check “A/F SEN1 (B1)” or “A/F SEN1 (B2)” indication.

Is the indication constantly approx. 5V?

YES >> Go to EC-481, "Diagnosis Procedure".
NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
   CAUTION:
   Always drive vehicle at a safe speed.
3. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	Suitable position

NOTE:
- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 1, return to step 1.**

4. Check 1st trip DTC.

Is 1st trip DTC is detected?

YES >> Go to EC-481, "Diagnosis Procedure".
NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-480, "Component Function Check".

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-481, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006391969

1. PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
3. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
   CAUTION:
   Always drive vehicle at a safe speed.
4. Maintain the following conditions for about 20 consecutive seconds.

Engine speed	1,000 - 3,200 rpm
Vehicle speed	More than 40 km/h (25 MPH)
Selector lever	Suitable position
Driving condition	Driving at level road (To avoid overloading will help maintain the driving conditions required for this test.)

NOTE:
- Keep the accelerator pedal as steady as possible during the cruising.

• If this procedure is not completed within 1 minute after restarting engine at step 2, return to step 2.

5. Repeat steps 2 to 4.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-481, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391970

1. CHECK GROUND CONNECTION

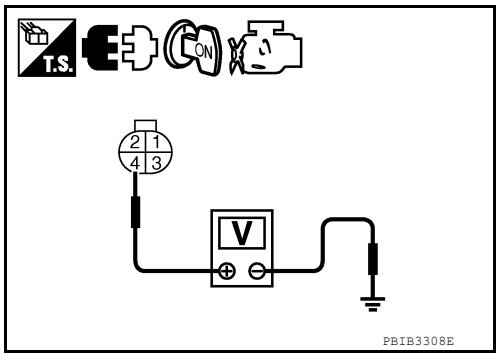
1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

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

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

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.



DTC	A/F sensor 1			Ground	Voltage
	Bank	Connector	Terminal		
P0132	1	F12	4	Ground	Battery voltage
P0152	2	F61	4		

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

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

>> Repair or replace harness or connectors.

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

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

DTC	A/F sensor 1			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0132	1	F12	1	F13	45	Existed
			2		49	
P0152	2	F61	1		53	
			2		57	

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

DTC	A/F sensor 1			Ground	Continuity
	Bank	Connector	Terminal		
P0132	1	F12	1	Ground	Not existed
			2		
P0152	2	F61	1		
			2		

DTC	ECM		Ground	Continuity
	Connector	Terminal		
P0132	F13	45	Ground	Not existed
		49		
P0152		53		
		57		

5. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

Is the inspection result normal?

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

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

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-138, "Removal and Installation".

CAUTION:

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

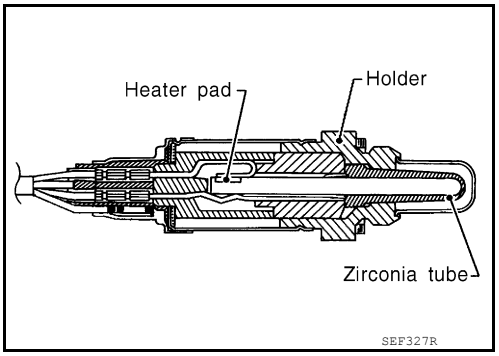
>> INSPECTION END

P0138, P0158 HO2S2

Description

INFOID:0000000006391971

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

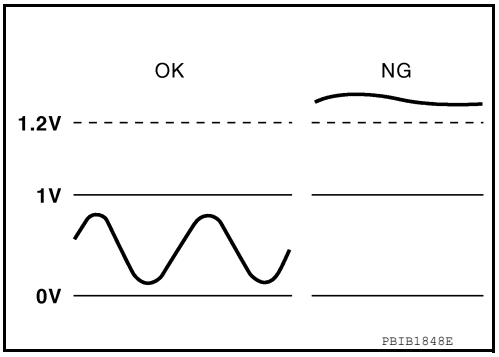


DTC Logic

INFOID:0000000006391972

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time.
To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the 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 (bank 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 2
P0158	Heated oxygen sensor 2 (bank 2) circuit high voltage		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION

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

Is 1st trip DTC detected?

YES >> Go to EC-484, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391973

1.CHECK GROUND CONNECTION

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

Is the inspection result normal?

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

2.CHECK HO2S2 CONNECTOR FOR WATER

1. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
2. Check that water is not inside conductors.

Is the inspection result normal?

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

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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

DTC	HO2S2			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0138	1	F62	1	F13	35	Existed
P0158	2	F56	1			

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

Is the inspection result normal?

YES >> GO TO4.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	HO2S2			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0138	1	F62	4	F13	33	Existed
P0158	2	F56	4		34	

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

DTC	HO2S2			Ground	Continuity
	Bank	Connector	Terminal		
P0138	1	F62	4	Ground	Not existed
P0158	2	F56	4		

DTC	ECM		Ground	Continuity
	Connector	Terminal		
P0138	F13	33	Ground	Not existed
P0158		34		

3. Also check harness for short to power.

Is the inspection result normal?

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

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-485, "Component Inspection".

Is the inspection result normal?

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

6. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to EM-138, "Removal and Installation".

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 [commercial service tool (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006391974

1. INSPECTION START

Will CONSULT-III be used?

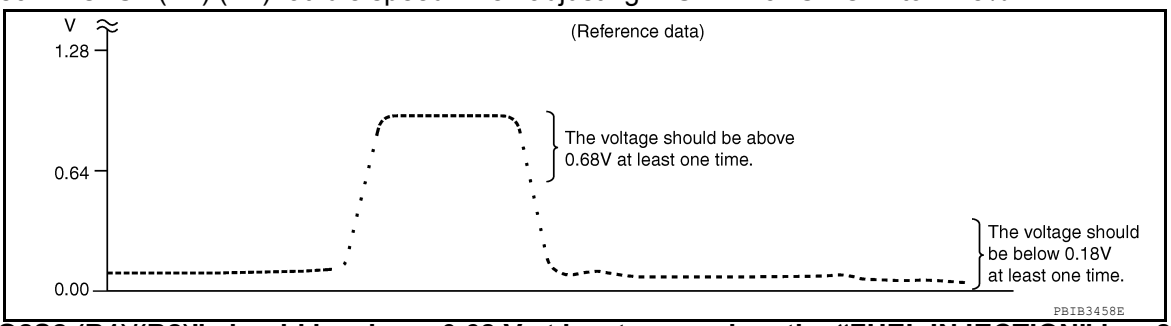
Will CONSULT-III be used?

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

2. CHECK HEATED OXYGEN SENSOR 2

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)/(B2)” as the monitor item with CONSULT-III.
7. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ± 25%.



“HO2S2 (B1)/(B2)” should be above 0.68 V at least once when the “FUEL INJECTION” is + 25%.
“HO2S2 (B1)/(B2)” should be below 0.18 V at least once when the “FUEL INJECTION” is – 25%.

Is the inspection result normal?

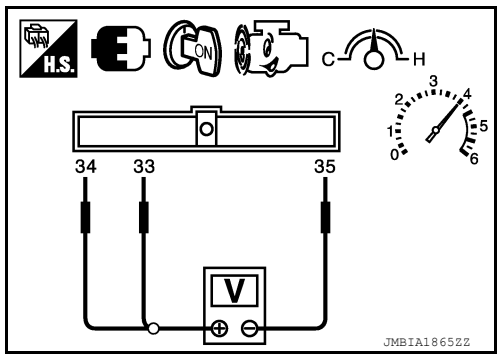
YES >> INSPECTION END

NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

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



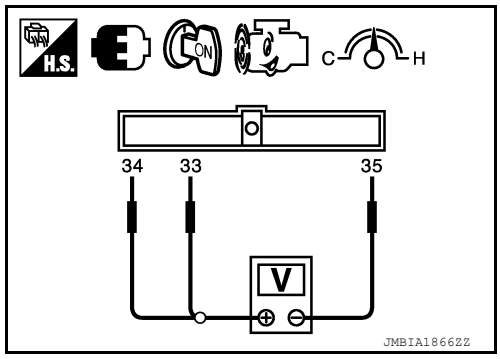
ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F13	33 [HO2S2 (bank 1) signal]	35 (Sensor ground)	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	34 [HO2S2 (bank 2) signal]			

Is the inspection result normal?

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

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals under the following conditions.



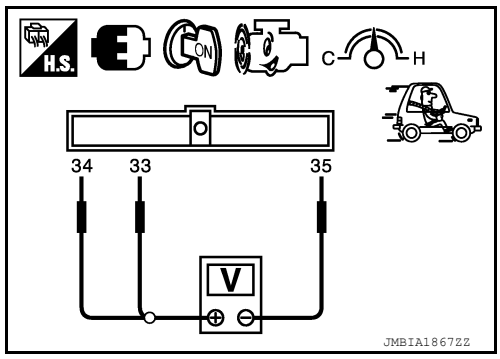
ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F13	33 [HO2S2 (bank 1) signal]	35 (Sensor ground)	Keeping engine at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	34 [HO2S2 (bank 2) signal]			

Is the inspection result normal?

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

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following conditions.



ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F13	33 [HO2S2 (bank 1) signal]	35 (Sensor ground)	Coasting from 80 km/h (50 MPH) while selector lever is in the D position	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	34 [HO2S2 (bank 2) signal]			

Is the inspection result normal?

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

6. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to EM-138, "Removal and Installation".

CAUTION:

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

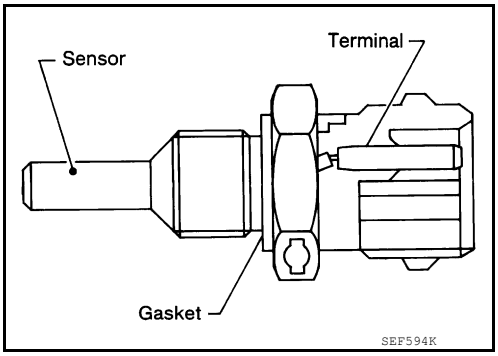
>> INSPECTION END

P0196 EOT SENSOR

Description

INFOID:0000000006391975

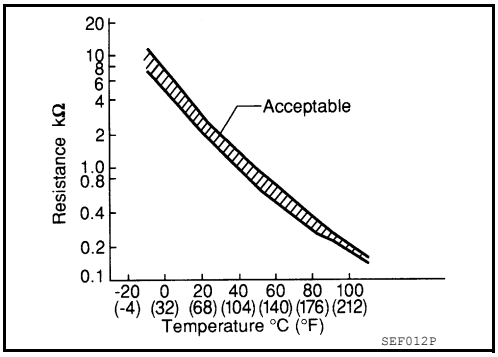
The engine oil temperature sensor is used to detect the engine oil temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine oil temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance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



<Reference data>

Engine oil temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260
110 (230)	0.6	0.143 - 0.153

*: These data are reference values and are measured between ECM terminals 54 (Engine oil temperature sensor) and 52 (Sensor ground).



DTC Logic

INFOID:0000000006391976

DTC DETECTION LOGIC

NOTE:
If DTC P0196 is displayed with P0197 or P0198, first perform the trouble diagnosis for DTC P0197, P0198. Refer to EC-491, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0196	Engine oil temperature sensor range/performance	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	• Harness or connectors (The sensor circuit is open or shorted.) • Engine oil temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Go to EC-492, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391977

1.CHECK GROUND CONNECTION

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

Is the inspection result normal?

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

2.CHECK EOT SENSOR POWER SUPPLY CIRCUIT

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

EOT sensor		Ground	Voltage
Connector	Terminal		
F68	1	Ground	Approx. 5 V

Is the inspection result normal?

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

3.CHECK EOT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

EOT sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F68	2	F13	52	Existed

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

Is the inspection result normal?

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

4.CHECK ENGINE OIL TEMPERATURE SENSOR

Refer to EC-492, "Component Inspection".

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

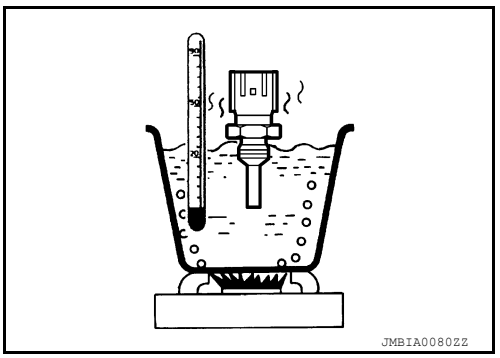
Component Inspection

INFOID:0000000006391978

1.CHECK ENGINE OIL TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine oil temperature sensor harness connector.
3. Remove engine oil temperature sensor. Refer to CO-49, "Exploded View".

4. Check resistance between engine oil 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?

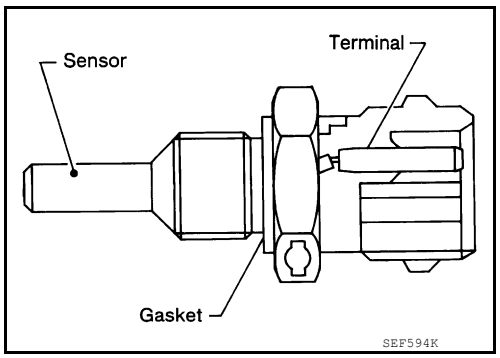
YES >> INSPECTION END
NO >> Replace engine oil temperature sensor.

P0197, P0198 EOT SENSOR

Description

INFOID:0000000006391979

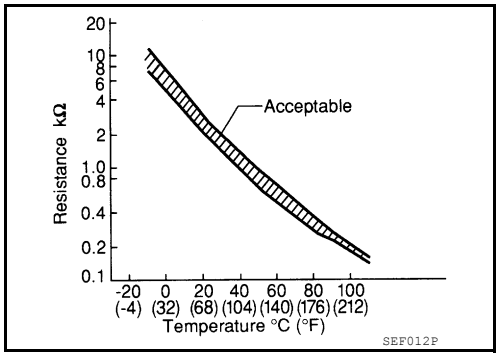
The engine oil temperature sensor is used to detect the engine oil temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine oil temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance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



<Reference data>

Engine oil temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260
110 (230)	0.6	0.143 - 0.153

*: These data are reference values and are measured between ECM terminals 54 (Engine oil temperature sensor) and 52 (Sensor ground).



DTC Logic

INFOID:0000000006391980

DTC DETECTION LOGIC

DTC No.	Trouble Diagnosis Name	DTC detecting condition	Possible Cause
P0197	Engine oil 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 oil temperature sensor
P0198	Engine oil temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Go to EC-492, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391981

1.CHECK GROUND CONNECTION

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

Is the inspection result normal?

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

2.CHECK EOT SENSOR POWER SUPPLY CIRCUIT

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

EOT sensor		Ground	Voltage
Connector	Terminal		
F68	1	Ground	Approx. 5 V

Is the inspection result normal?

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

3.CHECK EOT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

EOT sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F68	2	F13	52	Existed

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

Is the inspection result normal?

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

4.CHECK ENGINE OIL TEMPERATURE SENSOR

Refer to EC-492, "Component Inspection".

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

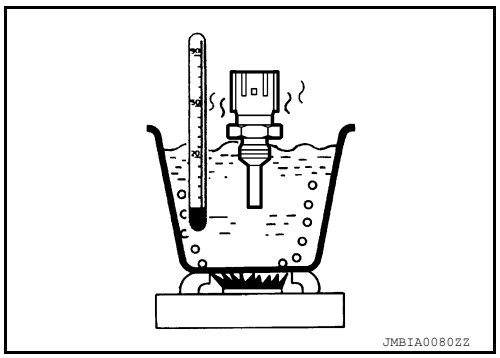
Component Inspection

INFOID:0000000006391982

1.CHECK ENGINE OIL TEMPERATURE SENSOR

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

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



Terminals	Condition		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?

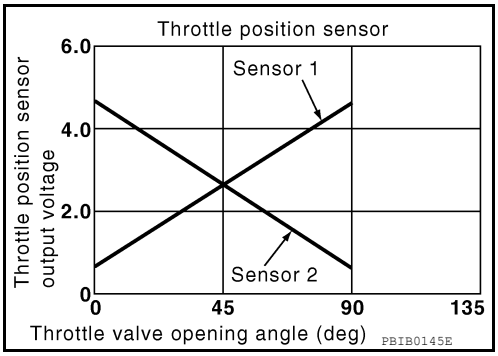
YES >> INSPECTION END
NO >> Replace engine oil temperature sensor.

P0222, P0223 TP SENSOR

Description

INFOID:0000000006391983

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. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving condition via the throttle control motor.



DTC Logic

INFOID:0000000006391984

DTC DETECTION LOGIC

NOTE:
If DTC P0222 or P0223 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-521, "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 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Go to EC-494, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391985

1.CHECK GROUND CONNECTION

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

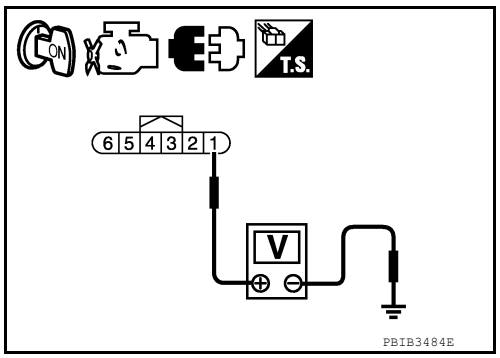
Is the inspection result normal?

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

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-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		
F57	1	Ground	Approx. 5 V

Is the inspection result normal?

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

3. CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F51	4	F13	36	Existed

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

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit, 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 and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F51	2	F13	37	Existed

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

Is the inspection result normal?

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

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-496, "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. Refer to EM-132, "Removal and Installation".
2. Refer to EC-496, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

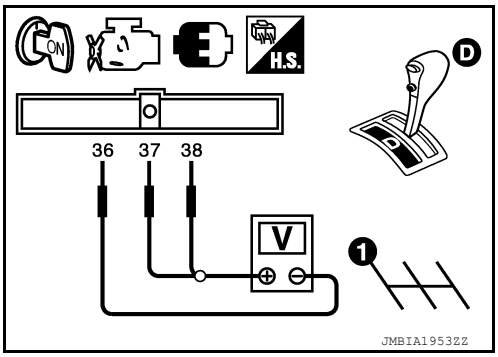
>> INSPECTION END

Component Inspection

INFOID:0000000006391986

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-470, "Special Repair Requirement".
4. Turn ignition switch ON.
5. Set selector lever position to D position.
6. Check the voltage between ECM harness connector terminals under the following conditions.



ECM			Condition		Voltage
Connector	+	–			
	Terminal	Terminal			
F13	37 (TP sensor 1 signal)	36 (Sensor ground)	Accelerator pedal	Fully released	More than 0.36 V
				Fully depressed	Less than 4.75 V
	38 (TP sensor 2 signal)			Fully released	Less than 4.75 V
				Fully depressed	More than 0.36 V

Is the inspection result normal?

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

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator. Refer to EM-132, "Removal and Installation".
2. Go to EC-470, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006391987

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-336, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-336, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

P0327, P0328, P0332, P0333 KS

Description

INFOID:0000000006391988

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:0000000006391989

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detected condition	Possible cause
P0327	Knock sensor (bank 1) circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Knock sensor
P0328	Knock sensor (bank 1) circuit high input	An excessively high voltage from the sensor is sent to ECM.	
P0332	Knock sensor (bank 2) circuit low input	An excessively low voltage from the sensor is sent to ECM.	
P0333	Knock sensor (bank 2) circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Go to EC-497, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391990

1.CHECK GROUND CONNECTION

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

Is the inspection result normal?

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

2.CHECK KNOCK SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

DTC	Knock sensor			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0327, P0328	1	F202	2	F13	67	Existed
P0332, P0333	2	F203	2			

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

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F76, F201
- Harness for open or short between knock sensor and ECM

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

4.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	Knock sensor			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0327, P0328	1	F202	1	F13	61	Existed
P0332, P0333	2	F203	1		62	

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

Is the inspection result normal?

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

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F76, F201
- Harness for open or short between knock sensor and ECM

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

6.CHECK KNOCK SENSOR

Refer to EC-498, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace malfunctioning knock sensor. Refer to EM-207, "Disassembly and Assembly".

7.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

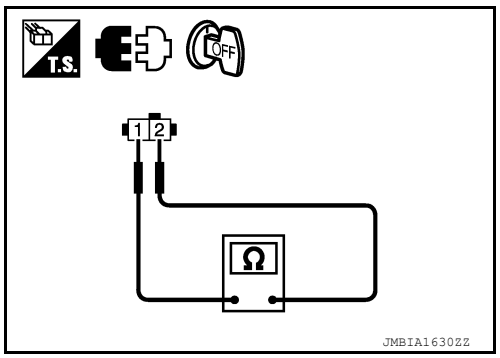
Component Inspection

INFOID:0000000006391991

1.CHECK KNOCK SENSOR

1. Turn ignition switch OFF.
2. Disconnect knock sensor harness connector.

3. Check resistance between knock sensor terminal as follows.
NOTE:
It is necessary to use an ohmmeter which can measure more than 10 MΩ.



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

CAUTION:
Never use any knock sensors that have been dropped or physically damaged. Use only new ones.

Is the inspection result normal?

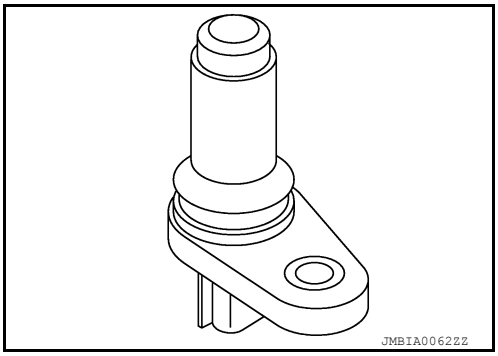
YES >> INSPECTION END
NO >> Replace malfunctioning knock sensor. Refer to EM-207, "Disassembly and Assembly".

P0335 CKP SENSOR (POS)

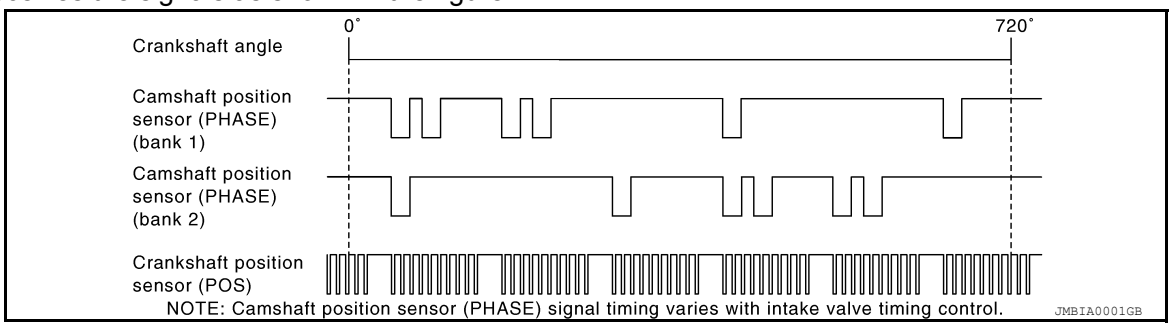
Description

INFOID:0000000006391992

The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.



ECM receives the signals as shown in the figure.



DTC Logic

INFOID:0000000006391993

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 [CKP sensor (POS) circuit is open or shorted.] (APP sensor 2 circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Crankshaft position sensor (POS) • Accelerator pedal position sensor • Refrigerant pressure sensor • 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 10.5 V 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-501, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391994

1. CHECK GROUND CONNECTION

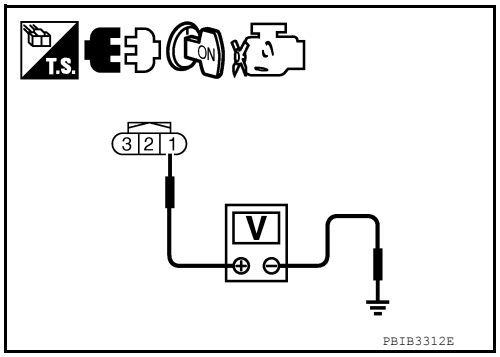
1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

OK or NG

OK >> GO TO 2.
NG >> 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 (V)
Connector	Terminal		
F30	1	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 3.

3. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-II

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

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F30	1	F13	76	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit.

4. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-III

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F13	72	Refrigerant pressure sensor	E219	1
	76	CKP sensor (POS)	F30	1
E10	87	APP sensor	E40	6

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

Check the following.
- Refrigerant pressure sensor (Refer to EC-636, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace refrigerant pressure sensor. Refer to HA-41, "Removal and Installation for Refrigerant Pressure Sensor".

6.CHECK APP SENSOR

Refer to EC-587, "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. Refer to ACC-4, "Exploded View".
2. Refer to EC-587, "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	
F30	2	F13	60	Existed

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

Is the inspection result normal?

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

9.CHECK CKP SENSOR (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	
F30	3	F13	65	Existed

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

Is the inspection result normal?

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

10.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-503, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace crankshaft position sensor (POS). Refer to EM-141, "Exploded View".

11.CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace the signal plate. Refer to EM-207, "Disassembly and Assembly".

12.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

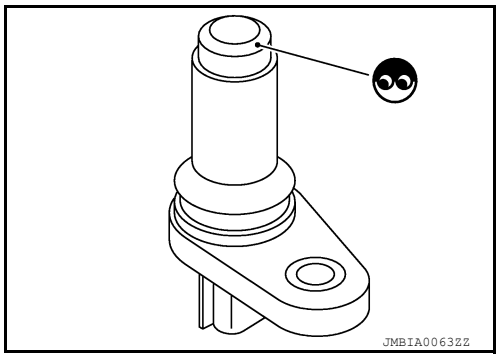
>> INSPECTION END

Component Inspection

INFOID:0000000006391995

1. CHECK CRANKSHAFT POSITION SENSOR (POS)-I

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor (POS) harness connector.
3. Remove the sensor. Refer to EM-141, "Exploded View".
4. Visually check the sensor for chipping.

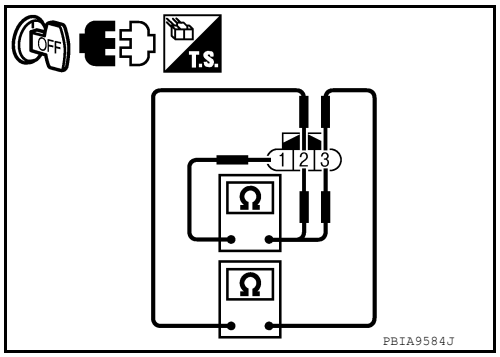


Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace crankshaft position sensor (POS). Refer to EM-141, "Exploded View".

2. CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check resistance crankshaft position sensor (POS) terminals as per the following.



Terminal No. (Polarity)	Resistance
1 (+) - 2 (-)	Except 0 or ∞ Ω [at 25°C (77°F)]
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

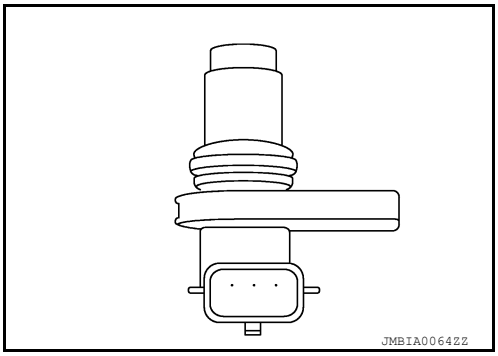
YES >> INSPECTION END
NO >> Replace crankshaft position sensor (POS). Refer to EM-141, "Exploded View".

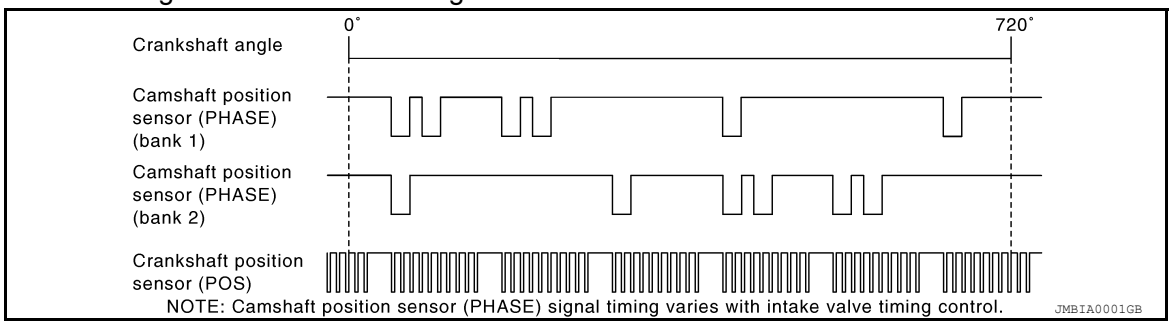
P0340, P0345 CMP SENSOR (PHASE)

Description

INFOID:0000000006391996

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:0000000006391997

DTC DETECTION LOGIC

NOTE:
If DTC P0340 or P0345 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-521, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340	Camshaft position sensor (PHASE) (bank 1) 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 (Refer to STR-38.) • Starting system circuit (Refer to STR-38.) • Dead (Weak) battery
P0345	Camshaft position sensor (PHASE) (bank 2) circuit		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

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-505, "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-505, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006391998

1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

YES >> GO TO 2.
NO >> Check starting system. Refer to STR-32, "Work Flow (With GR8-1200 NI)" or STR-35, "Work Flow (Without GR8-1200 NI)".

2. CHECK GROUND CONNECTION

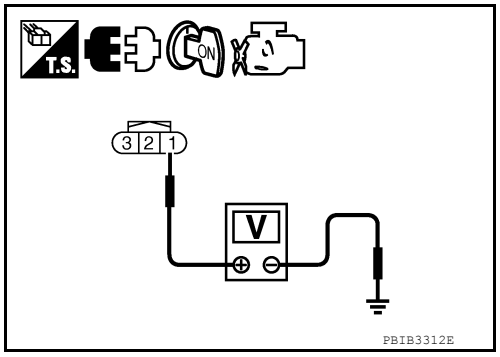
1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

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

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

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



DTC	CMP sensor (PHASE)			Ground	Voltage (V)
	Bank	Connector	Terminal		
P0340	1	F55	1	Ground	5 V
P0345	2	F60	1		

Is the inspection result normal?

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

4. CHECK 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.

DTC	CMP sensor (PHASE)			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0340	1	F55	2	F13	64	Existed
P0345	2	F60	2		68	

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

Is the inspection result normal?

YES >> GO TO 5.

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

5.CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

DTC	CMP sensor (PHASE)			ECM		Continuity
	Bank	Connector	Terminal	Connector	Terminal	
P0340	1	F55	3	F13	70	Existed
P0345	2	F60	3		69	

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, short to ground or short to power in harness or connectors.

6.CHECK CAMSHAFT POSITION SENSOR (PHASE)

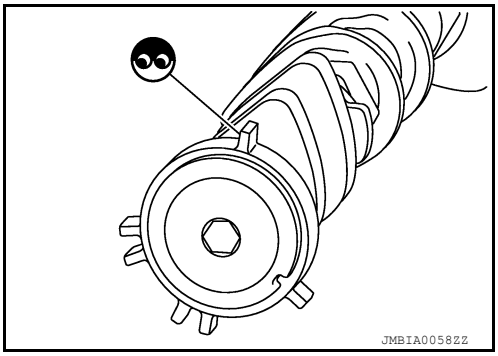
Refer to EC-506, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-153, "Exploded View".

7.CHECK CAMSHAFT (INT)

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



Is the inspection result normal?

YES >> GO TO 8.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-180, "Removal and Installation".

8.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

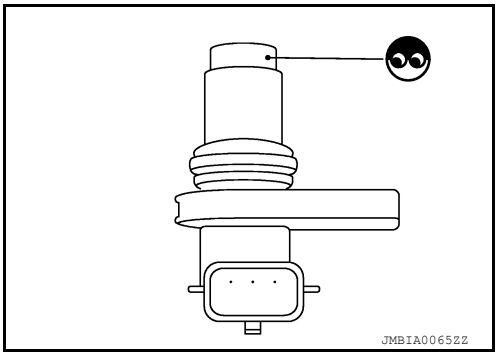
>> INSPECTION END

Component Inspection

INFOID:0000000006391999

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. Refer to EM-153, "Exploded View".
5. Visually check the sensor for chipping.

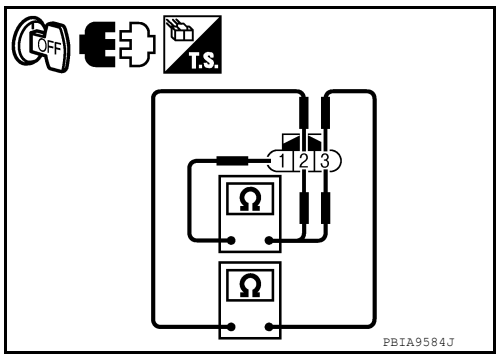


Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-153, "Exploded View".

2. CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check resistance camshaft position sensor (PHASE) terminals as per the following.



Terminal No. (Polarity)	Resistance
1 (+) - 2 (-)	Except 0 or ∞ Ω [at 25°C (77°F)]
1 (+) - 3 (-)	
2 (+) - 3 (-)	

Is the inspection result normal?

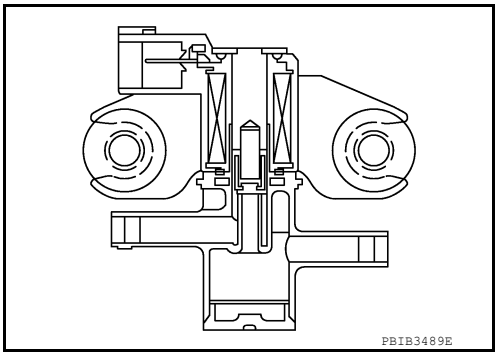
YES >> INSPECTION END
NO >> Replace malfunctioning camshaft position sensor (PHASE). Refer to EM-153, "Exploded View".

P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:0000000006392000

The EVAP canister purge volume control solenoid valve is used to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



DTC Logic

INFOID:0000000006392001

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 via 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 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Go to EC-508, "Diagnosis Procedure".
NO >> INSPECTION END

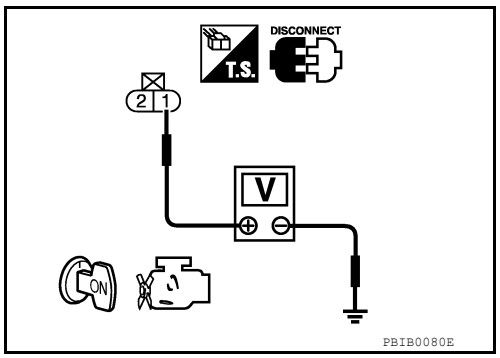
Diagnosis Procedure

INFOID:0000000006392002

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 (V)
Connector	Terminal		
F29	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 E11, F2
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

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

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
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	
F29	2	F14	25	Existed

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

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 4.
YES-2 >> Without CONSULT-III: GO TO 5.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

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

Does engine speed vary according to the valve opening?

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

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-510, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-26, "Removal and Installation".

6. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

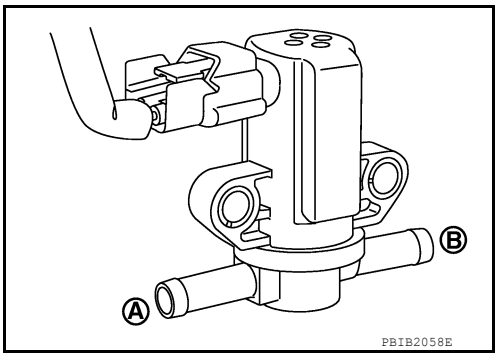
Component Inspection

INFOID:0000000006392003

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

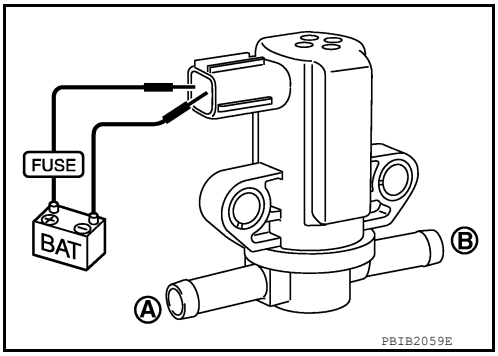
1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Turn ignition switch ON.
5. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III.
6. Touch “Qd” and “Qu” on CONSULT-III 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)
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-26, "Removal and Installation".

P0500 VSS

Description

INFOID:0000000006392004

The vehicle speed signal is sent to the combination meter from the “ABS actuator and electric unit (control unit)” via the CAN communication line. The combination meter then sends a signal to the ECM via the CAN communication line.

DTC Logic

INFOID:0000000006392005

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-441, "DTC Logic".**
- **If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-520, "DTC Logic".**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500	Vehicle speed sensor	The vehicle speed signal sent to ECM is almost 0 km/h (0 MPH) even when vehicle is being driven.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The vehicle speed signal circuit is open or shorted) • Wheel sensor • Unified meter and A/C amp. • ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Will CONSULT-III be used?

Will CONSULT-III be used?

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

2.PRECONDITIONING

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

>> GO TO 3.

3.CHECK VEHICLE SPEED SIGNAL

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

With CONSULT-III

1. Start engine (VDC switch OFF).
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-512, "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	5.5 - 31.8 msec
Selector lever	Except P or N position
PW/ST SIGNAL	OFF

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-512, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-512, "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-512, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006392006

1.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

1. Lift up drive wheels.
2. Start engine.
3. Check vehicle speed of speedometer.
   The vehicle speed 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-512, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006392007

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

Refer to BRC-45, "DTC No. Index" (Without TCS) or BRC-115, "DTC No. Index" (With TCS).

Is the inspection result normal?

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

2.CHECK COMBINATION METER FUNCTION

Refer to MWI-4, "Work Flow".

>> INSPECTION END

P0550 PSP SENSOR

Description

INFOID:0000000006392008

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load.
This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.

DTC Logic

INFOID:0000000006392009

DTC DETECTION LOGIC

NOTE:
If DTC P0550 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-521, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0550	Power steering pressure sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted) • Power steering pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-513, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006392010

1.CHECK GROUND CONNECTION

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

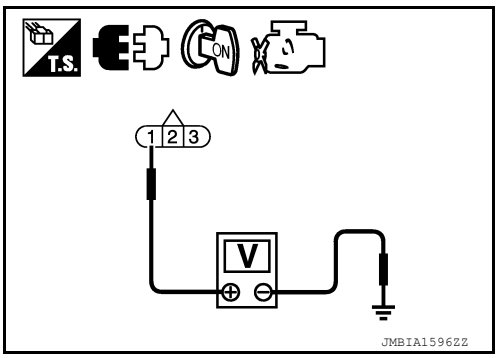
Is the inspection result normal?

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

2.CHECK PSP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect power steering pressure (PSP) sensor harness connector.
2. Turn ignition switch ON.

3. Check the voltage between PSP sensor harness connector and ground.



PSP sensor		Ground	Voltage (V)
Connector	Terminal		
F40	1	Ground	Approx. 5

Is the inspection result normal?

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

3.CHECK PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

PSP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F40	3	F13	48	Existed

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

Is the inspection result normal?

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

4.CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

PSP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F40	2	F13	41	Existed

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

Is the inspection result normal?

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

5.CHECK PSP SENSOR

Refer to EC-514, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace PSP sensor. Refer to ST-22, "VQ35DE : Component Parts Location - 17 Inch Tire", or ST-24, "VQ35DE : Component Parts Location - 18 Inch Tire".

6.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

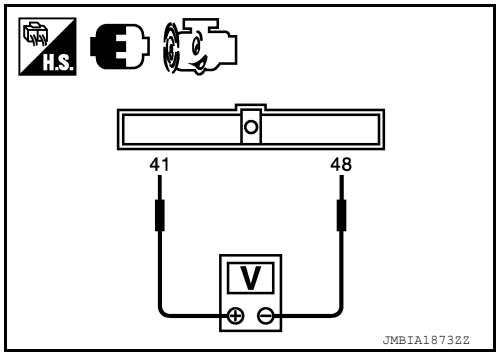
INFOID:0000000006392011

1.CHECK POWER STEERING PRESSURE SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and let it idle.

3. Check the voltage between ECM terminals under the following conditions.

ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F13	41 (Power steering pressure sensor signal)	48 (Sensor ground)	Steering wheel: Being turned.	0.5 - 4.5 V
			Steering wheel: Not being turned.	0.4 - 0.8 V



Is the inspection result normal?

YES >> INSPECTION END

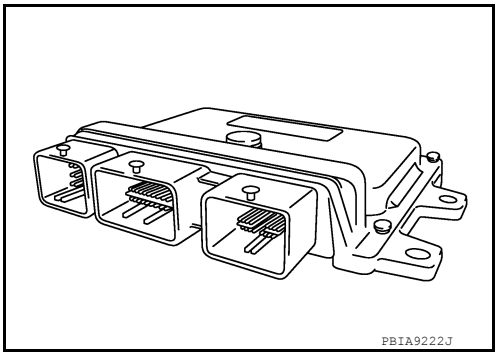
NO >> Replace power steering pressure sensor. Refer to ST-22, "VQ35DE : Component Parts Location - 17 Inch Tire", or ST-24, "VQ35DE : Component Parts Location - 18 Inch Tire".

P0603 ECM POWER SUPPLY

Description

INFOID:0000000006392012

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc.



DTC Logic

INFOID:0000000006392013

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0603	ECM power supply circuit	ECM back-up RAM system does not function properly.	• Harness or connectors [ECM power supply (back-up) circuit is open or shorted.] • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always 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 10 seconds.
2. Turn ignition switch OFF and wait at least 5 minutes.
3. Turn ignition switch ON, wait at least 10 seconds.
4. Repeat steps 2 and 3 for five times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-516, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

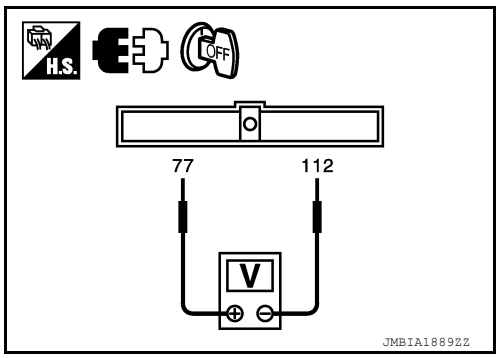
INFOID:0000000006392014

1.CHECK ECM POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

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

ECM				Voltage (V)
+		–		
Connector	Terminal	Connector	Terminal	
F13	77	E10	112	Battery voltage



Is the inspection result normal?

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

2. DETECT MALFUNCTIONING PART

Check the following.
- 15 A fuse (No. 42)
- IPDM E/R harness connector F10
- Harness for open or short between ECM and battery

>> Repair or replace harness or connectors.

3. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace harness or connectors.

4. PERFORM DTC CONFIRMATION PROCEDURE

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-516, "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-516, "DTC Logic".

Is the 1st trip DTC P0603 displayed again?

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

5. REPLACE ECM

1. Replace ECM.
2. Go to EC-334, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

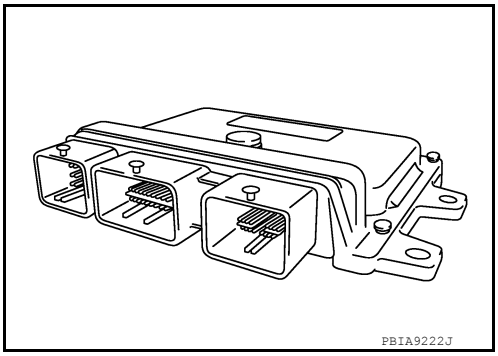
>> INSPECTION END

P0605 ECM

Description

INFOID:0000000006392015

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:0000000006392016

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-519, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-519, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
3. Repeat step 2 for 32 times.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-519, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006392017

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-518, "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-518, "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-334, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

P0607 ECM

Description

INFOID:0000000006392018

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:0000000006392019

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0607	CAN communication bus	When detecting error during the initial diagnosis of CAN controller of ECM.	• ECM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-520, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006392020

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC CONFIRMATION PROCEDURE.
   See EC-520, "DTC Logic".
4. Check DTC.

Is the DTC P0607 displayed again?

Yes >> GO TO 2.
No >> INSPECTION END

2.REPLACE ECM

1. Replace ECM.
2. Go to EC-334, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

P0643 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000006392021

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0643	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	• Harness or connectors (APP sensor 1 circuit is shorted.) (TP sensor circuit is shorted.) [CMP sensor (PHASE) circuit is shorted.) (PSP sensor circuit is shorted.) (Battery current sensor circuit is shorted.) • Accelerator pedal position sensor • Throttle position sensor • Camshaft position sensor (PHASE) • Power steering pressure sensor • Battery current sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Start engine and let it idle for 1 second.
3. Check DTC

Is DTC detected?

YES >> Go to EC-521, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006392022

1.CHECK GROUND CONNECTION

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

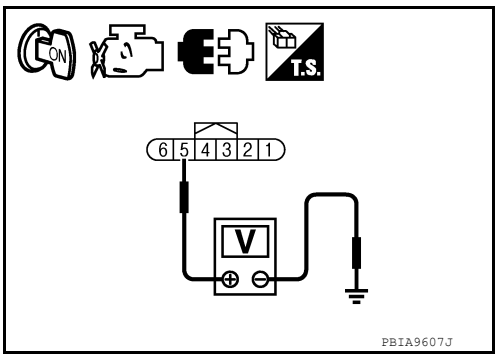
Is the inspection result normal?

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

2.CHECK 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 (V)
Connector	Terminal		
E40	5	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUITS

1. Turn ignition switch OFF.
2. Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F13	47	TP sensor	F57	1
	51	Battery current sensor	F5	1
	55	PSP sensor	F40	1
	59	CMP sensor (PHASE) (bank 1)	F55	1
	63	CMP sensor (PHASE) (bank 2)	F60	1
E10	83	APP sensor	E40	5

Is the inspection result normal?

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

4.CHECK COMPONENTS

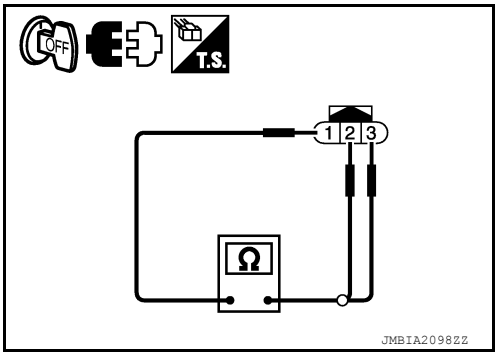
Check the following.
- Camshaft position sensor (PHASE) (Refer to EC-506, "Component Inspection".)
- Battery current sensor (Refer to EC-537, "Component Inspection".)
- Power steering pressure sensor (Refer to EC-514, "Component Inspection".)

Is the inspection result normal?

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

5.CHECK BATTERY CURRENT SENSOR-I

1. Disconnect battery current sensor harness connector.
2. Remove the sensor. Refer to CHG-9, "System Diagram".
3. Check resistance battery current sensor terminals as follows.



Terminal No.	Resistance
1 - 2	Except 0 Ω
1 - 3	

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace battery current sensor. Refer to CHG-9, "System Diagram".

6.CHECK TP SENSOR

Refer to EC-470, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 7.

7. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator. Refer to EM-132, "Removal and Installation".
2. Go to EC-470, "Special Repair Requirement".

>> INSPECTION END

8. CHECK APP SENSOR

Refer to EC-587, "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. Refer to ACC-4, "Exploded View".
2. Go to EC-587, "Special Repair Requirement".

>> INSPECTION END

10. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

P0850 PNP SWITCH

Description

INFOID:0000000006392023

When the selector lever position is P or N park/neutral position (PNP) signal is ON.

DTC Logic

INFOID:0000000006392024

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0850	Park/neutral position switch	The signal of the park/neutral position (PNP) signal is not changed in the process of engine starting and driving.	• Harness or connectors (The sensor circuit is open or shorted.) • TCM

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Will CONSULT-III be used?

Will CONSULT-III be used?

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

2.PRECONDITIONING

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

>> GO TO 3.

3.CHECK PNP SIGNAL

With CONSULT-III

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-III. Then check the “P/N POSI SW” signal under the following conditions.

Position (Selector lever)	Known-good signal
N or P position	ON
Except above position	OFF

Is the inspection result normal?

YES >> GO TO 4.
NO >> Go to EC-525, "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	1,100 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	4.0 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 mph)
Selector lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-525, "Diagnosis Procedure".
NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-525, "Component Function Check".

NOTE:
Use component function check to check the overall function of the park/neutral position (PNP) signal circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-525, "Diagnosis Procedure".

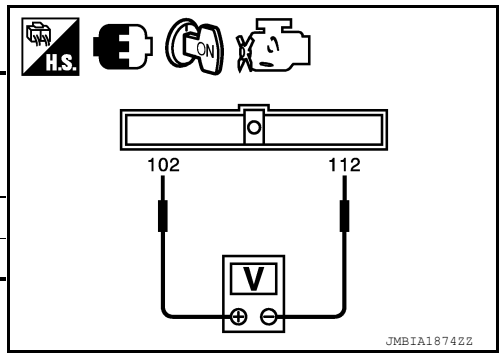
Component Function Check

INFOID:0000000006392025

1. PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connectors.

ECM			Condition		Voltage (V)
Connector	+	–			
	Terminal	Terminal			
E10	102	112	Selector lever position	P or N	Battery voltage
				Except above	Approx. 0



Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-525, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006392026

1. CHECK DTC WITH TCM

Refer to EC-659, "DTC Index".

Is the inspection result normal?

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

2. CHECK PNP SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect TCM harness connector.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between TCM harness connector and IPDM E/R harness connector.

TCM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F16	20	F10	72	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, short to ground or short to power in harness or connectors.

3. CHECK PNP SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect IPDM E/R harness connectors.
2. Disconnect ECM 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	
E10	102	E18	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, short to ground or short to power in harness or connectors.

4. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-45, "Removal and Installation".
NO >> Repair or replace malfunctioning part.

P1212 TCS COMMUNICATION LINE

Description

INFOID:0000000006392027

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:0000000006392028

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-441, "DTC Logic".**
- **If DTC P1212 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-520, "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 cannot 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

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

>> GO TO 2.

2.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-527, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006392029

Go to BRC-7, "Work Flow".

P1217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000006392030

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-441, "DTC Logic".**
- **If DTC P1217 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-520, "DTC Logic".**

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217	Engine over temperature (Overheat)	• Cooling fan does not operate properly (Overheat). • Cooling fan system does not operate properly (Overheat). • Engine coolant was not added to the system using the proper filling method. • Engine coolant is not within the specified range.	• Harness or connectors (The cooling fan circuit is open or shorted.) • IPDM E/R (Cooling fan relays) • Cooling fan motor • Radiator hose • Radiator • Radiator cap • Water pump • Thermostat

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to CO-35, "Changing Engine Coolant". Also, replace the engine oil. Refer to LU-26, "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-12, "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-528, "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-529, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006392031

1.PERFORM COMPONENT FUNCTION CHECK-I

WARNING:

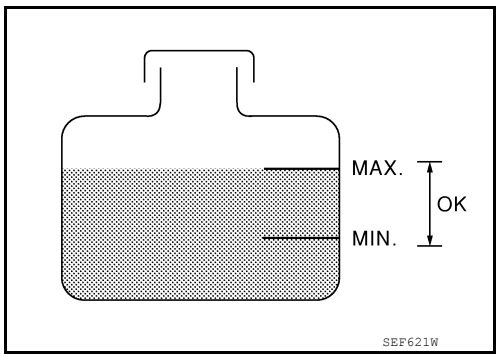
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator. For the location of the radiaor cap, refer to CO-38, "Exploded View".

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-529, "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-529, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

With CONSULT-III
1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that cooling fan motors-1 and -2 operate at each speed (LOW/MID/HI).

Without CONSULT-III
Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PCS-11, "Diagnosis Description".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-529, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006392032

1.CHECK COOLING FAN OPERATION

With CONSULT-III
1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
3. Check that cooling fans-1 and -2 operate at each speed (LOW/MID/HI).

Without CONSULT-III
1. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PCS-11, "Diagnosis Description".
2. Check that cooling fans-1 and -2 operate at each speed (Low/Middle/High).

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-603, "Diagnosis Procedure".

2.CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-34, "System Inspection".

Is leakage detected?

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

3.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak.
- Hose
- Radiator
- Water pump

>> Repair or replace malfunctioning part.

4. CHECK RADIATOR CAP

Check radiator cap. Refer to CO-34, "System Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace radiator cap. Refer to CO-38, "Exploded View".

5. CHECK THERMOSTAT

Check thermostat. Refer to CO-47, "Removal and Installation".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace thermostat. Refer to CO-47, "Exploded View".

6. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-466, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace engine coolant temperature sensor. Refer to CO-49, "Exploded View".

7. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, check the following.

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	MA-12, "SAE Viscosity Number"	
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-35, "Changing Engine Coolant"
	4	• Radiator cap	• Pressure tester	CO-34, "System Inspection"	
ON*2	5	• Coolant leaks	• Visual	No leaks	CO-34, "System Inspection"
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	CO-47, "Removal and Installation"
ON*1	7	• Cooling fan	• CONSULT-III	Operating	EC-603, "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-35, "Changing Engine Coolant"
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	CO-35, "Changing Engine Coolant"
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-198, "Inspection After Disassembly"
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	EM-218, "Inspection"

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (56 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to CO-32, "Troubleshooting Chart".

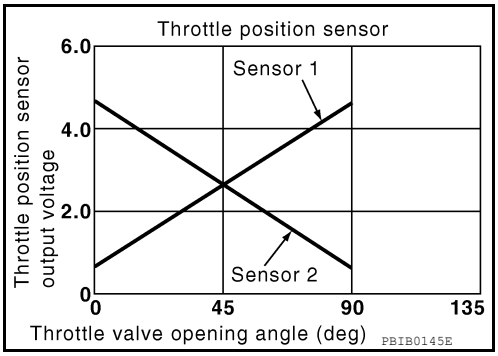
>> INSPECTION END

P1225 TP SENSOR

Description

INFOID:0000000006392033

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. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving condition via the throttle control motor.



DTC Logic

INFOID:0000000006392034

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-532, "Diagnosis Procedure".
NO >> INSPECTION END

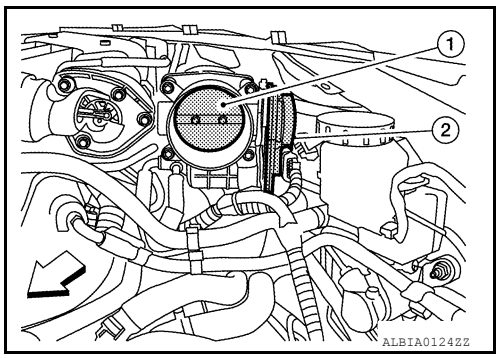
Diagnosis Procedure

INFOID:0000000006392035

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct. Refer to EM-131, "Removal and Installation".

3. Check if foreign matter is caught between the throttle valve (1) and the housing.
- Electric throttle control actuator (2)
- ⇦: Vehicle front



Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside. Refer to EM-132, "Removal and Installation".

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator. Refer to EM-132, "Removal and Installation".
2. Go to EC-533, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006392036

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-336, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-336, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

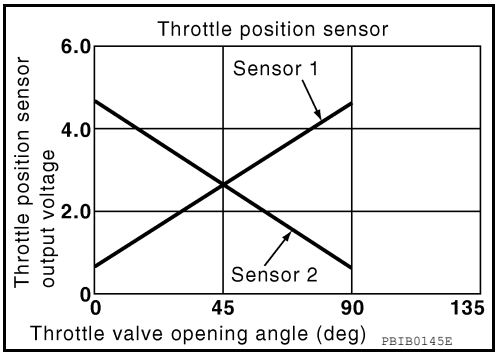
>> END

P1226 TP SENSOR

Description

INFOID:0000000006392037

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. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving condition via the throttle control motor.



DTC Logic

INFOID:0000000006392038

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 and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 2 and 3 for 32 times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-534, "Diagnosis Procedure".
NO >> INSPECTION END

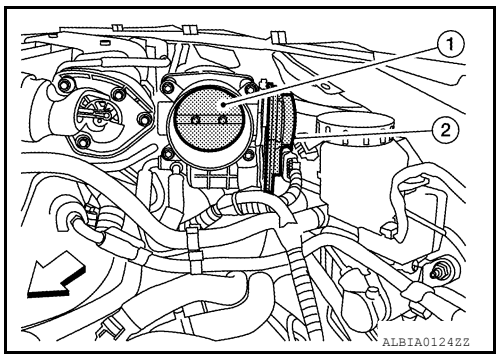
Diagnosis Procedure

INFOID:0000000006392039

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct. Refer to EM-131, "Removal and Installation".

3. Check if foreign matter is caught between the throttle valve (1) and the housing.
- Electric throttle control actuator (2)
- ⇦: Vehicle front



Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside. Refer to EM-132, "Removal and Installation".

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator. Refer to EM-132, "Removal and Installation".
2. Go to EC-533, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006392040

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-336, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-336, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

P1550 BATTERY CURRENT SENSOR

Description

INFOID:0000000006392041

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to CHG-9, "System Description".

CAUTION:

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then battery discharge may occur.

DTC Logic

INFOID:0000000006392042

DTC DETECTION LOGIC

NOTE:

If DTC P1550 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-521, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1550	Battery current sensor circuit range/performance	The output voltage of the battery current sensor remains within the specified range while engine is running.	• Harness or connectors (The sensor circuit is open or shorted.) • Battery current sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-536, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006392043

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

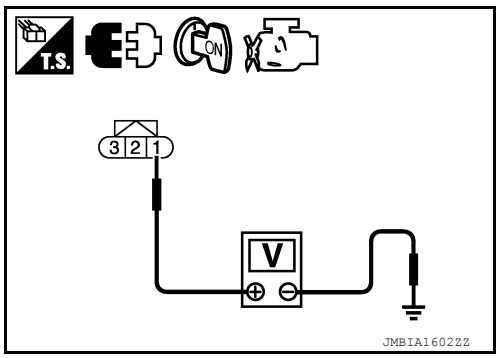
Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect battery current sensor harness connector.
2. Turn ignition switch ON.

3. Check the voltage between battery current sensor harness connector and ground.



Battery current sensor		Ground	Voltage (V)
Connector	Terminal		
F5	1	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

3.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F5	2	F13	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, short to ground or short to power in harness or connectors.

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F5	3	F13	42	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK BATTERY CURRENT SENSOR

Refer to EC-537, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace battery negative cable assembly.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

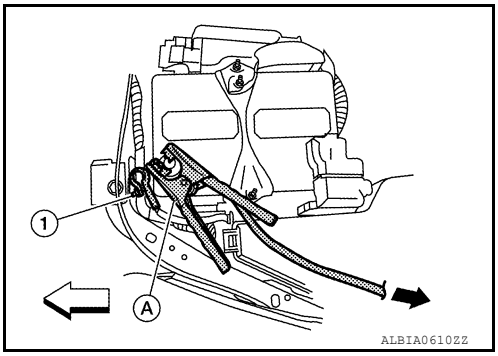
Component Inspection

INFOID:0000000006392044

1.CHECK BATTERY CURRENT SENSOR

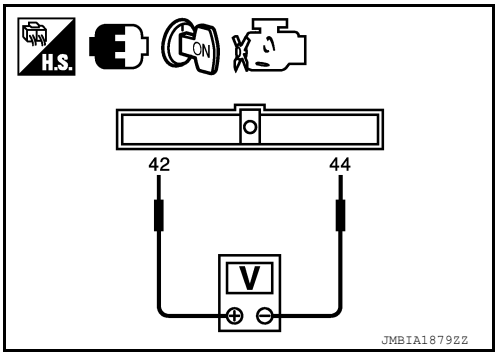
1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.

3. Disconnect battery negative cable (1).
- ⇦: Vehicle front
- ⬅: To body ground
4. Install jumper cable (A) between battery negative terminal and body ground.
5. Turn ignition switch ON.



6. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Voltage (V)
Connector	+	–	
	Terminal	Terminal	
F13	42 (Battery current sensor signal)	44 (Sensor ground)	Approx. 2.5



Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery" (COUPE models) or PG-71, "How to Handle Battery" (SEDAN models).

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly.

P1551, P1552 BATTERY CURRENT SENSOR

Description

INFOID:0000000006392045

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to CHG-9, "System Description".

CAUTION:

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then battery discharge may occur.

DTC Logic

INFOID:0000000006392046

DTC DETECTION LOGIC

NOTE:

If DTC P1551 or P1552 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-521, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1551	Battery current sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Battery current sensor
P1552	Battery current 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 8 V with ignition switch ON

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-539, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006392047

1.CHECK GROUND CONNECTION

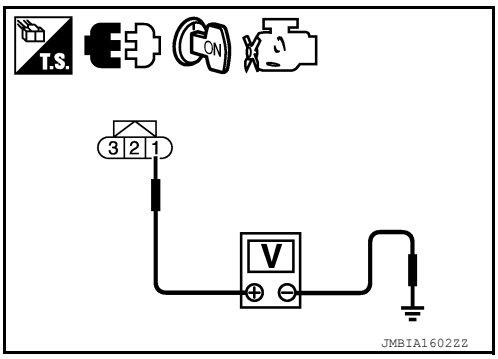
1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect battery current sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between battery current sensor harness connector and ground.



Battery current sensor		Ground	Voltage (V)
Connector	Terminal		
F5	1	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

3.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F5	2	F13	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, short to ground or short to power in harness or connectors.

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F5	3	F13	42	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK BATTERY CURRENT SENSOR

Refer to EC-537, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace battery negative cable assembly.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

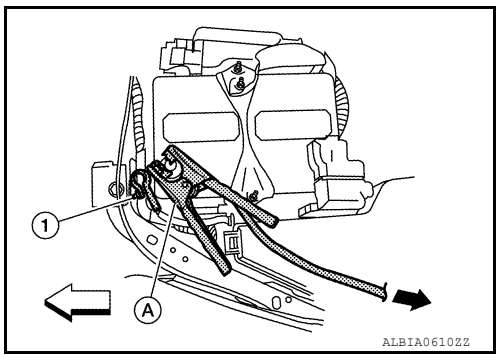
Component Inspection

INFOID:0000000006392048

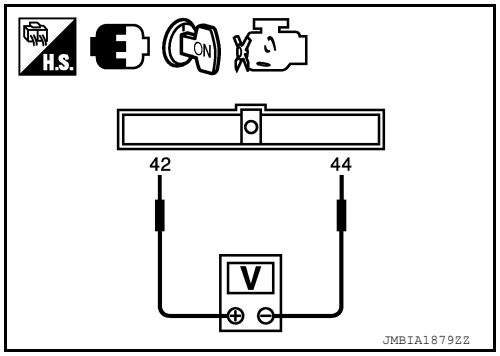
1.CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.

3. Disconnect battery negative cable (1).
- ⇦: Vehicle front
- ⬅: To body ground
4. Install jumper cable (A) between battery negative terminal and body ground.
5. Turn ignition switch ON.



6. Check the voltage between ECM harness connector terminals under the following conditions.



ECM			Voltage (V)
Connector	+	–	
	Terminal	Terminal	
F13	42 (Battery current sensor signal)	44 (Sensor ground)	Approx. 2.5

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery" (COUPE models) or PG-71, "How to Handle Battery" (SEDAN models).

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly.

P1553 BATTERY CURRENT SENSOR

Description

INFOID:0000000006392049

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to CHG-9, "System Description".

CAUTION:

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then battery discharge may occur.

DTC Logic

INFOID:0000000006392050

DTC DETECTION LOGIC

NOTE:

If DTC P1553 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-521, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1553	Battery current sensor performance	The signal voltage transmitted from the sensor to ECM is higher than the amount of the maximum power generation.	• Harness or connectors (The sensor circuit is open or shorted.) • Battery current sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait 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:0000000006392051

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

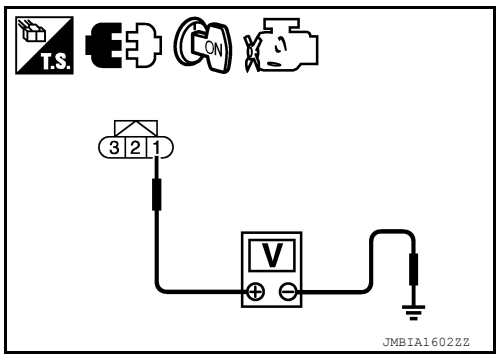
Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect battery current sensor harness connector.
2. Turn ignition switch ON.

3. Check the voltage between battery current sensor harness connector and ground.



Battery current sensor		Ground	Voltage (V)
Connector	Terminal		
F5	1	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

3.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F5	2	F13	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, short to ground or short to power in harness or connectors.

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F5	3	F13	42	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK BATTERY CURRENT SENSOR

Refer to EC-537, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace battery negative cable assembly.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

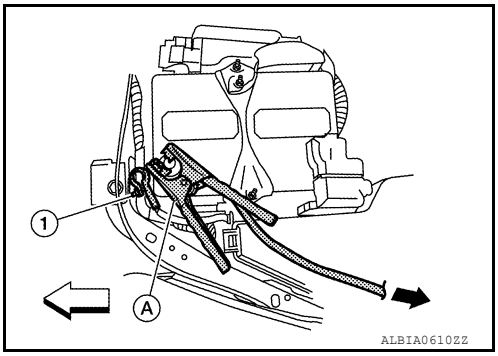
Component Inspection

INFOID:0000000006392052

1.CHECK BATTERY CURRENT SENSOR

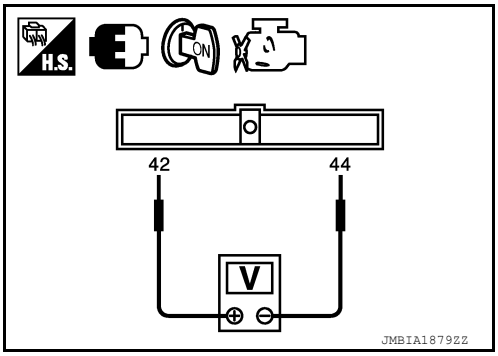
1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.

3. Disconnect battery negative cable (1).
- ⇦: Vehicle front
- ⬅: To body ground
4. Install jumper cable (A) between battery negative terminal and body ground.
5. Turn ignition switch ON.



6. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Voltage (V)
Connector	+	–	
	Terminal	Terminal	
F13	42 (Battery current sensor signal)	44 (Sensor ground)	Approx. 2.5



Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery" (COUPE models) or PG-71, "How to Handle Battery" (SEDAN models).

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly.

P1554 BATTERY CURRENT SENSOR

Description

INFOID:0000000006392053

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator. The battery current sensor is installed to the battery cable at the negative terminal. The sensor measures the charging/discharging current of the battery. Based on the sensor signal, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer to CHG-9, "System Description".

CAUTION:

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then battery discharge may occur.

DTC Logic

INFOID:0000000006392054

DTC DETECTION LOGIC

NOTE:

If DTC P1554 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-521, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1554	Battery current sensor performance	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.	• Harness or connectors (The sensor circuit is open or shorted.) • Battery current sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-545, "Component Function Check".

NOTE:

Use component function check to check the overall function of the battery current sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-546, "Diagnosis Procedure".

Component Function Check

INFOID:0000000006392055

1.PRECONDITIONING

TESTING CONDITION:

- **Before performing the following procedure, confirm that battery voltage is more than 12.8 V at idle.**
- **Before performing the following procedure, confirm that all load switches and A/C switch are turned OFF.**

>> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK

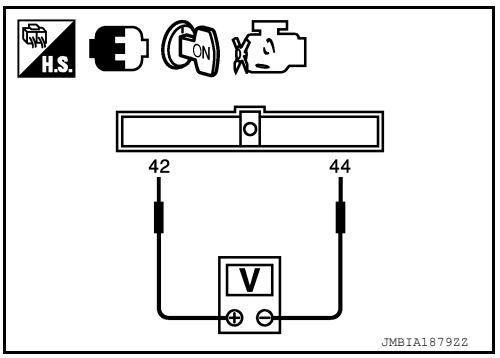
With CONSULT-III

1. Start engine and let it idle.
2. Select “BAT CUR SEN” in “DATA MONITOR” mode with CONSULT-III.
3. Check “BAT CUR SEN” indication for 10 seconds.
   “BAT CUR SEN” should be above 2,300 mV at least once.

Without CONSULT-III

1. Start engine and let it idle.

2. Check voltage between ECM harness connector terminals under the following conditions.



ECM			Voltage (V)
Connector	+	–	
	Terminal	Terminal	
F13	42 (Battery current sensor signal)	44 (Sensor ground)	Above 2.3 at least once

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-546, "Diagnosis Procedure"

Diagnosis Procedure

INFOID:0000000006392056

1.CHECK GROUND CONNECTION

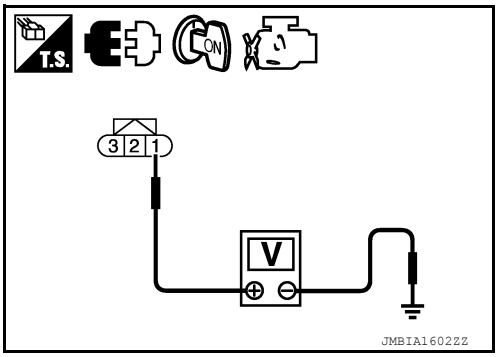
1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK BATTERY CURRENT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect battery current sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between battery current sensor harness connector and ground.



Battery current sensor		Ground	Voltage (V)
Connector	Terminal		
F5	1	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

3.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F5	2	F13	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, short to ground or short to power in harness or connectors.

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

Battery current sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F5	3	F13	42	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK BATTERY CURRENT SENSOR

Refer to EC-537, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace battery negative cable assembly.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

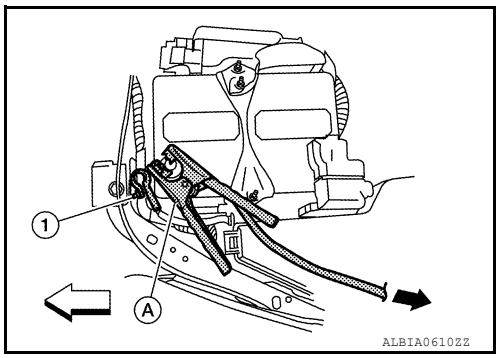
>> INSPECTION END

Component Inspection

INFOID:0000000006392057

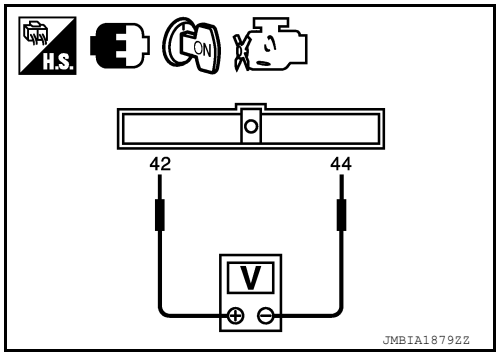
1.CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable (1).
- ⇦: Vehicle front
- ⬅: To body ground
4. Install jumper cable (A) between battery negative terminal and body ground.
5. Turn ignition switch ON.



6. Check the voltage between ECM harness connector terminals under the following conditions.

ECM			Voltage (V)
Connector	+	–	
	Terminal	Terminal	
F13	42 (Battery current sensor signal)	44 (Sensor ground)	Approx. 2.5



Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-3, "How to Handle Battery" (COUPE models) or PG-71, "How to Handle Battery" (SEDAN models).

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly.

P1564 ASCD STEERING SWITCH

Description

INFOID:0000000006392058

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-369, "System Diagram" for the ASCD function.

DTC Logic

INFOID:0000000006392059

DTC DETECTION LOGIC

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-518, "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 and wait at least 10 seconds.
2. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
3. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Check DTC.

Is DTC detected?

YES >> Go to EC-548, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006392060

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK ASCD STEERING SWITCH CIRCUIT

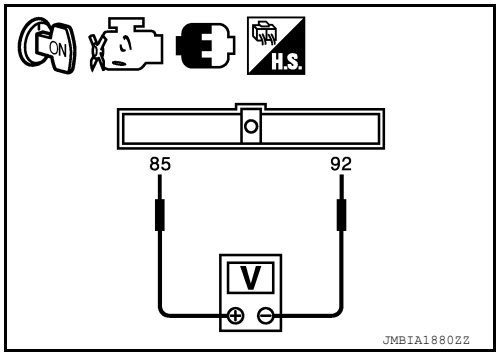
With CONSULT-III
1. Turn ignition switch ON.
2. Select “MAIN SW”, “CANCEL SW”, “RESUME/ACC SW” and “SET SW” in “DATA MONITOR” mode with CONSULT-III.

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/ACCEL-ERATE 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 under the following conditions.



ECM			Condition	Voltage (V)
Connector	+	–		
	Terminal	Terminal		
E10	85 (ASCD steering switch signal)	92 (ASCD steering switch ground)	MAIN switch: Pressed	Approx. 0
			CANCEL switch: Pressed	Approx. 1
			SET/COAST switch: Pressed	Approx. 2
			RESUME/ACCELERATE switch: Pressed	Approx. 3
			All ASCD steering switches: Released	Approx. 4

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 3.

3. CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect combination switch harness connector.
4. Check the continuity between combination switch and ECM harness connector.

Combination switch	ECM		Continuity
Terminal	Connector	Terminal	
16	E10	92	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E30, M1
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit, 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 combination switch and ECM harness connector.

Combination switch	ECM		Continuity
Terminal	Connector	Terminal	
13	E10	85	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E30, M1
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit, short to ground or short to power in harness or connectors.

7.CHECK ASCD STEERING SWITCH

Refer to EC-550, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace ASCD steering switch.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

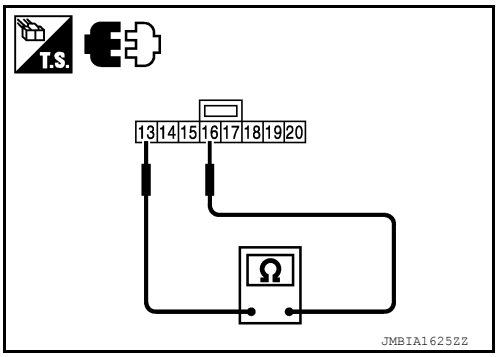
>> INSPECTION END

Component Inspection

INFOID:0000000006392061

1.CHECK ASCD STEERING SWITCH

1. Turn ignition switch OFF.
2. Disconnect combination switch (spiral cable) harness connector.
3. Check resistance between combination switch harness connector terminals as per the following.



Combination switch		Condition	Resistance (Ω)
Connector	Terminals		
M88	13 and 16	MAIN switch: Pressed	Approx. 0
		CANCEL switch: Pressed	Approx. 250
		SET/COAST switch: Pressed	Approx. 660
		RESUME/ACCELERATE switch: Pressed	Approx. 1,480
		All ASCD steering switches: Released	Approx. 4,000

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD steering switch

P1572 ASCD BRAKE SWITCH

Description

INFOID:0000000006392062

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-369, "System Diagram" for the ASCD function.

DTC Logic

INFOID:0000000006392063

DTC DETECTION LOGIC

NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-518, "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.) • Stop lamp switch • ASCD brake switch • Incorrect stop lamp switch installation • Incorrect ASCD brake 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.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

1. Start engine (VDC switch OFF).
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Press MAIN switch and make sure that CRUISE lamp lights up.
4. Drive the vehicle for at least 5 consecutive seconds under the following conditions.

   CAUTION:

   Always drive vehicle at a safe speed.

   NOTE:

   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

VHCL SPEED SE	More than 30 km/h (19 mph)
Selector lever	Suitable position

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-553, "Diagnosis Procedure".
NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE 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-553, "Diagnosis Procedure".
NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-552, "Component Function Check".
NOTE:
Use component function check to check the overall function of ASCD brake switch. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-553, "Diagnosis Procedure".

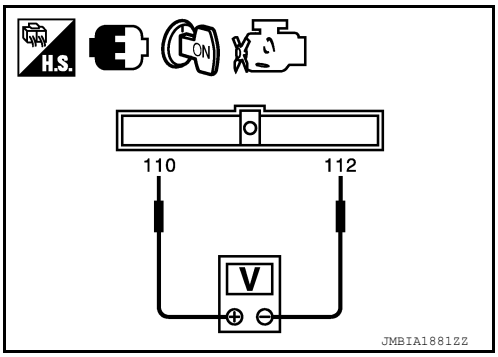
Component Function Check

INFOID:0000000006392064

1. PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connectors.

ECM			Condition		Voltage
Connector	+ Terminal	– Terminal			
E10	110 (ASCD brake switch signal)	112	Brake pedal	Slightly depressed	Approx. 0 V
				Fully released	Battery voltage



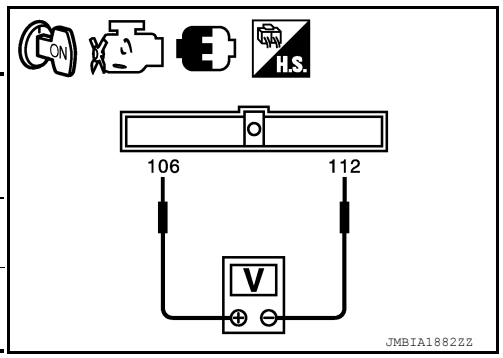
Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connectors.

ECM			Condition		Voltage
Connector	+ Terminal	– Terminal			
E10	106 (Stop lamp switch signal)	112	Brake pedal	Slightly depressed	Battery voltage
				Fully released	Approx. 0 V



Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-553, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006896841

1.CHECK OVERALL FUNCTION-I

With CONSULT-III

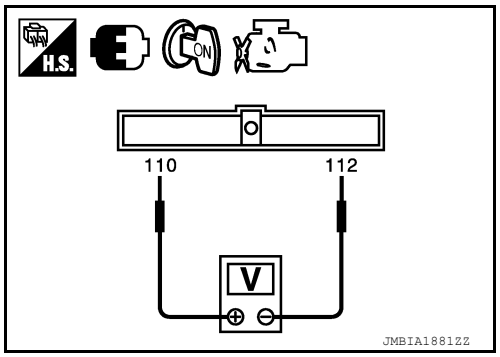
1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-III.
3. Check “BRAKE SW1” indication under the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connectors.

ECM			Condition		Voltage
Connector	+ Terminal	– Terminal			
E10	110 (ASCD brake switch signal)	112	Brake pedal	Slightly depressed	Approx. 0 V
				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

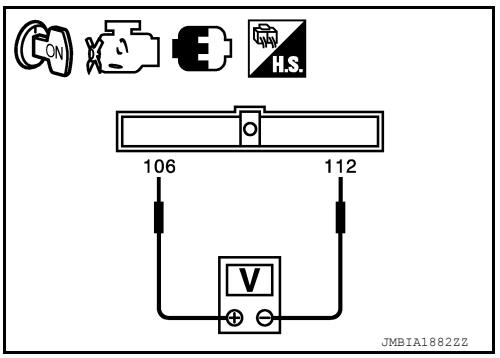
Check “BRAKE SW2” indication in “DATA MONITOR” mode.

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal	Slightly depressed	ON
		Fully released	OFF

Without CONSULT-III

Check the voltage between ECM harness connectors.

ECM			Condition		Voltage
Connector	+	–			
	Terminal	Terminal			
E10	106 (Stop lamp switch signal)	112	Brake pedal	Slightly depressed	Battery voltage
				Fully released	Approx. 0 V



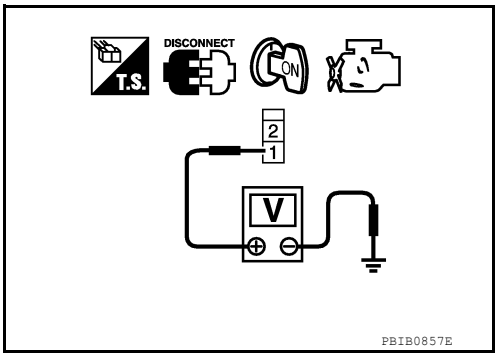
Is the inspection result normal?

YES >> GO TO 16.
NO >> GO TO 7.

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		
E37	1	Ground	Battery voltage



Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector E6
- 10 A fuse (No. 3)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit, short to ground or short to power in harness or connectors.

5.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	
E37	2	E10	110	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

6.CHECK ASCD BRAKE SWITCH

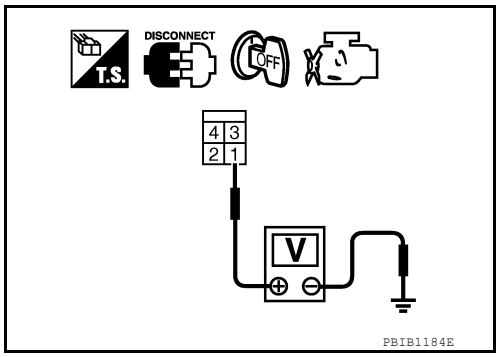
Refer to EC-556, "Component Inspection (ASCD Brake Switch)".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace ASCD brake switch. Refer to BR-17, "Exploded View".

7.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		
E38	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

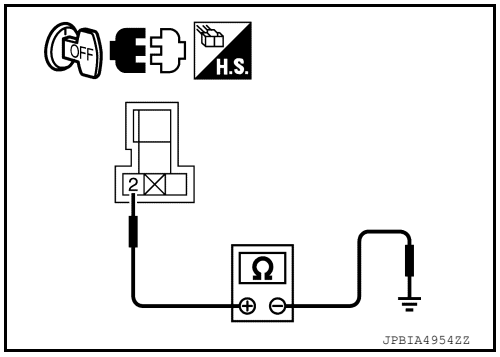
8.DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector E6
- 10 A fuse (No. 7)
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit, short to ground or short to power in harness or connectors.

9.CHECK STOP LAMP RELAY-1 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp relay-1 harness connector.
3. Check the continuity between stop lamp relay-1 harness connector and ground.



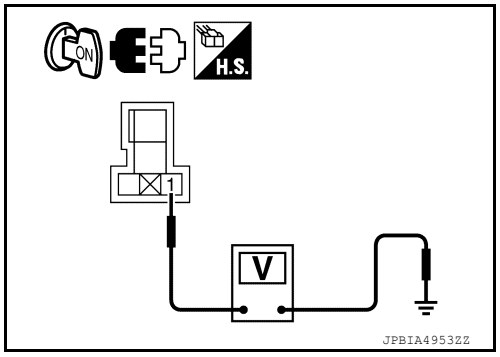
Stop lamp relay-1		Ground	Continuity
Connector	Terminal		
E57	2	Ground	Existed

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 STOP LAMP SWITCH INPUT SIGNAL CIRCUIT

1. Connect stop lamp switch harness connector.
2. Turn ignition switch ON.
3. Check the voltage between stop lamp relay-1 harness connector and ground.



Stop lamp relay-1		Ground	Condition		Voltage (V)
Connector	Terminal				
E57	1	Ground	Brake pedal	Slightly depressed	Battery voltage
				Fully released	Approx. 0

Is the inspection result normal?

YES >> GO TO 12.
NO >> GO TO 11.

11.DETECT MALFUNCTIONING PART

Check the following.
- Joint connector-E14 E56

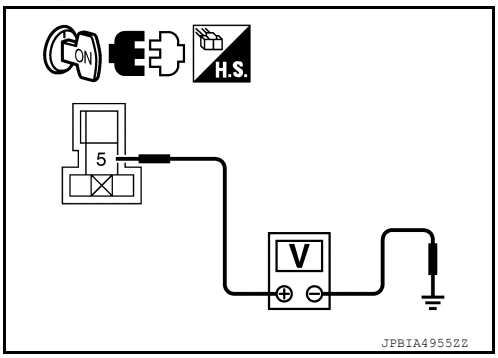
• Harness for open or short between stop lamp switch and stop lamp relay-1

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK STOP LAMP RELAY-1 POWER SUPPLY CIRCUIT

1. Check the voltage between stop lamp relay-1 harness connector and ground.
2. Check the voltage between stop lamp relay-1 harness connector and ground.



Stop lamp relay-1		Ground	Voltage (V)
Connector	Terminal		
E57	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP RELAY-1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect stop lamp relay-1 harness connector.
3. Check the continuity between stop lamp relay-1 harness connector and ECM harness connector.

ECM		Stop lamp relay-1		Continuity
Connector	Terminal	Connector	Terminal	
E10	106	E57	3	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.

14. CHECK STOP LAMP SWITCH

Refer to EC-557, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace stop lamp switch.

15. CHECK STOP LAMP RELAY-1

Refer to EC-558, "Component Inspection (Stop Lamp Relay-1)".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace stop lamp relay-1.

16. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection (ASCD Brake Switch)

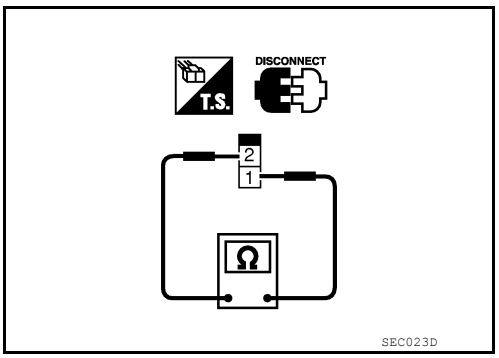
INFOID:0000000006392066

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



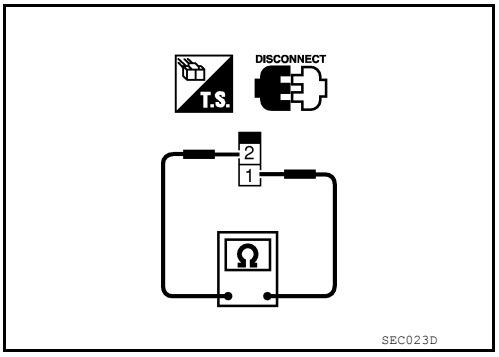
Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-13, "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. Refer to BR-17, "Exploded View".

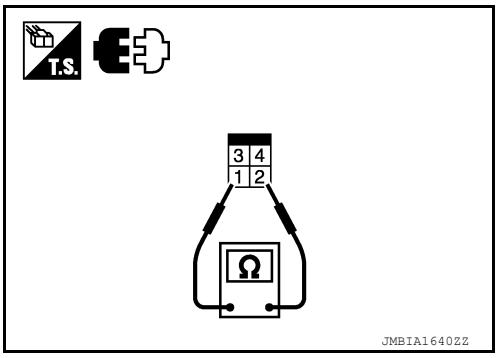
Component Inspection (Stop Lamp Switch)

INFOID:0000000006392067

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check harness 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



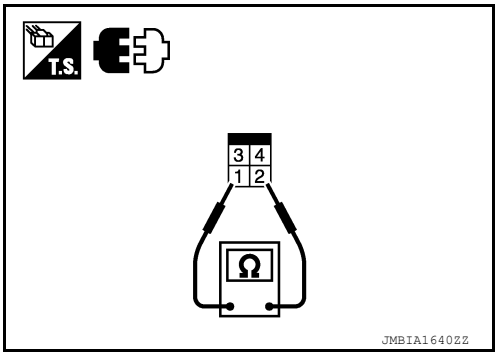
Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-13, "Inspection and Adjustment".
2. Check harness 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. Refer to BR-17, "Exploded View".

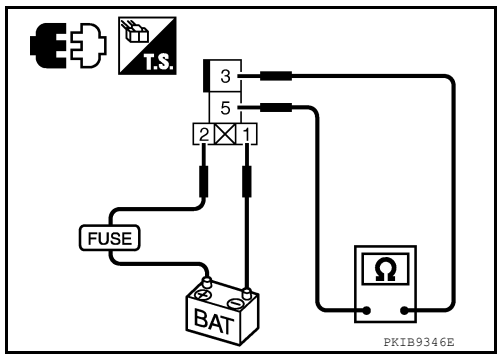
Component Inspection (Stop Lamp Relay-1)

INFOID:0000000006896819

1. STOP LAMP RELAY-1

1. Turn ignition switch OFF.
2. Remove stop lamp relay-1.
3. Check continuity between stop lamp relay-1 terminals under the following conditions.

Stop lamp relay-1 Terminal		Conditions	Continuity
3	5	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp relay-1.

P1574 ASCD VEHICLE SPEED SENSOR

Description

INFOID:0000000006392068

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-369, "System Diagram" for ASCD functions.

DTC Logic

INFOID:0000000006392069

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-441, "DTC Logic".**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-511, "DTC Logic".**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-518, "DTC Logic".**
- **If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-520, "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 • ABS actuator and electric unit (control unit) • Wheel sensor • TCM • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always 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 (ESP switch OFF).
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-559, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006392070

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-196, "DTC Index".

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-45, "DTC No. Index" (Without TCS) or BRC-115, "DTC No. Index" (With TCS).

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK COMBINATION METER FUNCTION

Refer to MWI-4, "Work Flow".

>> INSPECTION END

P1700 CVT CONTROL SYSTEM

Description

INFOID:0000000006392071

This DTC is displayed with other DTC regarding TCM. Perform the trouble diagnosis for corresponding DTC. Refer to EC-659, "DTC Index". When this DTC is detected, the ASCD control is canceled.

P1715 INPUT SPEED SENSOR

Description

INFOID:0000000006392072

ECM receives input speed sensor signal from TCM through CAN communication line. ECM uses this signal for engine control.

DTC Logic

INFOID:0000000006392073

DTC DETECTION LOGIC

NOTE:

- **If DTC P1715 is displayed with DTC U1000, U1001 first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-441, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to EC-500, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0340, P0345, first perform the trouble diagnosis for DTC P0340, P0345. Refer to EC-504, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-518, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-520, "DTC Logic".**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715	Input speed sensor (TCM output)	Input speed sensor signal is different from the theoretical value calculated by ECM from output speed sensor signal and engine rpm signal.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (Input speed sensor circuit is open or shorted) • TCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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 vehicle at a speed of more than 50 km/h (31 MPH) for at least 5 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-562, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006392074

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-196, "DTC Index".

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM. Refer to TM-239, "Removal and Installation".

>> INSPECTION END

P1720 VSS

Description

INFOID:0000000006392075

ECM receives two vehicle speed signals via CAN communication line. One is sent from “ABS actuator and electric unit (control unit)” via combination meter, and the other is from TCM (Transmission control module). ECM uses these signals for engine control.

DTC Logic

INFOID:0000000006392076

DTC DETECTION LOGIC

NOTE:

- **If DTC P1720 is displayed with DTC U1000, U1001 first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-441, "DTC Logic".**
- **If DTC P1720 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-520, "DTC Logic".**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1720	Vehicle speed sensor (TCM output)	A difference between two vehicle speed signals is out of the specified range.	• Harness or connectors (Output speed sensor circuit is open or shorted.) • Harness or connectors (Wheel sensor circuit is open or shorted.) • TCM • Output speed sensor • ABS actuator and electric unit (control unit) • Wheel sensor • Combination meter

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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 vehicle at a 20 km/h (12 MPH) or more for at least 5 seconds without brake pedal depressing.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-563, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006392077

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-196, "DTC Index".

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-45, "DTC No. Index" (Without TCS) or BRC-115, "DTC No. Index" (With TCS).

OK or NG

OK >> GO TO 3.
NG >> perform trouble shooting relevant to DTC indicated.

3.CHECK COMBINATION METER FUNCTION

Refer to GI-38, "Work Flow".

>> INSPECTION END

P1800 VIAS CONTROL SOLENOID VALVE 1

Description

INFOID:0000000006392078

The VIAS control solenoid valve 1 cuts the intake manifold vacuum signal for power valve 1 control. It responds to ON/OFF signals from the ECM. When the solenoid is OFF, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and sends the vacuum signal to the power valve actuator 1.

DTC Logic

INFOID:0000000006392079

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1800	VIAS control solenoid valve 1 circuit	An excessively low or high voltage signal is sent to ECM through the VIAS control solenoid valve 1.	• Harness or connectors (The solenoid valve 1 circuit is open or shorted.) • VIAS control solenoid valve 1

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-565, "Diagnosis Procedure".
NO >> INSPECTION END

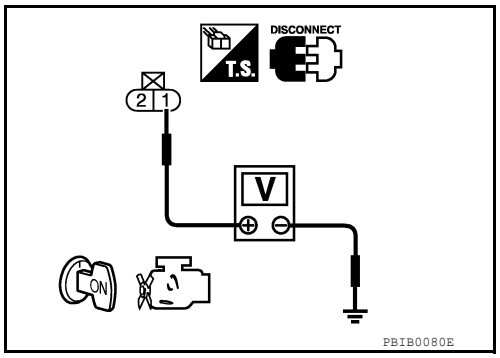
Diagnosis Procedure

INFOID:0000000006392080

1.CHECK VIAS CONTROL SOLENOID VALVE 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect VIAS control solenoid valve 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between VIAS control solenoid valve 1 harness connector and ground.

VIAS control solenoid valve 1		Ground	Voltage (V)
Connector	Terminal		
F63	2	Ground	Battery voltage



Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

2.CHECK VIAS CONTROL SOLENOID VALVE 1 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between VIAS control solenoid valve 1 harness connector and ECM harness connector.

VIAS control solenoid valve 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F63	1	F14	27	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, short to ground or short to power in harness or connectors.

3.CHECK VIAS CONTROL SOLENOID VALVE 1

Refer to EC-566, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace VIAS control solenoid valve 1. Refer to EC-340, "Component Parts Location".

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

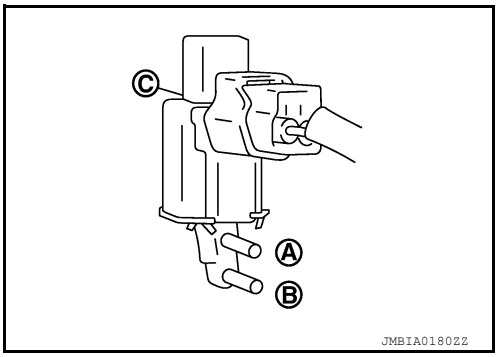
INFOID:0000000006392081

1.CHECK VIAS CONTROL SOLENOID VALVE 1

With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect VIAS purge hoses connected to VIAS control solenoid valve 1.
4. Turn ignition switch ON.
5. Select “VIAS S/V 1” in “ACTIVE TEST” mode with CONSULT-III.
6. Check air passage continuity and operation delay time under the following conditions.

Condition (VIAS S/V 1)	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
ON	Existed	Not existed
OFF	Not existed	Existed



Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect VIAS control solenoid valve 1 harness connector.
3. Disconnect VIAS purge hoses connected to VIAS volume control solenoid valve 1.
4. Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12 V direct current supply between terminals 1 and 2	Existed	Not existed
No supply	Not existed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace VIAS control solenoid valve 1. Refer to EC-340, "Component Parts Location".

P1801 VIAS CONTROL SOLENOID VALVE 2

Description

INFOID:0000000006392082

The VIAS control solenoid valve 2 cuts the intake manifold vacuum signal for power valve 2 control. It responds to ON/OFF signals from the ECM. When the solenoid is OFF, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and sends the vacuum signal to the power valve actuator 2.

DTC Logic

INFOID:0000000006392083

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1801	VIAS control solenoid valve 2 circuit	An excessively low or high voltage signal is sent to ECM through the VIAS control solenoid valve 2.	• Harness or connectors (The solenoid valve 2 circuit is open or shorted.) • VIAS control solenoid valve 2

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-567, "Diagnosis Procedure".
NO >> INSPECTION END

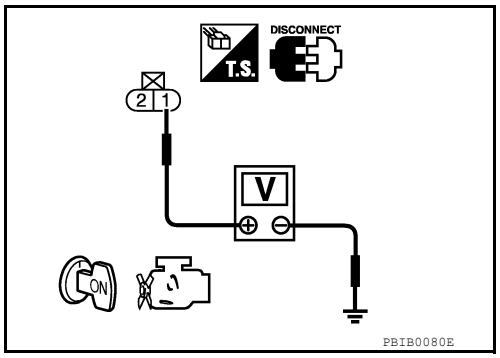
Diagnosis Procedure

INFOID:0000000006392084

1.CHECK VIAS CONTROL SOLENOID VALVE 2 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect VIAS control solenoid valve 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between VIAS control solenoid valve 2 harness connector and ground.

VIAS control solenoid valve 2		Ground	Voltage (V)
Connector	Terminal		
F65	2	Ground	Battery voltage



Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

2.DETECT MALFUNCTIONING PART

Check harness for open or short between VIAS control solenoid valve 2 and IPDM E/R

>> Repair open circuit, short to ground or short to power in harness or connectors.

3.CHECK VIAS CONTROL SOLENOID VALVE 2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between VIAS control solenoid valve 2 harness connector and ECM harness connector.

VIAS control solenoid valve 2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F65	1	F14	26	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK VIAS CONTROL SOLENOID VALVE 2

Refer to EC-568, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace VIAS control solenoid valve 2. Refer to EC-340, "Component Parts Location".

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

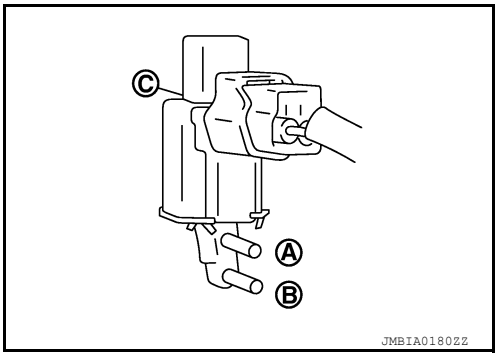
INFOID:0000000006392085

1.CHECK VIAS CONTROL SOLENOID VALVE 2

With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect VIAS purge hoses connected to VIAS control solenoid valve 2.
4. Turn ignition switch ON.
5. Select “VIAS S/V 2” in “ACTIVE TEST” mode with CONSULT-III.
6. Check air passage continuity and operation delay time under the following conditions.

Condition (VIAS S/V 2)	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
ON	Existed	Not existed
OFF	Not existed	Existed



Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect VIAS control solenoid valve 2 harness connector.
3. Disconnect VIAS purge hoses connected to VIAS volume control solenoid valve 2.
4. Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12 V direct current supply between terminals 1 and 2	Existed	Not existed
No supply	Not existed	Existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace VIAS control solenoid valve 2. Refer to EC-340, "Component Parts Location".

P1805 BRAKE SWITCH

Description

INFOID:0000000006392086

Brake switch signal is applied to the ECM via the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driven.

DTC Logic

INFOID:0000000006392087

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-570, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006896842

1.CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

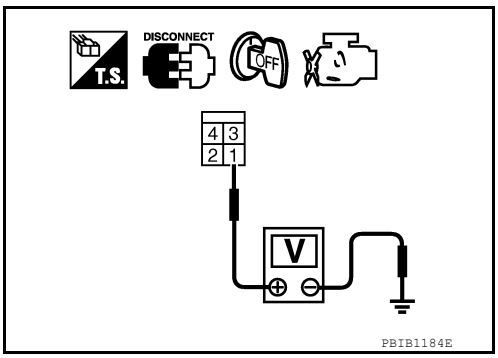
Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch harness connector.
2. Check the voltage between stop lamp switch harness connector and ground.



Stop lamp switch		Ground	Voltage
Connector	Terminal		
E38	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

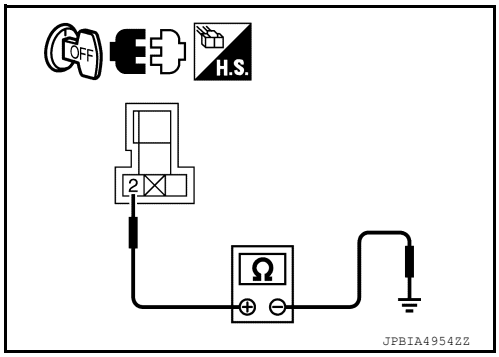
Check the following.

- Fuse block (J/B) connector E6
- 10 A fuse (No. 7)
- Harness for open or short between battery and stop lamp switch

>> Repair open circuit, short to ground or short to power in harness or connectors.

4. CHECK STOP LAMP RELAY-1 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp relay-1 harness connector.
3. Check the continuity between stop lamp relay-1 harness connector and ground.



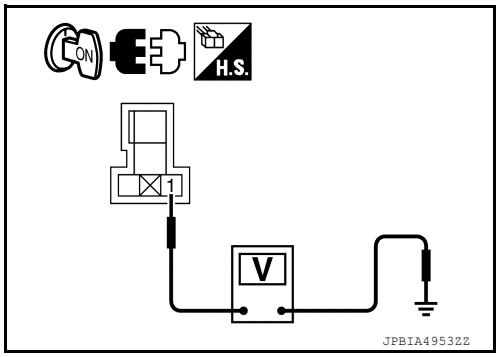
Stop lamp relay-1		Ground	Continuity
Connector	Terminal		
E57	2	Ground	Existed

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 STOP LAMP SWITCH INPUT SIGNAL CIRCUIT

1. Connect stop lamp switch harness connector.
2. Turn ignition switch ON.
3. Check the voltage between stop lamp relay-1 harness connector and ground.



Stop lamp relay-1		Ground	Condition		Voltage (V)
Connector	Terminal				
E57	1	Ground	Brake pedal	Slightly depressed	Battery voltage
				Fully released	Approx. 0

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. DETECT MALFUNCTIONING PART

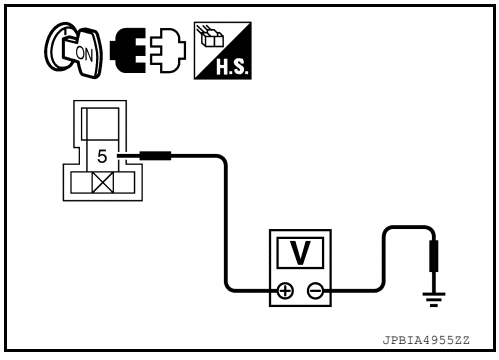
Check the following.
- Joint connector-E14 E56
- Harness for open or short between stop lamp switch and stop lamp relay-1

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.

7. CHECK STOP LAMP RELAY-1 POWER SUPPLY CIRCUIT

Check the voltage between stop lamp relay-1 harness connector and ground.



Stop lamp relay-1		Ground	Voltage (V)
Connector	Terminal		
E57	5	Ground	Battery voltage

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 STOP LAMP RELAY-1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect stop lamp relay-1 harness connector.
3. Check the continuity between stop lamp relay-1 harness connector and ECM harness connector.

ECM		Stop lamp relay-1		Continuity
Connector	Terminal	Connector	Terminal	
E10	106	E57	3	Existed

4. 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.

9.CHECK STOP LAMP SWITCH

Refer to EC-572, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace stop lamp switch.

10.CHECK STOP LAMP RELAY-1

Refer to EC-573, "Component Inspection (Stop Lamp Relay-1)".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace stop lamp relay-1.

11.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

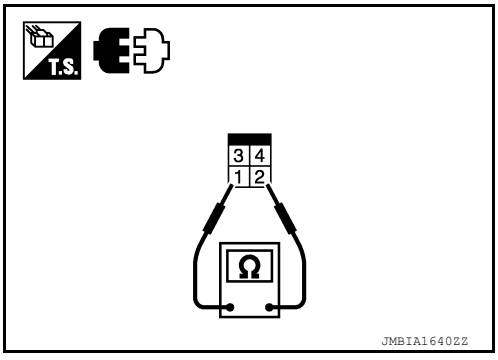
Component Inspection (Stop Lamp Switch)

INFOID:0000000006903520

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check harness 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?

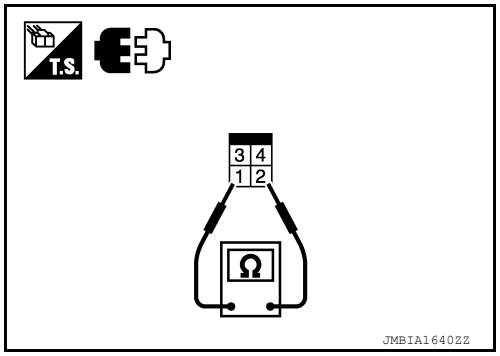
YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-13, "Inspection and Adjustment".

2. Check harness 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. Refer to BR-17, "Exploded View".

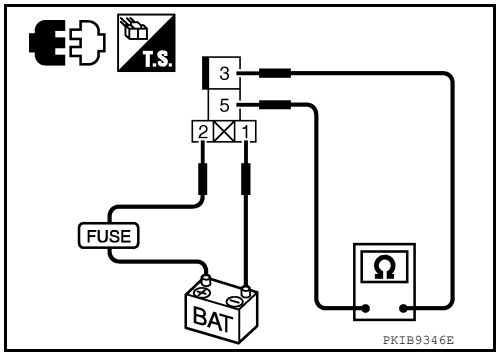
Component Inspection (Stop Lamp Relay-1)

INFOID:0000000006896820

1. STOP LAMP RELAY-1

1. Turn ignition switch OFF.
2. Remove stop lamp relay-1.
3. Check continuity between stop lamp relay-1 terminals under the following conditions.

Stop lamp relay-1 Terminal		Conditions	Continuity
3	5	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp relay-1.

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

Description

INFOID:0000000006392090

Power supply for the throttle control motor is provided to the ECM via the throttle control motor relay. The throttle control motor relay is controlled ON/OFF by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

DTC Logic

INFOID:0000000006392091

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2100	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	• Harness or connectors (Throttle control motor relay circuit is open) • Throttle control motor relay
P2103	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	• Harness or connectors (Throttle control motor relay circuit is shorted) • Throttle control motor relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V.

Witch DTC is detected?

P2100 >> GO TO 2.
P2103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-574, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-574, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006392092

1.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector F10.
4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F10	70	F14	15	Existed

5. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector F10.
3. Check the continuity between IPDM E/R harness connector and ECM harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F10	54	F14	2	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, short to ground or short to power in harness or connectors.

3.CHECK FUSE

1. Disconnect 15 A fuse (No. 43) from IPDM E/R.
2. Check 15 A fuse for blown.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace 15A fuse.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-45, "Removal and Installation".
NO >> Repair or replace harness or connectors.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:0000000006392093

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor. The throttle position sensor provides feedback to the ECM, when opens/closes the throttle valve in response to driving conditions via the throttle control motor.

DTC Logic

INFOID:0000000006392094

DTC DETECTION LOGIC

NOTE:
If DTC P2101 is displayed with DTC P2100 or 2119, first perform the trouble diagnosis for DTC P2100 or P2119. Refer to EC-574, "DTC Logic" or EC-583, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2101	Electric throttle control performance	Electric throttle control function does not operate properly.	• Harness or connectors (Throttle control motor circuit is open or shorted) • Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11 V when engine is running.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-576, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006392095

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

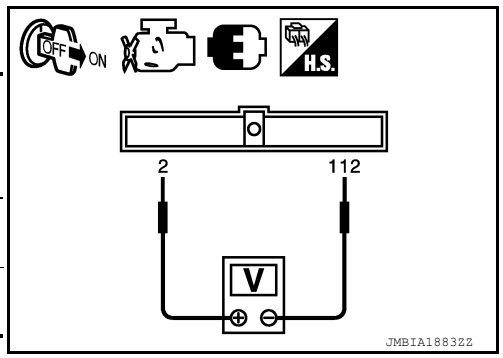
Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

Check the voltage between ECM harness connectors.

ECM				Condition	Voltage (V)
+		–			
Connector	Terminal	Connector	Terminal		
F14	2	E10	112	Ignition switch OFF	Approx. 0
				Ignition switch ON	Battery voltage



Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 3.

3. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector F10.
4. Check the continuity between IPDM E/R harness connector and ECM harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F10	70	F14	15	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, short to ground or short to power in harness or connectors.

4. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector F10.
3. Check the continuity between IPDM E/R harness connector and ECM harness connector.

IPDM E/R		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F10	54	F14	2	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5. CHECK FUSE

1. Disconnect 15 A fuse (No. 43) from IPDM E/R.
2. Check 15 A fuse for blown.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace 15 A fuse.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-45, "Removal and Installation".
NO >> Repair or replace harness or connectors.

7. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F51	5	F14	5	Not existed
			6	Existed
	6		5	Existed
			6	Not existed

5. Also check harness for short to ground and short to power.

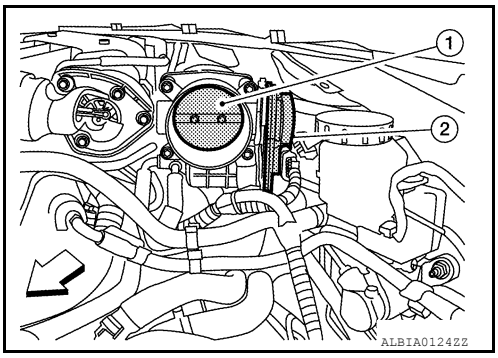
Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace.

8.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct. Refer to EM-131, "Removal and Installation".
2. Check if foreign matter is caught between the throttle valve (1) and the housing.

- Electric throttle control actuator (2)
- ⇦: Vehicle front



Is the inspection result normal?

YES >> GO TO 9.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside. Refer to EM-132, "Removal and Installation".

9.CHECK THROTTLE CONTROL MOTOR

Refer to EC-578, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 11.

10.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace harness or connectors.

11.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator. Refer to EM-132, "Removal and Installation".
2. Refer to EC-579, "Special Repair Requirement".

>> INSPECTION END

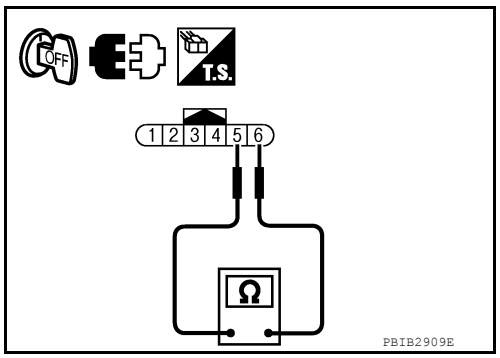
Component Inspection

INFOID:0000000006392096

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 per the following.



Terminals	Resistance
5 and 6	Approx. 1 - 15 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator. Refer to EM-132, "Removal and Installation".
2. Go to EC-579, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006392097

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-336, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-336, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

P2118 THROTTLE CONTROL MOTOR

Description

INFOID:0000000006392098

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor. The throttle position sensor it provides feedback to the ECM, when opens/closes the throttle valve in response to driving conditions via the throttle control motor.

DTC Logic

INFOID:0000000006392099

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2118	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	• Harness or connectors (Throttle control motor circuit is shorted.) • Electric throttle control actuator (Throttle control motor)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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-580, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006392100

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connections.

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	
F51	5	F14	5	Not existed
			6	Existed
	6		5	Existed
			6	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-581, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 5.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "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. Refer to EM-132, "Removal and Installation".
2. Go to EC-581, "Special Repair Requirement".

>> INSPECTION END

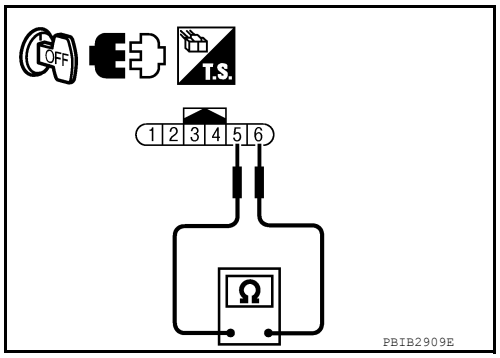
Component Inspection

INFOID:0000000006392101

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 per the following.

Terminals	Resistance
5 and 6	Approx. 1 - 15 Ω [at 25°C (77°F)]



Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator. Refer to EM-132, "Removal and Installation".
2. Go to EC-579, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006392102

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-336, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-336, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

Description

INFOID:0000000006392103

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and sends the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and opens/closes the throttle valve in response to driving conditions via the throttle control motor.

DTC Logic

INFOID:0000000006392104

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P2119	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	• Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND B

1. Turn ignition switch ON and wait at least 1 second.
2. Shift selector lever position to D position and wait at least 3 seconds.
3. Shift selector lever position to P position.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Shift selector lever position to D position and wait at least 3 seconds.
7. Shift selector lever position to P 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-583, "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. Shift selector lever position to D position and wait at least 3 seconds.
3. Shift selector lever position to N, P or neutral position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.

Is DTC detected?

YES >> Go to EC-583, "Diagnosis Procedure".
NO >> INSPECTION END

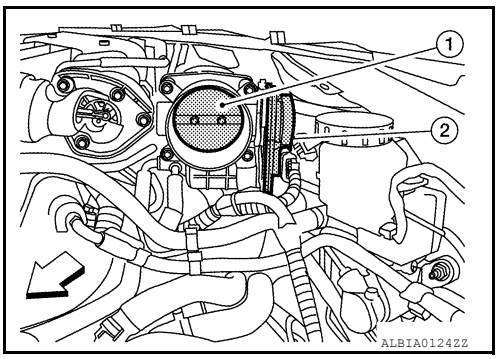
Diagnosis Procedure

INFOID:0000000006392105

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct. Refer to EM-131, "Removal and Installation".
3. Check if foreign matter is caught between the throttle valve (1) and the housing.

- Electric throttle control actuator (2)
- ⇦: Vehicle front



Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside. Refer to EM-132, "Removal and Installation".

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator. Refer to EM-132, "Removal and Installation".
2. Go to EC-533, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006392106

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-336, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-336, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

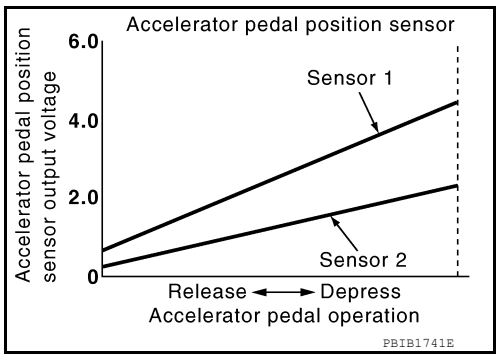
>> END

P2122, P2123 APP SENSOR

Description

INFOID:0000000006392107

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



DTC Logic

INFOID:0000000006392108

DTC DETECTION LOGIC

NOTE:
If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-521, "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 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-585, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006392109

1.CHECK GROUND CONNECTION

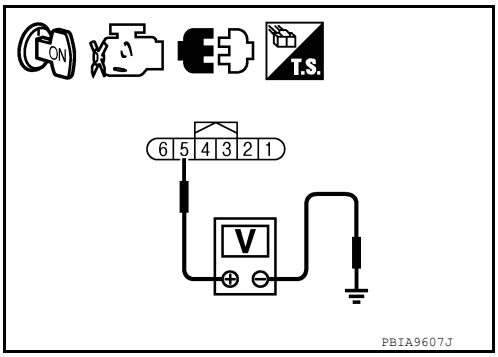
1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK 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 (V)
Connector	Terminal		
E40	5	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

3.CHECK 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	
E40	4	E10	84	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK 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	
E40	3	E10	81	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK APP SENSOR

Refer to EC-587, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly. Refer to ACC-4, "Exploded View".
2. Refer to EC-587, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

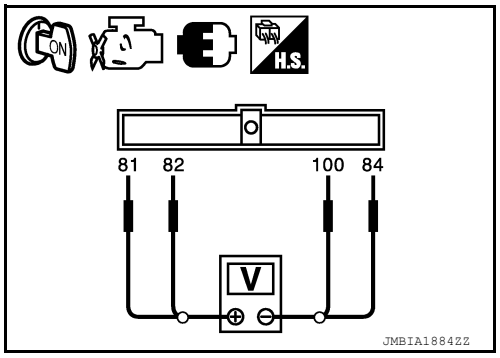
>> INSPECTION END

Component Inspection

INFOID:0000000006392110

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 under the following conditions.



ECM			Condition		Voltage (V)
Connector	+	–			
	Terminal	Terminal			
E10	81 (APP sensor 1 signal)	84 (Sensor ground)	Accelerator pedal	Fully released	0.65 - 0.87
				Fully de-pressed	More than 4.3
	82 (APP sensor 2 signal)	100 (Sensor ground)		Fully released	0.28 - 0.48
				Fully de-pressed	More than 2.0

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly. Refer to ACC-4, "Exploded View".
2. Go to EC-587, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006392111

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-335, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-336, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-336, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

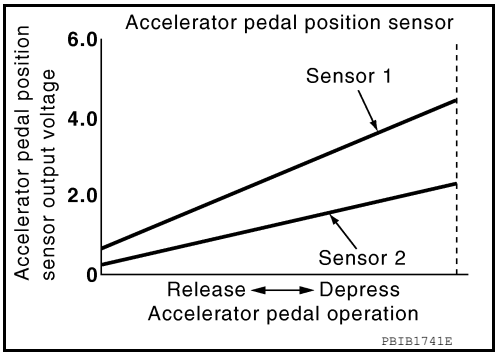
>> END

P2127, P2128 APP SENSOR

Description

INFOID:0000000006392112

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



DTC Logic

INFOID:0000000006392113

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.) [CKP 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 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-588, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006392114

1.CHECK GROUND CONNECTION

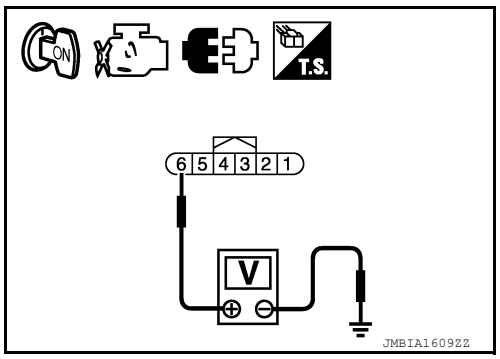
1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK 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 (V)
Connector	Terminal		
E40	6	Ground	Approx. 5

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	
E40	6	E10	87	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit.

4. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F13	72	Refrigerant pressure sensor	E219	1
	76	CKP sensor (POS)	F30	1
E10	87	APP sensor	E40	6

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair short to ground or short to power in harness or connectors.

5. CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-503, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-636, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace malfunctioning components.

6. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E40	2	E10	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, short to ground or short to power in harness or connectors.

7.CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E40	1	E10	82	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, short to ground or short to power in harness or connectors.

8.CHECK APP SENSOR

Refer to EC-590, "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. Refer to ACC-4, "Exploded View".
2. Refer to EC-591, "Special Repair Requirement".

>> INSPECTION END

10.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

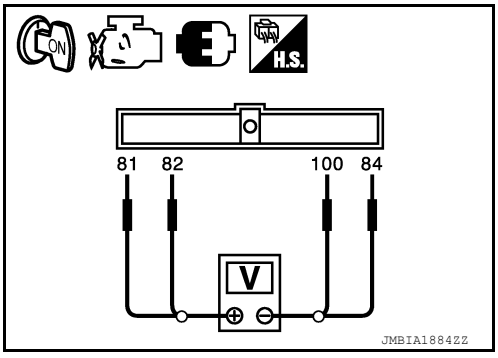
>> INSPECTION END

Component Inspection

INFOID:0000000006392115

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 under the following conditions.



ECM			Condition		Voltage (V)
Connector	+	–			
	Terminal	Terminal			
E10	81 (APP sensor 1 signal)	84 (Sensor ground)	Accelerator pedal	Fully released	0.65 - 0.87
				Fully de-pressed	More than 4.3
	82 (APP sensor 2 signal)	100 (Sensor ground)		Fully released	0.28 - 0.48
				Fully de-pressed	More than 2.0

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly. Refer to ACC-4, "Exploded View".
2. Go to EC-587, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006392116

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-335, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-336, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-336, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

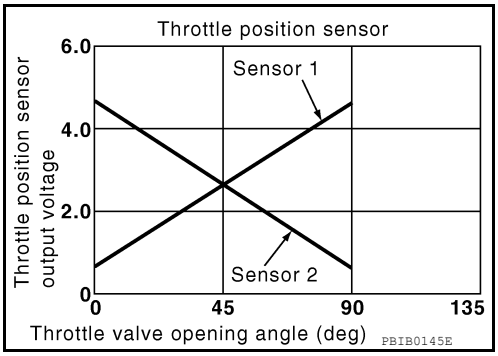
>> END

P2135 TP SENSOR

Description

INFOID:0000000006392117

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:0000000006392118

DTC DETECTION LOGIC

NOTE:
If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-521, "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 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-592, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006392119

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

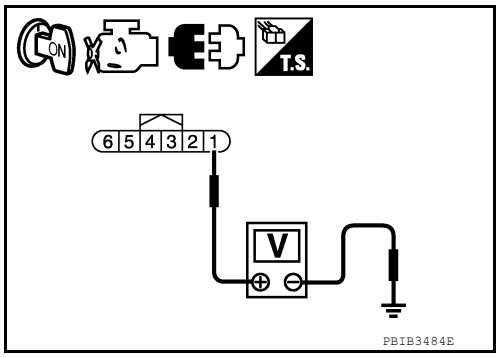
Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE POSITION SENSOR 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 (V)
Connector	Terminal		
F51	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

3. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
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	
F51	4	F13	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F51	2	F13	37	Existed
	3		38	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-594, "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. Refer to EM-132, "Removal and Installation".
2. Refer to EC-594, "Special Repair Requirement"

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

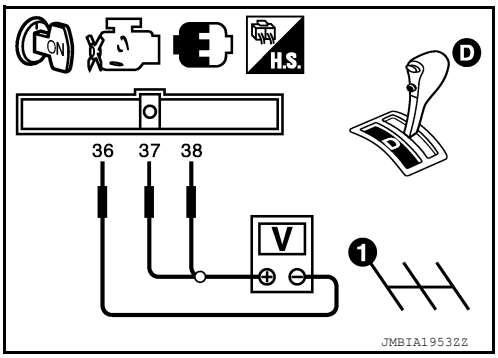
>> INSPECTION END

Component Inspection

INFOID:0000000006392120

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-470, "Special Repair Requirement".
4. Turn ignition switch ON.
5. Set selector lever position to D position.
6. Check the voltage between ECM harness connector terminals under the following conditions.



ECM			Condition		Voltage
Connector	+	–			
	Terminal	Terminal			
F13	37 (TP sensor 1 signal)	36 (Sensor ground)	Accelerator pedal	Fully released	More than 0.36 V
				Fully depressed	Less than 4.75 V
	38 (TP sensor 2 signal)			Fully released	Less than 4.75 V
				Fully depressed	More than 0.36 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator. Refer to EM-132, "Removal and Installation".
2. Go to EC-470, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006392121

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-336, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-336, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

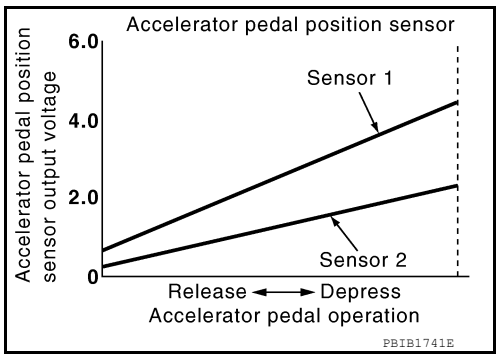
>> END

P2138 APP SENSOR

Description

INFOID:0000000006392122

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometer which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



DTC Logic

INFOID:0000000006392123

DTC DETECTION LOGIC

NOTE:
If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-521, "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.) [CKP 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 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-595, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000006392124

1.CHECK GROUND CONNECTION

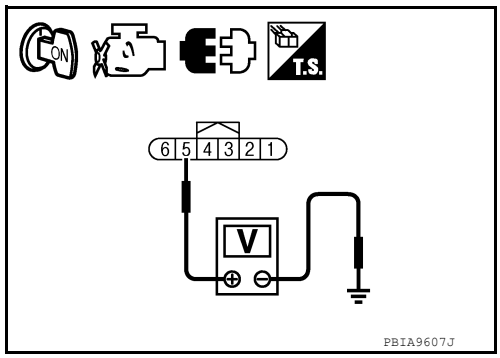
1. Turn ignition switch OFF.
2. Check ground connection E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK 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.



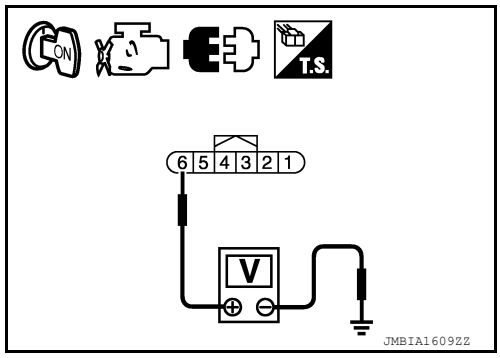
APP sensor		Ground	Voltage (V)
Connector	Terminal		
E40	5	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

3.CHECK 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 (V)
Connector	Terminal		
E40	6	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 4.

4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E40	6	E10	87	Existed

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit.

5.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F13	72	Refrigerant pressure sensor	E219	1
	76	CKP sensor (POS)	F30	1
E10	87	APP sensor	E40	6

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair short to ground or short to power in harness or connectors.

6.CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-503, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-636, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace malfunctioning components.

7.CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E40	4	E10	84	Existed
	2		100	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

8.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E40	3	E10	81	Existed
	1		82	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

9.CHECK APP SENSOR

Refer to EC-598, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 10.

10.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly. Refer to EM-132, "Removal and Installation".
2. Refer to EC-598, "Special Repair Requirement".

>> INSPECTION END

11.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

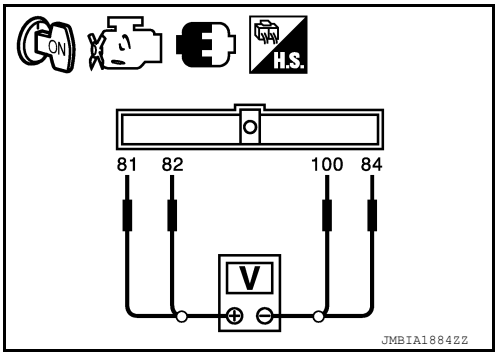
>> INSPECTION END

Component Inspection

INFOID:0000000006392125

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 under the following conditions.



ECM			Condition		Voltage (V)
Connector	+	–			
	Terminal	Terminal			
E10	81 (APP sensor 1 signal)	84 (Sensor ground)	Accelerator pedal	Fully released	0.65 - 0.87
				Fully de-pressed	More than 4.3
	82 (APP sensor 2 signal)	100 (Sensor ground)		Fully released	0.28 - 0.48
				Fully de-pressed	More than 2.0

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly. Refer to ACC-4, "Exploded View".
2. Go to EC-587, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000006392126

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-335, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-336, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-336, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

ASCD BRAKE SWITCH

Description

INFOID:0000000006392127

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-369, "System Diagram" for the ASCD function.

Component Function Check

INFOID:0000000006392128

1.CHECK ASCD BRAKE SWITCH FUNCTION

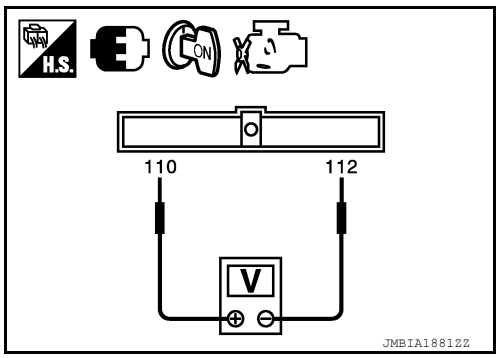
With CONSULT-III

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	Slightly depressed	OFF
		Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connectors.



ECM			Condition		Voltage
Connector	+ Terminal	– Terminal			
E10	110 (ASCD brake switch signal)	112	Brake pedal	Slightly depressed	Approx. 0 V
				Fully released	Battery voltage

Is the inspection result normal?

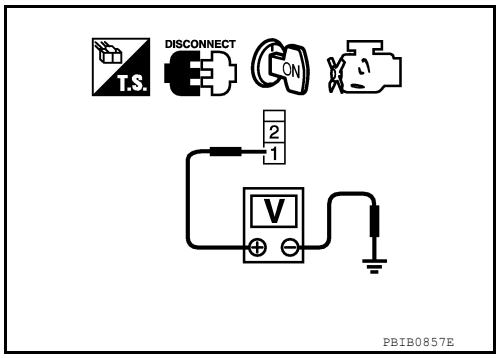
YES >> INSPECTION END
NO >> Go to EC-599, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006392129

1.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ASCD brake switch harness connector and ground.



ASCD brake switch		Ground	Voltage (V)
Connector	Terminal		
E37	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector E6

- 10 A fuse (No. 3)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit, short to ground or short to power in harness or connectors.

3.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	
E37	2	E10	110	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK ASCD BRAKE SWITCH

Refer to EC-600, "Component Inspection (ASCD Brake Switch)"

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace ASCD brake switch. Refer to BR-17, "Exploded View".

5.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

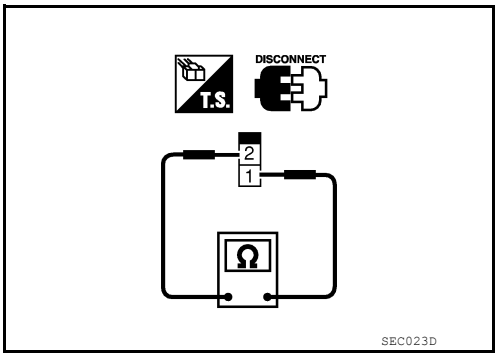
Component Inspection (ASCD Brake Switch)

INFOID:0000000006392130

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?

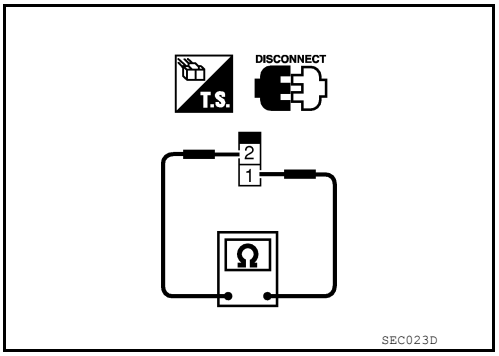
YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK ASCD BRAKE SWITCH-II

1. Adjust ASCD brake switch installation. Refer to BR-13, "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. Refer to BR-17, "Exploded View".

ASCD INDICATOR

Description

INFOID:0000000006392131

The ASCD operation status is indicated by two indicators, (CRUISE and SET on the information display) on the combination meter.
CRUISE indicator is displayed to indicate that ASCD system is ready for operation when MAIN switch on ASCD steering switch is turned ON.
SET indicator is displayed when the following conditions are met.
- CRUISE indicator is displayed.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET indicator is displayed during ASCD control.
Refer to EC-369, "System Description" for the ASCD function.

Component Function Check

INFOID:0000000006392132

1.CHECK ASCD INDICATOR FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE	• Ignition switch: ON	• MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET	• MAIN switch: ON • When vehicle speed is between 40 km/h (25 MPH) and 210 km/h (130 MPH)	• ASCD: Operating	ON
		• ASCD: Not operating	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-602, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006392133

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-441, "Diagnosis Procedure".

2.CHECK COMBINATION METER OPERATION

Refer to MWI-4, "Work Flow".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check combination meter circuit. Refer to EC-441, "Diagnosis Procedure".

3.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

COOLING FAN

Description

INFOID:0000000006392134

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 4-step control [HIGH/MIDDLE/LOW/OFF].

COOLING FAN MOTOR

The cooling fan operates at each speed when the current flows in the cooling fan motor as follows.

Cooling fan speed	Cooling fan motor terminals	
	(+)	(-)
Middle (MID)	1	3 and 4
	2	3 and 4
	1 and 2	3
	1 and 2	4
High (HI)	1 and 2	3 and 4

The cooling fan operates at low (LOW) speed when cooling fan motors-1 and -2 are circuited in series under middle speed condition.

Refer to EC-378, "System Diagram".

Component Function Check

INFOID:0000000006392135

1. CHECK COOLING FAN FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
3. Check that cooling fan speed varies according to the percent.

Without CONSULT-III

1. Perform IPDM E/R auto active test and check cooling fan motors operation, refer to PCS-11, "Diagnosis Description".
2. Check that cooling fan operates.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-603, "Diagnosis Procedure".

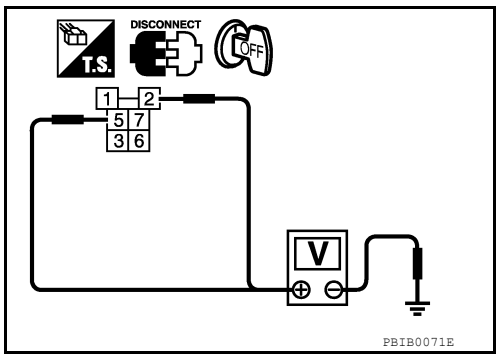
Diagnosis Procedure

INFOID:0000000006392136

1. CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relays-2, -3.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan relays-2, -3 harness connectors and ground.

Cooling fan relay		Ground	Voltage
Connector	Terminal		
E42 (cooling fan relay-2)	2	Ground	Battery voltage
	5		
E43 (cooling fan relay-3)	2		
	5		



Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- 10 A fuse (No. 33)
- 40 A fusible link (letter K)
- IPDM E/R harness connector E18
- Harness for open or short between cooling fan relay-2 and battery
- Harness for open or short between cooling fan relay-3 and battery
- Harness for open or short between cooling fan relay-2 and IPDM E/R
- Harness for open or short between cooling fan relay-3 and IPDM E/R

>> Repair open circuit, short to ground or short to power in harness or connectors.

3.CHECK COOLING FAN RELAY OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connectors.
3. Check the continuity between cooling fan relay-2, -3 harness connectors and IPDM E/R harness connector.

Cooling fan relay		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E42 (cooling fan relay-2)	1	E17	42	Existed
E43 (cooling fan relay-3)	1	E18	34	

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

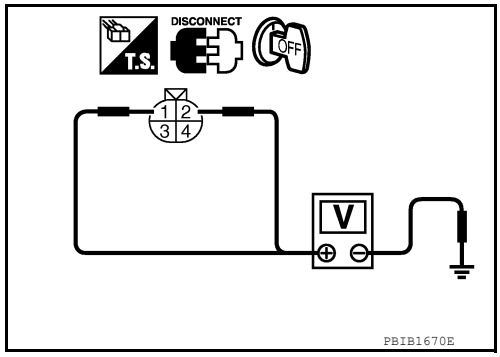
Check the following.
- Harness for open or short between cooling fan relay-2 and IPDM E/R
- Harness for open or short between cooling fan relay-3 and IPDM E/R

>> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK COOLING FAN MOTOR POWER SUPPLY CIRCUIT

1. Disconnect cooling fan motor-1 harness connector.
2. Check the voltage between cooling fan motor-1 harness connector and ground.

Cooling fan motor-1		Ground	Voltage
Connector	Terminal		
E220	1	Ground	Battery voltage
	2		



Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.
- 40 A fusible link (letter M)
- Harness connector E12, E203
- Harness for open or short between cooling fan motor-1 and battery

>> Repair open circuit, short to ground or short to power in harness or connectors.

7. CHECK COOLING FAN MOTOR CIRCUIT-I

1. Disconnect cooling fan motor-2 harness connector.
2. Check the continuity between cooling fan relay-2, -3 harness connectors and cooling fan motor-1, -2 harness connectors.

Cooling fan relay		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E42 (cooling fan relay-2)	3	E221 (Cooling fan motor-2)	2	Existed
	7	E220 (Cooling fan motor-1)	3	
E43 (cooling fan relay-3)	3	E221 (Cooling fan motor-2)	1	
	7	E220 (Cooling fan motor-1)	4	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E12, E203
- Harness for open or short between cooling fan motor-1 and cooling fan relay-2
- Harness for open or short between cooling fan motor-1 and cooling fan relay-3
- Harness for open or short between cooling fan motor-2 and cooling fan relay-2
- Harness for open or short between cooling fan motor-2 and cooling fan relay-3

>> Repair open circuit, short to ground or short to power in harness or connectors.

9. CHECK COOLING FAN MOTOR CIRCUIT-II

1. Check the continuity between IPDM E/R harness connector and cooling fan motor-1, -2 harness connector.

IPDM E/R		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E18	35	E220 (Cooling fan motor-1)	4	Existed
	38	E221 (Cooling fan motor-2)	1	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.
- Harness connector E70, E305
- Harness for open or short between cooling fan motor-1 and IPDM E/R
- Harness for open or short between cooling fan motor-2 and IPDM E/R

>> Repair open circuit, short to ground or short to power in harness or connectors.

11. CHECK COOLING FAN MOTOR CIRCUIT-III

1. Check the continuity between cooling fan relay-2, -3 harness connectors and ground.

Cooling fan motor		Ground	Continuity
Connector	Terminal		
E42 (cooling fan relay-2)	6	Ground	Existed
E43 (cooling fan relay-3)	6		

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

12. CHECK COOLING FAN MOTOR CIRCUIT-IV

1. Check the continuity between cooling fan motor-2 harness connector and ground.

Cooling fan motor-2		Ground	Continuity
Connector	Terminal		
E221	3	Ground	Existed
	4		

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

13. CHECK COOLING FAN RELAYS-2 AND -3

Refer to EC-607, "Component Inspection (Cooling Fan Relay)".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Replace malfunctioning cooling fan relay.

14. CHECK COOLING FAN MOTORS-1 AND -2

Refer to EC-606, "Component Inspection (Cooling Fan Motor)".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace malfunctioning cooling fan motor. Refer to CO-40, "Exploded View".

15. CHECK INTERMITTENT INCIDENT

Perform GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-45, "Removal and Installation".
NO >> Repair or replace harness connectors.

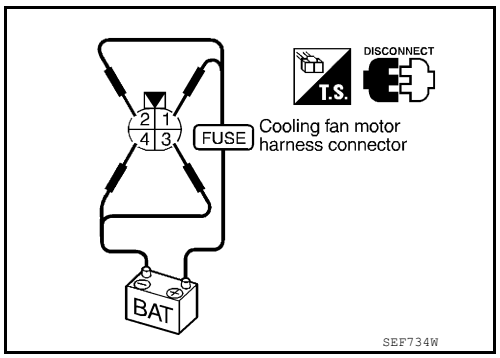
Component Inspection (Cooling Fan Motor)

INFOID:0000000006392137

1. 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.



	Condition	Terminals	
		+	–
Cooling fan motor	A	1	3 and 4
		2	3 and 4
		1 and 2	3
		1 and 2	4
	B	1, 2	3, 4

Check that cooling fan speed of condition B is higher than that of A.

Is the inspection result normal?

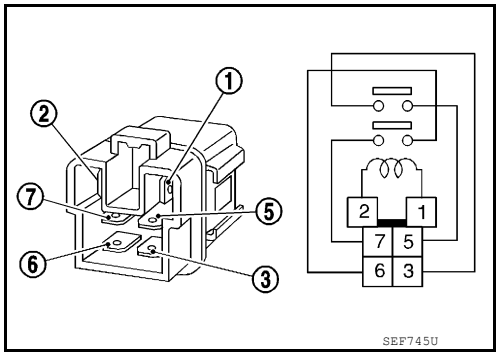
YES >> INSPECTION END
NO >> Replace cooling fan motor. Refer to CO-40, "Exploded View".

Component Inspection (Cooling Fan Relay)

INFOID:0000000006392138

1. CHECK COOLING FAN RELAY

1. Disconnect cooling fan relays -2, -3 harness connectors.
2. Check continuity between cooling fan relay -2, -3 terminals under the following conditions.



Terminals	Conditions	Continuity
3 and 5 6 and 7	12 V direct current supply between terminals 1 and 2	Existed
	No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan relay.

ELECTRICAL LOAD SIGNAL

Description

INFOID:0000000006392139

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred via the CAN communication.

Component Function Check

INFOID:0000000006392140

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-608, "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-608, "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-608, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006392141

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to EC-608, "Component Function Check".

Which circuit is related to the incident?

Rear window defogger>>GO TO 2.
Headlamp>>GO TO 3.
Heater fan>>GO TO 4.

2.CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to DEF-3, "Work Flow".

>> INSPECTION END

3. CHECK HEADLAMP SYSTEM

Refer to EXL-4, "Work Flow".

>> INSPECTION END

4. CHECK HEATER FAN CONTROL SYSTEM

Refer to HAC-4, "Work Flow" (Automatic air conditioner) or HAC-107, "Work Flow" (Manual air conditioner).

>> INSPECTION END

ELECTRONIC CONTROLLED ENGINE MOUNT

Description

INFOID:0000000006392142

The electronic controlled engine mount control solenoid valve controls the intake manifold vacuum signal for electronic controlled engine mount. The electronic controlled engine mount control solenoid valve is moved by ON/OFF signal from the ECM. When the solenoid is OFF, the vacuum signal from the intake manifold is cut. When the solenoid is ON, the intake manifold vacuum signal is sent to the electronic controlled engine mount.

Component Function Check

INFOID:0000000006392143

1.CHECK OVERALL FUNCTION

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “ENGINE MOUNTING” in “ACTIVE TEST” mode with CONSULT-III and touch “ON/OFF” on the CONSULT-III screen.
3. Check that the motor operating sound is heard from front electronic controlled engine mount and rear electronic controlled engine mount for about 0.5 seconds according to the switching condition of “ENGINE MOUNTING”.

Without CONSULT-III

1. Make sure that gear position is P or N.
2. Start engine and let it idle.
3. Change the engine speed from idle to more than 1,000 rpm and then return to idle (with vehicle stopped).
4. Check that the motor operating sound is heard from front electronic controlled engine mount for and rear electronic controlled engine mount about 0.5 seconds when changing engine speed.
   It is better to hear the operating sound around the left side front wheel house.

Is the inspection result normal?

YES >> INSPECTION END
NO >> EC-610, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006392144

1.CHECK VACUUM SOURCE

1. Turn ignition switch OFF.
2. Reconnect electronic controlled engine mount control solenoid valve harness connector.
3. Disconnect vacuum hose connected to electronic controlled engine mount.
4. Start engine and let it idle.
5. Check vacuum hose for vacuum existence.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.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-386, "System Description".

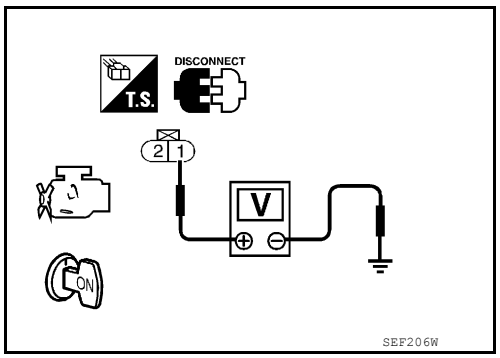
Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace vacuum hoses and vacuum gallery.

3.CHECK ELECTRONIC CONTROLLED ENGINE MOUNT CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Disconnect electronic controlled engine mount control solenoid valve harness connector.
2. Turn ignition switch ON.

3. Check the voltage between front electronic controlled engine mount harness connector and ground.



Electronic controlled engine mount control solenoid valve		Ground	Voltage
Connector	Terminal		
F64	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- 10 A fuse (No. 3)
- Fuse block (J/B) connector E6
- Harness connectors E3, F1
- Harness for open or short between electronic controlled engine mount control solenoid valve and fuse

>> Repair open circuit, short to ground or short to power in harness or connectors.

5. CHECK ELECTRONIC CONTROLLED ENGINE MOUNT CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and electronic controlled engine mount control solenoid valve harness connector.

ECM		Electronic controlled engine mount control solenoid valve		Continuity
Connector	Terminal	Connector	Terminal	
F14	28	F64	2	Existed

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, short to ground or short to power in harness connectors.

6. CHECK ELECTRONIC CONTROLLED ENGINE MOUNT CONTROL SOLENOID VALVE

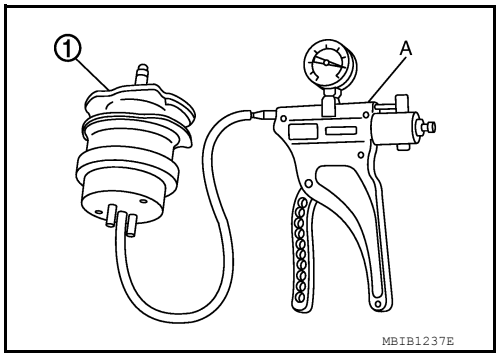
Refer to EC-612, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace electronic controlled engine mount control solenoid valve.

7. CHECK ELECTRONIC CONTROLLED ENGINE MOUNT

1. Turn ignition switch OFF.
2. Install vacuum pump (A) to electronic controlled engine mount (1).
3. Check that a vacuum is maintained when applying the vacuum of -40 kPa (-0.41 kg/cm^2, -5.8 psi) to electronic controlled engine mount.
4. Also visually check electronic controlled engine mount.



Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace electronic controlled engine mount.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake manifold collector. Refer to EM-132, "Removal and Installation".
NO >> Repair or replace malfunctioning part.

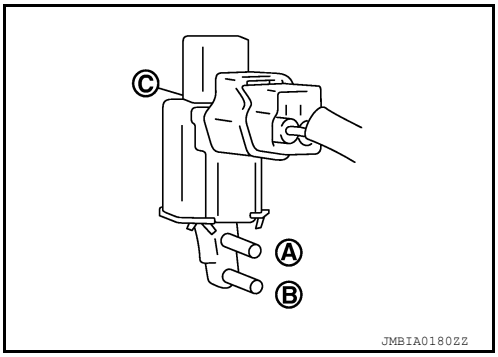
Component Inspection

INFOID:0000000006392145

1. CHECK ELECTRONIC CONTROLLED ENGINE MOUNT CONTROL SOLENOID VALVE

With CONSULT-III

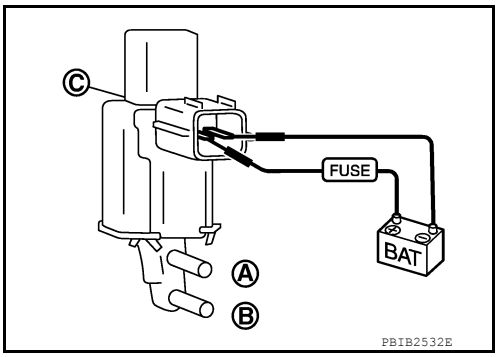
1. Turn ignition switch OFF.
2. Reconnect electronic controlled engine mount control solenoid valve harness connector.
3. Disconnect vacuum hoses connected to electronic controlled engine mount control solenoid valve.
4. Turn ignition switch ON.
5. Select “ENGINE MOUNTING” in “ACTIVE TEST” mode with CONSULT-III.
6. Check air passage continuity and operation delay time under the following conditions.



Condition (ENGINE MOUNTING)	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
TRVL	Existed	Not existed
IDLE	Not existed	Existed

Without CONSULT-III

1. Turn ignition switch OFF.
2. Disconnect electronic controlled engine mount control solenoid valve harness connector.
3. Disconnect vacuum hoses connected to electronic controlled engine mount control solenoid valve.
4. Check air passage continuity and operation delay time under the following conditions.



Condition	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12 V direct current supply between terminals 1 and 2	Existed	Not existed
No supply	Not existed	Existed

Is the inspection result normal?

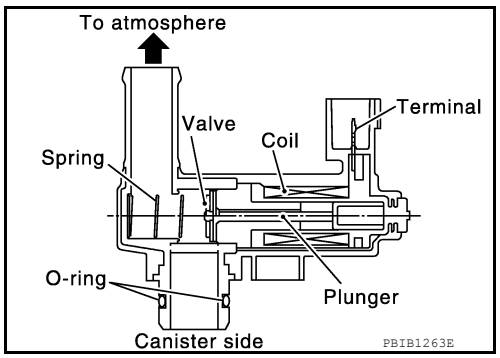
YES >> INSPECTION END
NO >> Replace electronic controlled engine mount control solenoid valve.

EVAP CANISTER VENT CONTROL VALVE

Description

INFOID:0000000006392146

The EVAP canister vent control valve is located on the EVAP canister.
This solenoid valve is not used for engine control, and always remains open.
If the vent is closed by any reason under EVAP purge conditions, the evaporative emission control system is depressurized and EVAP canister may be damaged.

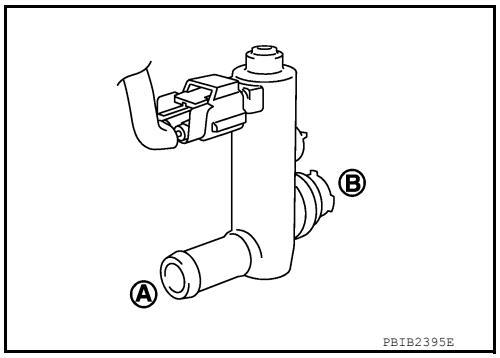


Component Function Check

INFOID:0000000006392147

1. CHECK EVAP CANISTER VENT CONTROL VALVE FUNCTION

1. Turn ignition switch OFF.
2. Remove EVAP canister vent control valve with its harness connector connected from EVAP canister.
3. Start engine.
4. Blow air into port A and check that it flows freely out of port B.



YES >> INSPECTION END
NO >> Go to EC-613, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006392148

1. CHECK VACUUM LINE

1. Turn ignition switch OFF.
2. Check vacuum line between EVAP canister purge volume control solenoid valve and intake manifold collector for crack, clogging, improper connection or disconnection. Refer to EC-394, "System Diagram".

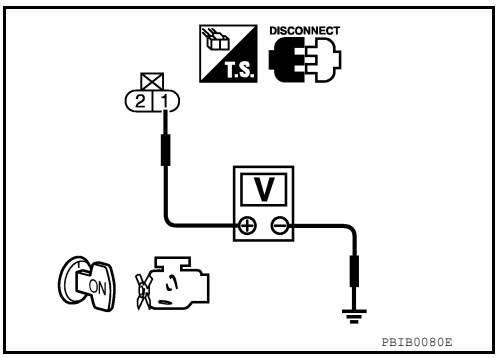
Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace.

2. CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Disconnect EVAP canister vent control valve harness connector.
2. Turn ignition switch ON.

3. Check voltage between EVAP canister vent control valve harness connector and ground.



EVAP canister vent control valve		Ground	Voltage
Connector	Terminal		
B39	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 E29, B10
- Harness connectors F2, E11
- Harness for open or short between EVAP canister vent control valve and IPDM E/R

>> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK EVAP CANISTER VENT CONTROL 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 vent control valve harness connector and ECM harness connector.

EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B39	2	E10	109	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 E29, B10
- Harness for open or short between EVAP canister vent control valve and ECM

>> Repair open circuit, short to ground or short to power in harness or connectors.

6.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-614, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace EVAP canister vent control valve.

7.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

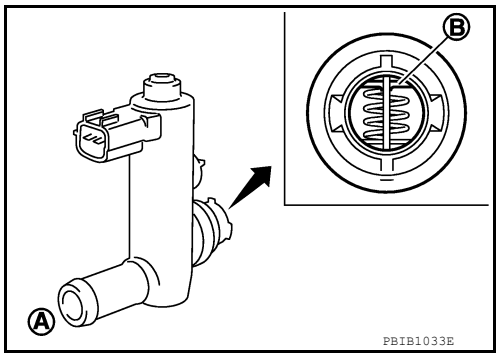
>> INSPECTION END

Component Inspection

INFOID:0000000006392149

1.CHECK EVAP CANISTER VENT CONTROL VALVE

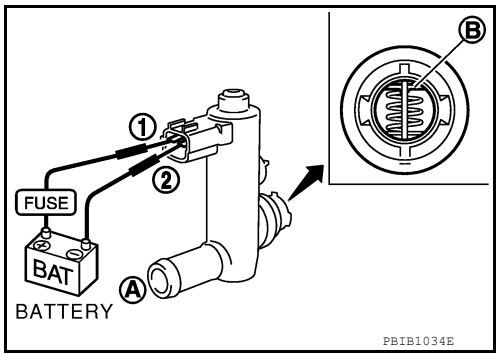
1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion B of EVAP canister vent control valve for being rusted.



3. Check air passage continuity and operation delay time under the following conditions.
   Make sure new O-ring is installed properly.

Condition	Air passage continuity between A and B
12 V direct current supply between terminals 1 and 2	No
OFF	Yes

   Operation takes less than 1 second.
   If NG, go to next step.
4. Clean the air passage (portion A to B) of EVAP canister vent control valve using an air blower.
5. Perform step 3 again.



Is the inspection result normal?

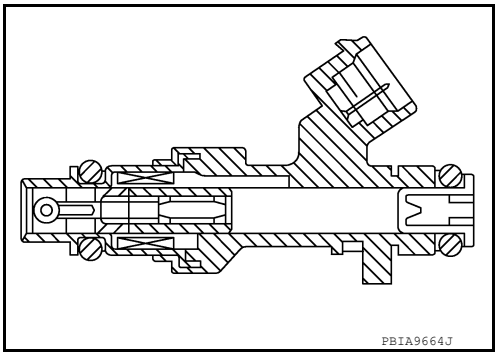
YES >> INSPECTION END
NO >> Replace EVAP canister vent control solenoid valve

FUEL INJECTOR

Description

INFOID:0000000006392150

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



Component Function Check

INFOID:0000000006392151

1.INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.
NO >> Go to EC-616, "Diagnosis Procedure".

2.CHECK FUEL INJECTOR FUNCTION

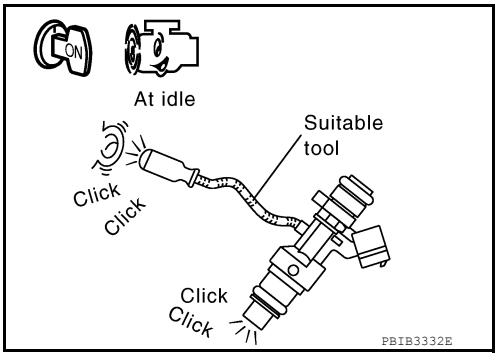
With CONSULT-III

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. Start engine.
2. Listen to each fuel injector operating sound.

Clicking sound should be heard.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-616, "Diagnosis Procedure".

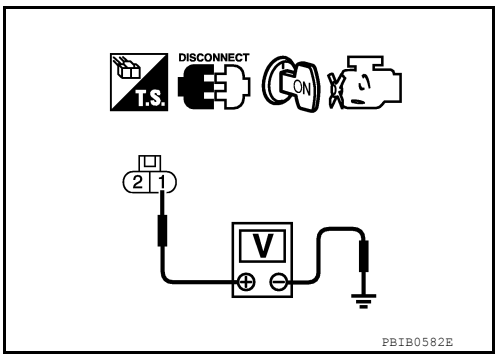
Diagnosis Procedure

INFOID:0000000006392152

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 (V)
Cylinder	Connector	Terminal		
1	F17	1	Ground	Battery voltage
2	F18	1		
3	F19	1		
4	F20	1		
5	F21	1		
6	F22	1		

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.
- 10 A fuse (No. 35)
- IPDM E/R harness connector F10
- Harness for open or short between fuel injector and fuse

>> Repair open circuit, short to ground or short to power in harness or connectors.

3. CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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	F14	32	Existed
2	F18	2		31	
3	F19	2		30	
4	F20	2		29	
5	F21	2		3	
6	F22	2		1	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4. CHECK FUEL INJECTOR

Refer to EC-618, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning fuel injector. Refer to EM-148, "Removal and Installation".

5. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

OK or NG

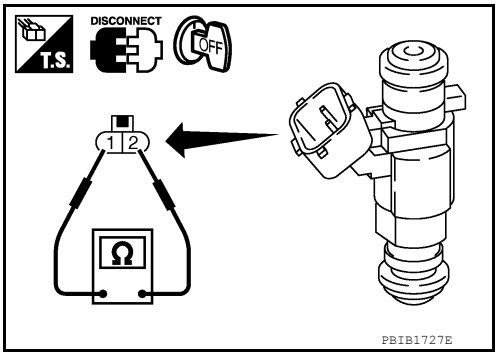
OK >> Replace IPDM E/R. Refer to PCS-45, "Removal and Installation".
NG >> INSPECTION END

Component Inspection

INFOID:0000000006392153

1. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as per the following.



Terminals	Resistance
1 and 2	11.1 - 14.5 Ω [at 10 - 60°C (50 - 140°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace malfunctioning fuel injector. Refer to EM-148, "Removal and Installation".

FUEL PUMP

Description

INFOID:0000000006392154

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 start ability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second.
Engine running and cranking	Operates.
When engine is stopped	Stops in 1.5 seconds.
Except as shown above	Stops.

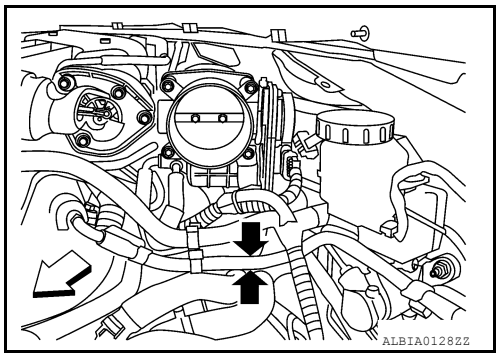
Component Function Check

INFOID:0000000006392155

1.CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.

- ⇦: Vehicle front (Illustration shows the view with intake air duct removed)



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-619, "Diagnosis Procedure".

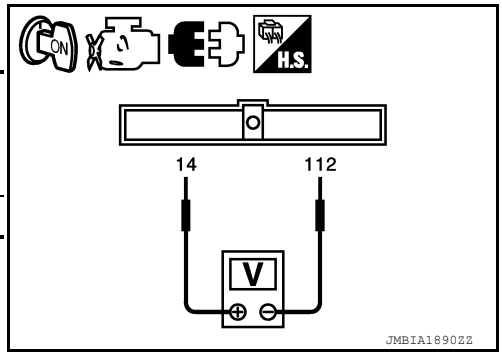
Diagnosis Procedure

INFOID:0000000006392156

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 connectors.

ECM				Voltage
+		–		
Connector	Terminal	Connector	Terminal	
F14	14	E10	112	Battery voltage

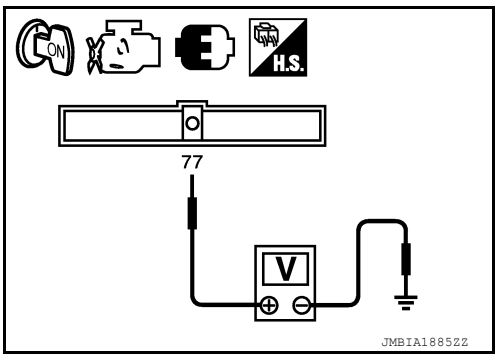


Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

Check the voltage between IPDM E/R harness connector and ground.



IPDM E/R		Ground	Voltage
Connector	Terminal		
F10	77	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 10.

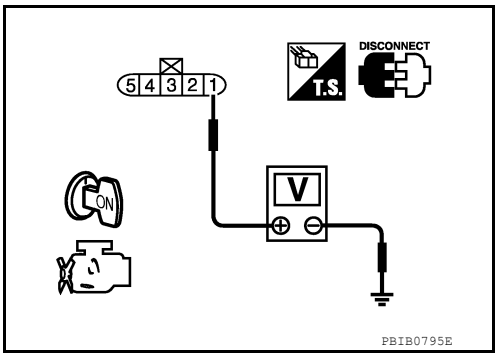
3.DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R harness connector F10
- Harness for open or short between IPDM E/R and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect “fuel level sensor unit and fuel pump” harness connector.
4. Turn ignition switch ON.
5. Check the voltage between “fuel level sensor unit and fuel pump” harness connector and ground.



Fuel level sensor unit and fuel pump		Ground	Voltage
Connector	Terminal		
B42	1	Ground	Battery voltage should exist 1 second after ignition switch is turn ON.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 5.

5.CHECK 15 A FUSE

1. Turn ignition switch OFF.
2. Disconnect 15 A fuse (No. 32).
3. Check 15 A 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 E18.
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	
E18	13	B42	1	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B10, E29
- IPDM E/R harness connector E18
- Harness for open or short between IPDM E/R and “fuel level sensor unit and fuel pump”

>> Repair open circuit or short to power in harness or connectors.

8. CHECK FUEL PUMP GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between “fuel level sensor unit and fuel pump” and ground.

Fuel level sensor unit and fuel pump		Ground	Continuity
Connector	Terminal		
B42	3	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B10, E29
- IPDM E/R harness connector E18
- Harness for open or short between IPDM E/R and “fuel level sensor unit and fuel pump”

>> Repair open circuit or short to power in harness or connectors.

10. CHECK FUEL PUMP

Refer to EC-621, "Component Inspection (Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace “fuel level sensor unit and fuel pump”. Refer to FL-7, "Removal and Installation".

11. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-45, "Removal and Installation".
NO >> Repair or replace harness or connectors.

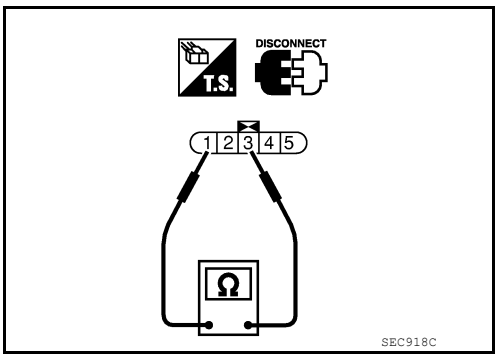
Component Inspection (Fuel Pump)

INFOID:0000000006392157

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 per the following.



Terminals	Resistance
1 and 3	0.2 - 5.0 Ω [at 25°C (77°F)]

Is the inspection result normal?

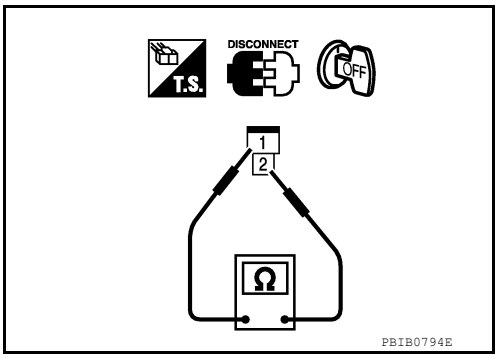
YES >> INSPECTION END
NO >> Replace “fuel level sensor unit and fuel pump”. Refer to FL-7, "Exploded View".

Component Inspection (Condenser-1)

INFOID:0000000006392158

1.CHECK CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser-1 harness connector.
3. Check resistance between condenser-1 terminals as per the following.



Terminals	Resistance
1 and 2	Above 1 MΩ [at 25°C (77°F)]

Is the inspection result normal?

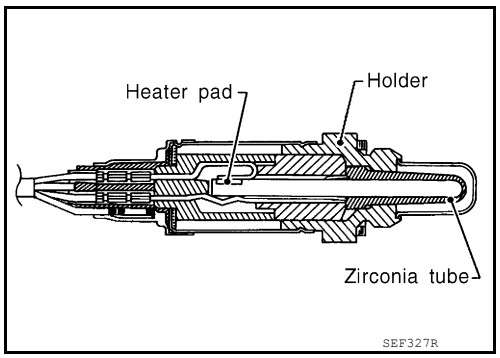
YES >> INSPECTION END
NO >> Replace condenser.

HO2S2

Description

INFOID:0000000006392159

The heated oxygen sensor 2, after three way catalyst 1, monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.

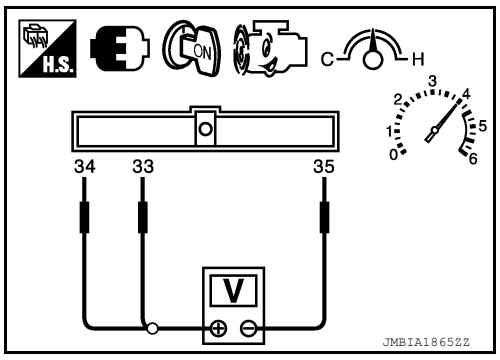


Component Function Check

INFOID:0000000006392160

1. CHECK HEATED OXYGEN SENSOR 2 FUNCTION-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 terminals under the following conditions.



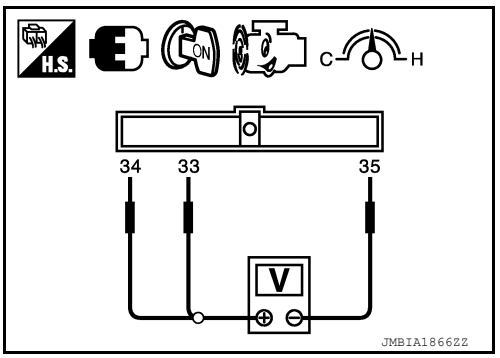
ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F13	33 [HO2S2 (bank 1) signal]	35 (Sensor Ground)	Revving up to 4,000 rpm under no load at least 10 times	The voltage does not remain in the range of 0.2 - 0.4 V.
	34 [HO2S2 (bank 2) signal]			

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. CHECK HEATED OXYGEN SENSOR 2 FUNCTION-II

Check the voltage between ECM harness connector and ground under the following condition.



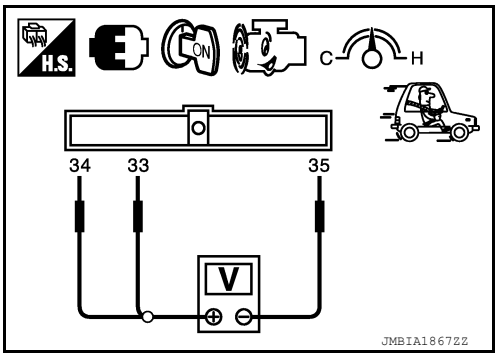
ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F13	33 [HO2S2 (bank 1) signal]	35 (Sensor Ground)	Keeping engine at idle for 10 minutes	The voltage does not remain in the range of 0.2 - 0.4 V.
	34 [HO2S2 (bank 2) signal]			

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3.CHECK HEATED OXYGEN SENSOR 2 FUNCTION-III

Check the voltage between ECM harness connector and ground under the following condition.



ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F13	33 [HO2S2 (bank 1) signal]	35 (Sensor Ground)	Coasting from 80 km/h (50 MPH) in D position	The voltage does not remain in the range of 0.2 - 0.4 V.
	34 [HO2S2 (bank 2) signal]			

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-624, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006392161

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection M95. Refer to Ground Inspection in GI-45, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

HO2S2			ECM		Continuity
Bank	Connector	Terminal	Connector	Terminal	
1	F62	1	F13	35	Existed
2	F56	1			

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, 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
Bank	Connector	Terminal	Connector	Terminal	
1	F62	4	F13	33	Existed
2	F56	4		34	

2. Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

HO2S2			Ground	Continuity
Bank	Connector	Terminal		
1	F62	4	Ground	Not existed
2	F56	4		

ECM		Ground	Continuity
Connector	Terminal		
F13	33	Ground	Not existed
	34		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

4.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-626, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to EM-138, "Removal and Installation".

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 [commercial service tool (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

6.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000006392162

1.INSPECTION START

Will CONSULT-III be used?

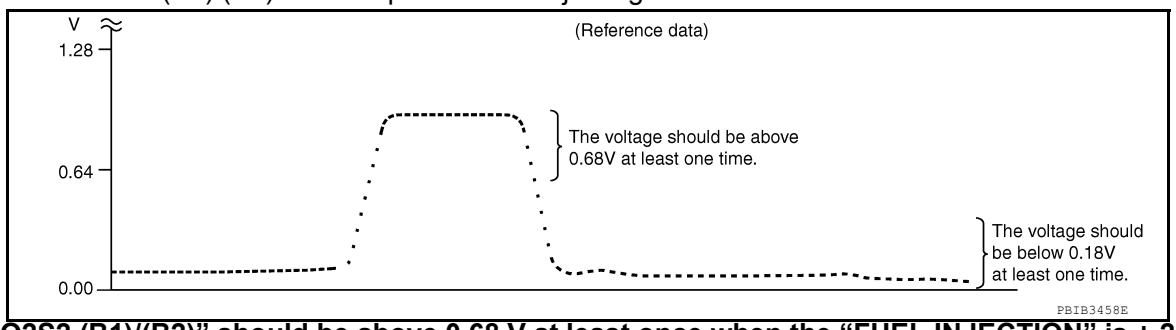
Will CONSULT-III be used?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

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)/(B2)” as the monitor item with CONSULT-III.
7. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ± 25%.



“HO2S2 (B1)/(B2)” should be above 0.68 V at least once when the “FUEL INJECTION” is + 25%.
“HO2S2 (B1)/(B2)” should be below 0.18 V at least once when the “FUEL INJECTION” is – 25%.

Is the inspection result normal?

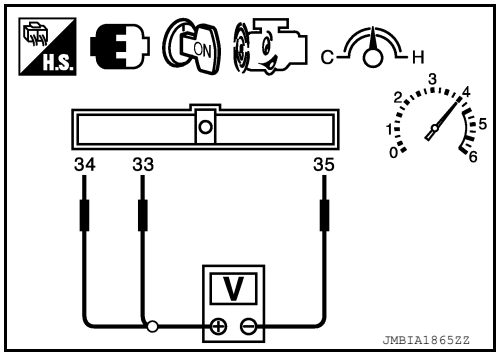
YES >> INSPECTION END
NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.

5. Check the voltage between ECM harness connector terminals under the following conditions.



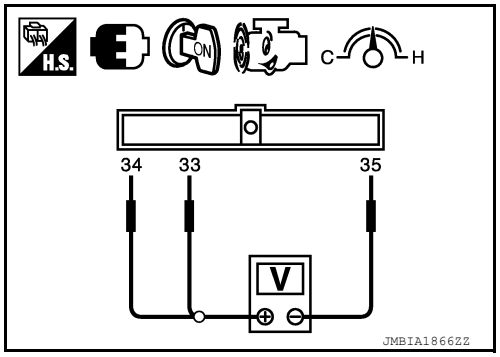
ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F13	33 [HO2S2 (bank 1) signal]	35 (Sensor ground)	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	34 [HO2S2 (bank 2) signal]			

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector terminals under the following conditions.



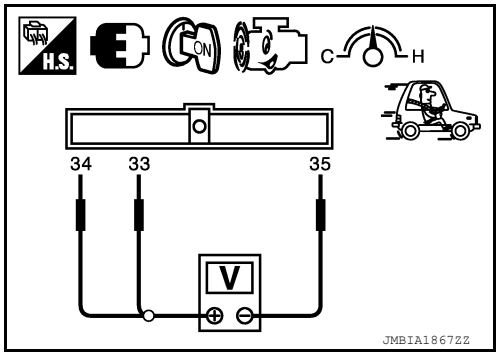
ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F13	33 [HO2S2 (bank 1) signal]	35 (Sensor ground)	Keeping engine at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	34 [HO2S2 (bank 2) signal]			

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector terminals under the following conditions.



ECM			Condition	Voltage
Connector	+	–		
	Terminal	Terminal		
F13	33 [HO2S2 (bank 1) signal]	35 (Sensor ground)	Coasting from 80 km/h (50 MPH) while selector lever is in the D position	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.
	34 [HO2S2 (bank 2) signal]			

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace malfunctioning heated oxygen sensor 2. Refer to EM-138, "Removal and Installation".

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved anti-seize lubricant (commercial service tool).**

>> INSPECTION END

IGNITION SIGNAL

Description

INFOID:0000000006392163

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:0000000006392164

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-629, "Diagnosis Procedure".

2.CHECK 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.

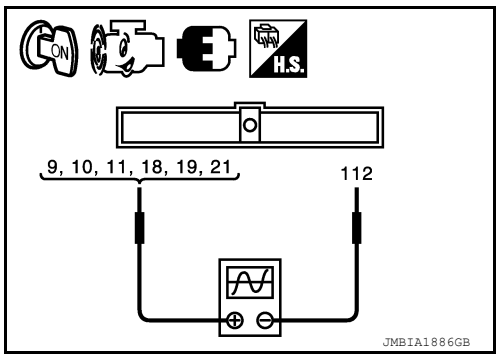
Is the inspection result normal?

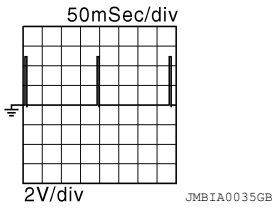
YES >> INSPECTION END
NO >> Go to EC-629, "Diagnosis Procedure".

3.CHECK IGNITION SIGNAL FUNCTION

Without CONSULT-III

1. Let engine idle.
2. Read the voltage signal between ECM harness connector terminals with an oscilloscope.



ECM				Voltage signal
+		–		
Connector	Terminal	Connector	Terminal	
F14	9	E10	112	
	10			
	11			
	18			
	19			
	21			

NOTE:

The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-629, "Diagnosis Procedure".

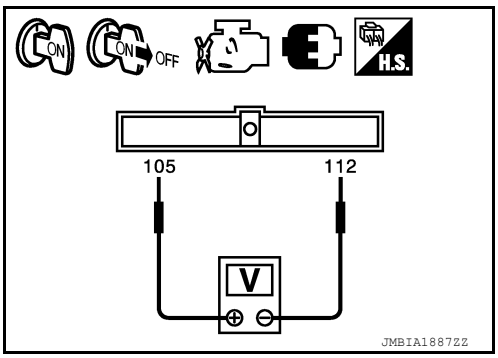
Diagnosis Procedure

INFOID:0000000006392165

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.



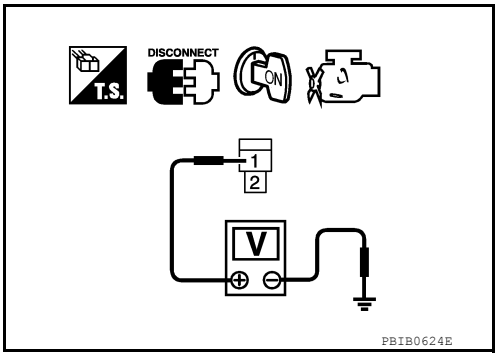
ECM			Voltage (V)
Connector	+	–	
	Terminal	Terminal	
E10	105	112	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Refer to EC-629, "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 (V)
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 F10.
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	
F10	49	F26	1	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Refer to EC-629, "Diagnosis Procedure".
NO >> Repair open circuit, 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 power in harness or connectors.

5.CHECK CONDENSER-2

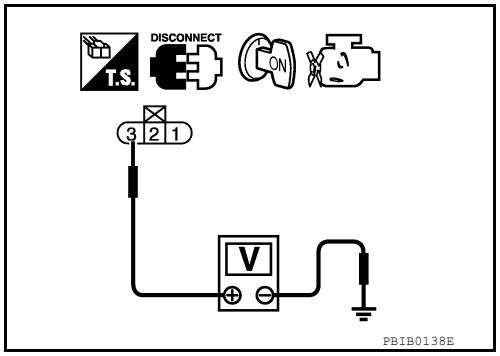
Refer to EC-633, "Component Inspection (Condenser-2)"

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace condenser-2.

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 (V)
Cylinder	Connector	Terminal		
1	F34	3	Ground	Battery voltage
2	F35	3		
3	F36	3		
4	F37	3		
5	F38	3		
6	F39	3		

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace 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		
5	F38	2		
6	F39	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 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 ignition coil harness connector and ECM harness connector.

Ignition coil			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F34	1	F14	11	Existed
2	F35	1		10	
3	F36	1		9	
4	F37	1		21	
5	F38	1		19	
6	F39	1		18	

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, short to ground or short to power in harness or connectors.

9.CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-632, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-146, "Exploded View".

10.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

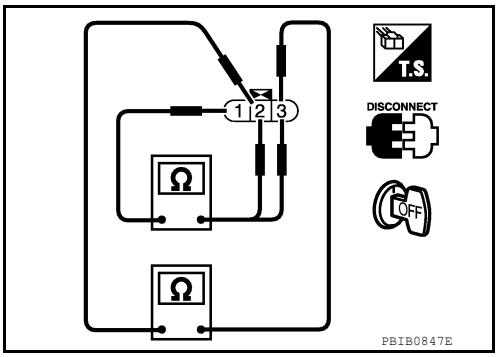
Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000006392166

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 per the following.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 and 2	Except 0 or ∞
1 and 3	Except 0
2 and 3	



Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-146, "Exploded View".

2.CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:

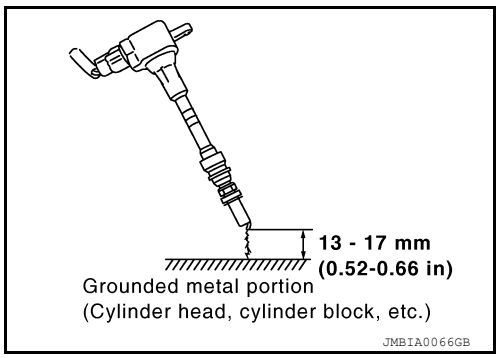
Perform the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Remove fuel pump fuse in IPDM E/R to release fuel pressure. Refer to PG-64, "Fuse, Connector and Terminal Arrangement"

   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. Refer to EM-146, "Exploded View".
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:

- **Never place the spark plug and the ignition coil within 50 cm (19.7 in) each other. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made.**

NOTE:

When the gap is less than 13 mm (0.52 in), a spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

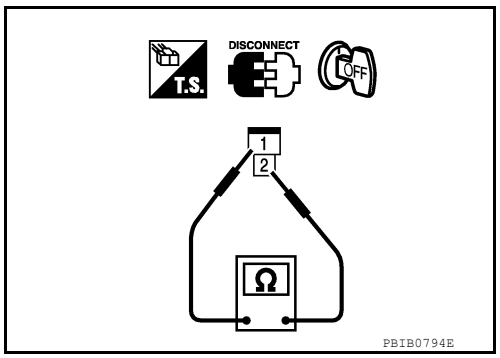
YES >> INSPECTION END
NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-146, "Exploded View".

Component Inspection (Condenser-2)

INFOID:0000000006392167

1. CHECK CONDENSER-2

1. Turn ignition switch OFF.
2. Disconnect condenser-2 harness connector.
3. Check resistance between condenser-2 terminals as per the following.



Terminals	Resistance
1 and 2	Above 1 MΩ [at 25C° (77C°)]

OK or NG

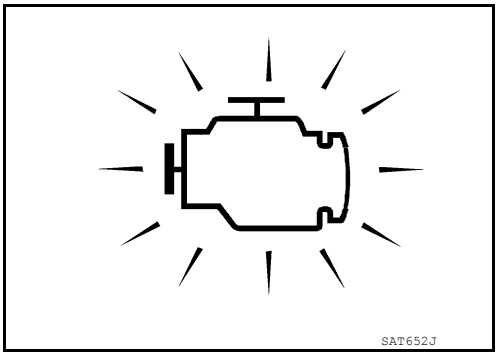
OK >> INSPECTION END
NG >> Replace condenser-2.

MALFUNCTION INDICATOR LAMP

Description

INFOID:0000000006392168

The Malfunction Indicator Lamp (MIL) is located on the combination meter.
The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
When the engine is started, the MIL should turn off. If the MIL remains illuminated, the on board diagnostic system has detected an engine system malfunction.
For details, refer to EC-420, "DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)".



Component Function Check

INFOID:0000000006392169

1.CHECK MIL FUNCTION

1. Turn ignition switch ON.
2. Make sure that MIL lights up.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-634, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006392170

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-441, "Description".

2.CHECK COMBINATION METER FUNCTION

Refer to MWI-4, "Work Flow".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

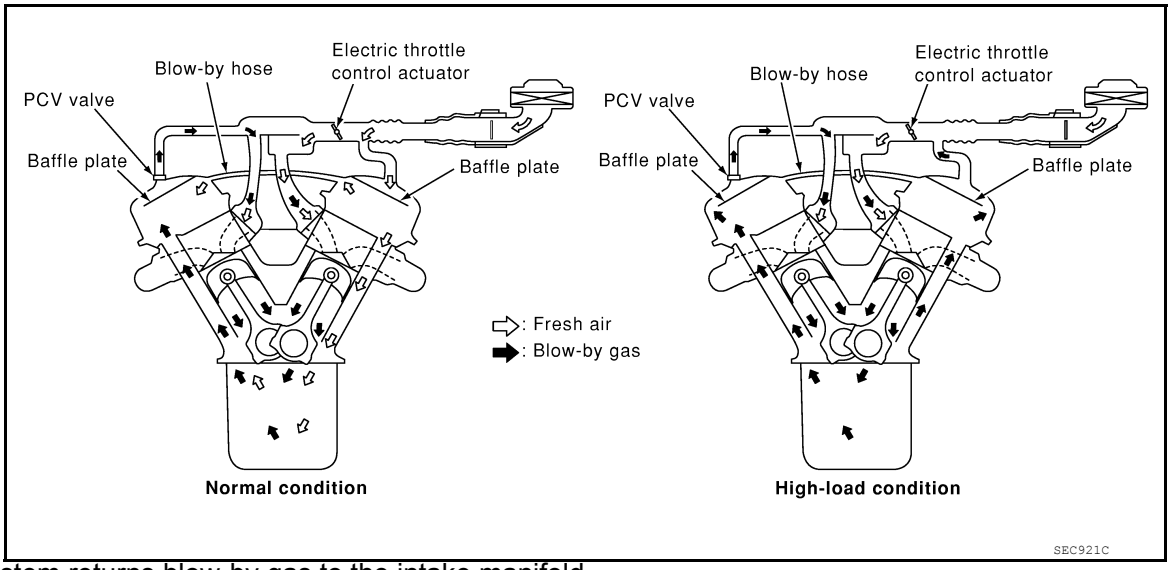
Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-139, "Removal and Installation".
NO >> Repair or replace.

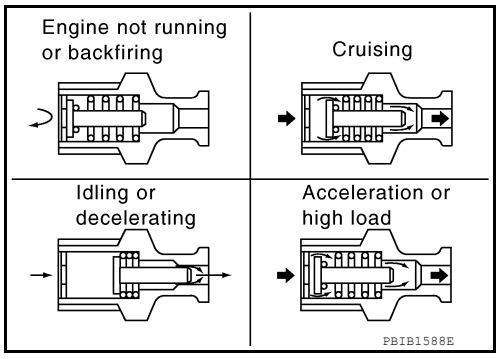
POSITIVE CRANKCASE VENTILATION

Description

INFOID:0000000006392171



This system returns blow-by gas to the intake manifold.
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.
The ventilating air is drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air in let 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

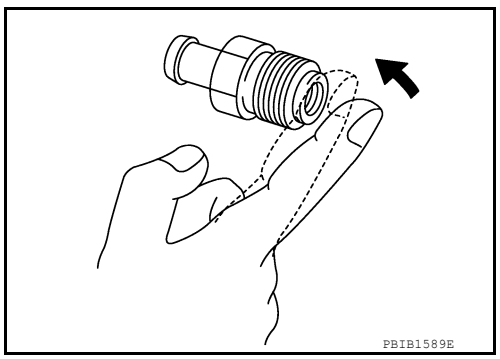
INFOID:0000000006392172

1. CHECK PCV VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace PCV valve. Refer to EM-26, "Removal and Installation".

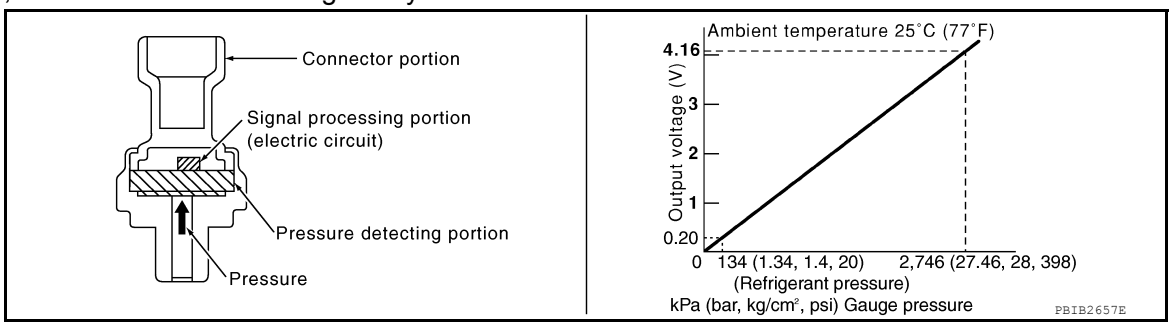


REFRIGERANT PRESSURE SENSOR

Description

INFOID:0000000006392173

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.

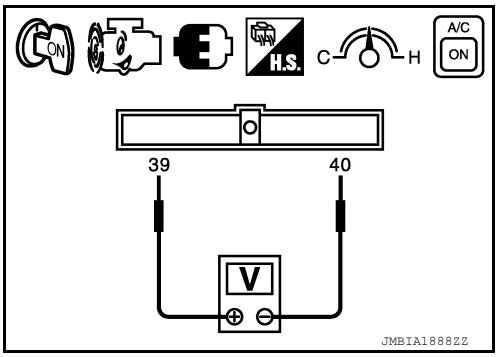


Component Function Check

INFOID:0000000006392174

1.CHECK REFRIGERANT PRESSURE SENSOR FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower fan switch ON.
3. Check the voltage between ECM harness connector terminals under the following conditions.



ECM			Voltage (V)
Connector	+	–	
	Terminal	Terminal	
F13	39 (Refrigerant pressure sensor signal)	40 (Sensor ground)	1.0 - 4.0

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-636, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006392175

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 E9. Refer to Ground Inspection in GI-45, "Circuit Inspection".

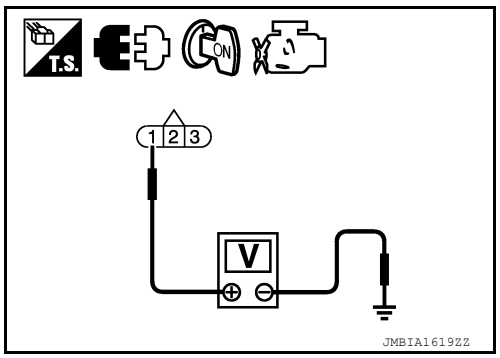
Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.

3. Check the voltage between refrigerant pressure sensor harness connector and ground.



Refrigerant pressure sensor		Ground	Voltage (V)
Connector	Terminal		
E219	1	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F1, E3
- IPDM E/R harness connectors E18, E201
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit, short to ground or short to power in harness or connectors.

4. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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	
E219	3	F13	40	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F1, E3
- IPDM E/R harness connectors E18, E201
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit, short to ground or short to power in harness or connectors.

6. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E219	2	F13	39	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F1, E3
- IPDM E/R harness connectors E18, E201
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit, short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor. Refer to HA-29, "Component".
NO >> Repair or replace.

VARIABLE INDUCTION AIR SYSTEM

Description

INFOID:0000000006392176

Power Valves 1 and 2

The power valves 1 and 2 are installed in intake manifold collector and used to control the suction passage of the variable induction air control system. They are set in the fully closed or fully opened position by the power valve actuators 1 and 2 operated by the vacuum stored in the vacuum tank. The vacuum to power valve actuators is controlled by the VIAS control solenoid valves 1 and 2.

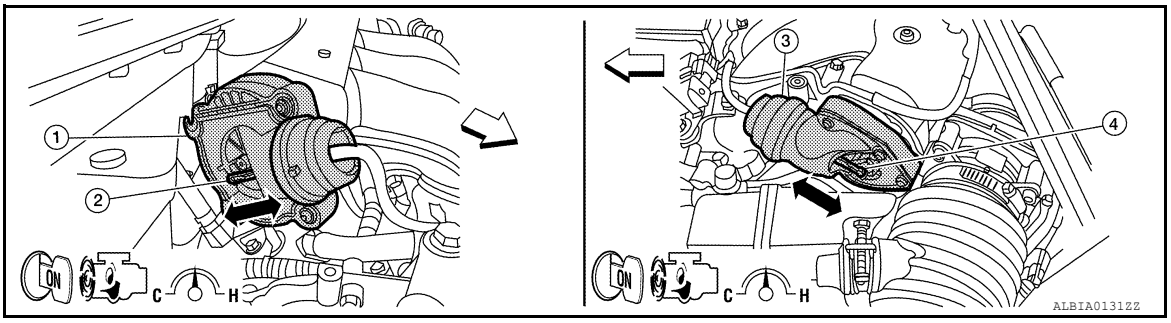
Component Function Check

INFOID:0000000006392177

1.CHECK OVERALL FUNCTION-I

With CONSULT-III

1. Start engine and let it idle.
2. Perform “VIAS S/V 1” in “ACTIVE TEST” mode with CONSULT-III.
3. Turn VIAS control solenoid valve 1 “ON” and “OFF”, and make sure that power valve actuator 1 rod moves.

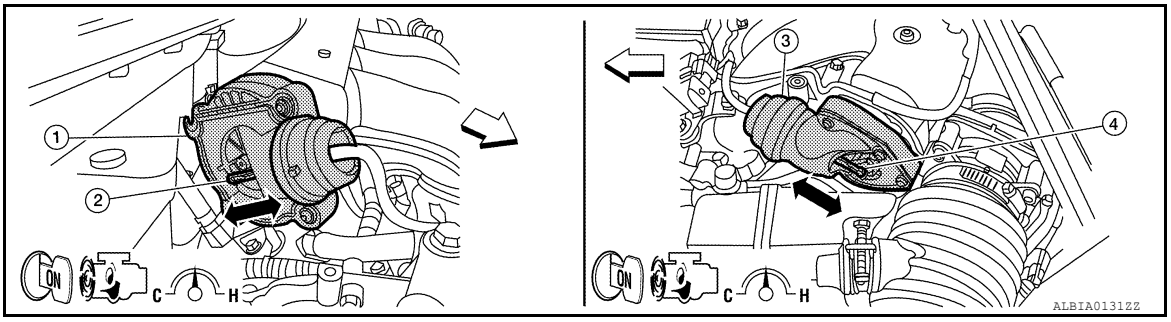


1. Power valve actuator 1
2. Power valve actuator 1 rod
3. Power valve actuator 2
4. Power valve actuator 2 rod

⇦ : Vehicle front

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Rev engine quickly up to approximately 5000 rpm.
3. Check that power valve actuator 1 rod moves.



1. Power valve actuator 1
2. Power valve actuator 1 rod
3. Power valve actuator 2
4. Power valve actuator 2 rod

⇦ : Vehicle front

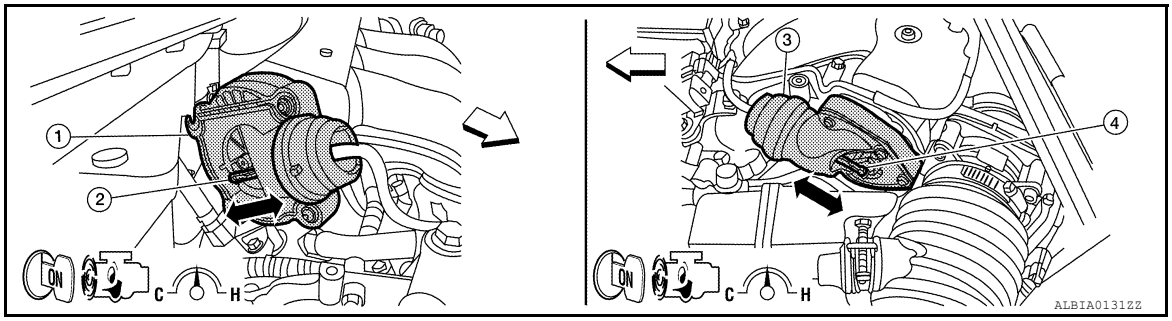
Is the inspection result normal?

YES >> GO TO 2.
NO >> EC-640, "Diagnosis Procedure".

2.CHECK OVERALL FUNCTION-II

With CONSULT-III

1. Perform “VIAS S/V B2” in “ACTIVE TEST” mode with CONSULT-III.
2. Turn VIAS control solenoid valve 2 “ON” and “OFF”, and make sure that power valve actuator 2 rod moves.

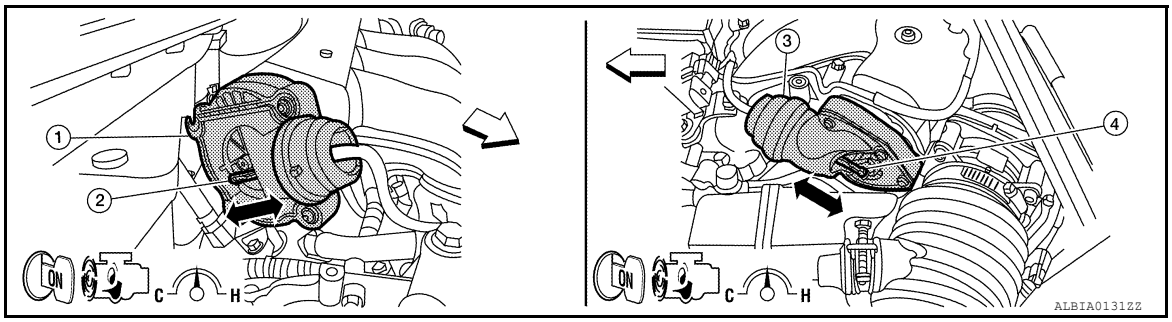


1. Power valve actuator 1
2. Power valve actuator 1 rod
3. Power valve actuator 2
4. Power valve actuator 2 rod

⇦ : Vehicle front

Without CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Rev engine quickly up to approximately 5000 rpm.
3. Check that power valve actuator 2 rod moves.



1. Power valve actuator 1
2. Power valve actuator 1 rod
3. Power valve actuator 2
4. Power valve actuator 2 rod

⇦ : Vehicle front

Is the inspection result normal?

YES >> INSPECTION END
NO >> EC-640, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000006392178

1.INSPECTION START

Confirm the malfunctioning system (power valve 1 or power valve 2). Refer to EC-639, "Component Function Check".

Which system is related to the incident?

Power valve 1>>GO TO 2.
Power valve 2>>GO TO 6.

2.CHECK VACUUM EXISTENCE-I

With CONSULT-III

1. Stop engine and disconnect vacuum hose connected to power valve actuator 1.
2. Start engine and let it idle.
3. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-III.

4. Turn VIAS control solenoid valve 1 ON and OFF, and check vacuum existence under the following conditions.

VIAS SOL VALVE	Vacuum
ON	Existed
OFF	Not existed

Without CONSULT-III

1. Stop engine and disconnect vacuum hose connected to power valve actuator 1. Refer to EC-340, "Component Parts Location".
2. Disconnect VIAS control solenoid valve 1 harness connector.
3. Start engine.
4. Rev engine quickly up to approximately 5,000 rpm.
5. Check vacuum existence under the following conditions.

Condition	Vacuum
Idle	Existed
Rev engine quickly up to approximately 5,000 rpm	Not existed

Is the inspection result normal?

YES >> Repair or replace power valve actuator 1. Refer to EC-340, "Component Parts Location".
NO >> GO TO 3.

3. CHECK VACUUM TANK

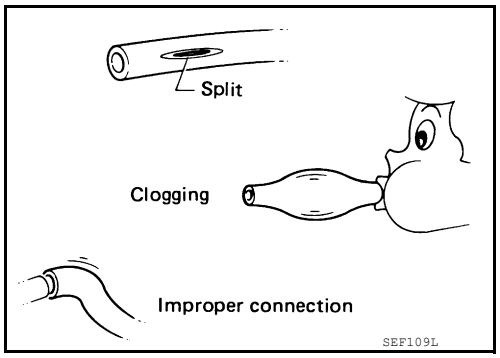
1. Stop engine and disconnect vacuum hose connected to intake manifold collector.
2. Start engine and let it idle.
3. Check vacuum existence from intake manifold collector.

Does vacuum existence from the intake manifold collector?

YES >> GO TO 4.
NO >> Replace intake manifold collector.

4. CHECK VACUUM HOSE

1. Stop engine.
2. Check vacuum hose for cracks, clogging, improper connection or disconnection. Refer to EC-410, "System Diagram".



Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair hoses or tubes.

5. CHECK VIAS CONTROL SOLENOID VALVE 1

Refer to EC-566, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace VIAS control solenoid valve 1.

6. CHECK VACUUM EXISTENCE-II

With CONSULT-III

1. Stop engine and disconnect vacuum hose connected to power valve actuator 2.
2. Start engine and let it idle.
3. Perform “VIAS S/V B2” in “ACTIVE TEST” mode with CONSULT-III.
4. Turn VIAS control solenoid valve 2 ON and OFF, and check vacuum existence under the following conditions.

VIAS S/V B2	Vacuum
ON	Existed
OFF	Not existed

Without CONSULT-III

1. Stop engine and disconnect vacuum hose connected to power valve actuator 2.
2. Disconnect VIAS control solenoid valve 1 harness connector.
3. Start engine.
4. Rev engine quickly up to approximately 5,000 rpm.
5. Check vacuum existence under the following conditions.

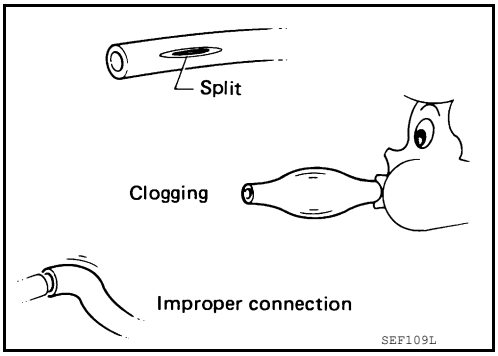
Condition	Vacuum
Idle	Existed
Rev engine quickly up to approximately 5,000 rpm	Not existed

Is the inspection result normal?

YES >> Repair or replace power valve actuator 2. Refer to EC-340, "Component Parts Location".
NO >> GO TO 7.

7. CHECK VACUUM HOSE

1. Stop engine.
2. Check vacuum hose for cracks, clogging, improper connection or disconnection. Refer to EC-410, "System Diagram".



Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair hoses or tubes.

8. CHECK VIAS CONTROL SOLENOID VALVE 2

Refer to EC-568, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace VIAS control solenoid valve 2.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-42, "Intermittent Incident".

>> INSPECTION END

ECU DIAGNOSIS INFORMATION

ECM

Reference Value

INFOID:0000000006392179

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-430, "Description".		
B/FUEL SCHDL	See EC-430, "Description".		
A/F ALPHA-B1	See EC-430, "Description".		
A/F ALPHA-B2	See EC-430, "Description".		
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
A/F SEN1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
HO2S2 (B1)	• Revving engine from idle 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 - 0.3 V ←→ Approx. 0.6 - 1.0 V
HO2S2 (B2)	• Revving engine from idle 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 - 0.3 V ←→ Approx. 0.6 - 1.0 V
HO2S2 MNTR (B1)	• Revving engine from idle 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
HO2S2 MNTR (B2)	• Revving engine from idle 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 - 14 V
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.65 - 0.87 V
		Accelerator pedal: Fully depressed	More than 4.3 V
ACCEL SEN 2*1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.56 - 0.96 V
		Accelerator pedal: Fully depressed	More than 4.0 V

Monitor Item	Condition		Values/Status
TP SEN 1-B1	• Ignition switch: ON (Engine stopped) • Selector lever position: D	Accelerator pedal: Fully released	More than 0.36 V
		Accelerator pedal: Fully depressed	Less than 4.75 V
TP SEN 2-B1*1	• Ignition switch: ON (Engine stopped) • Selector lever position: D	Accelerator pedal: Fully released	More than 0.36 V
		Accelerator pedal: Fully depressed	Less than 4.75 V
FUEL T/TMP SE	• Ignition switch: ON		Indicates fuel tank temperature
INT/A TEMP SE	• Ignition switch: ON		Indicates intake air temperature
EVAP SYS PRES	• Ignition switch: ON		Approx. 1.8 - 4.8 V
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	• Ignition switch: ON	Selector lever position: P or N	ON
		Selector lever position: 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 • Selector lever position: P or N • Air conditioner switch: OFF • No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
INJ PULSE-B2	• Engine: After warming up • Selector lever position: P or N • 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 • Selector lever position: P or N • Air conditioner switch: OFF • No load	Idle	7 - 17° BTDC
		2,000 rpm	25 - 45° BTDC
MASS AIRFLOW	• Engine: After warming up • Selector lever position: P or N • Air conditioner switch: OFF • No load	Idle	2.0 - 6.0 g/s
		2,500 rpm	7.0 - 20.0 g/s
PURG VOL C/V	• Engine: After warming up • Selector lever position: P or N • Air conditioner switch: OFF • No load	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0%
		2,000 rpm	—

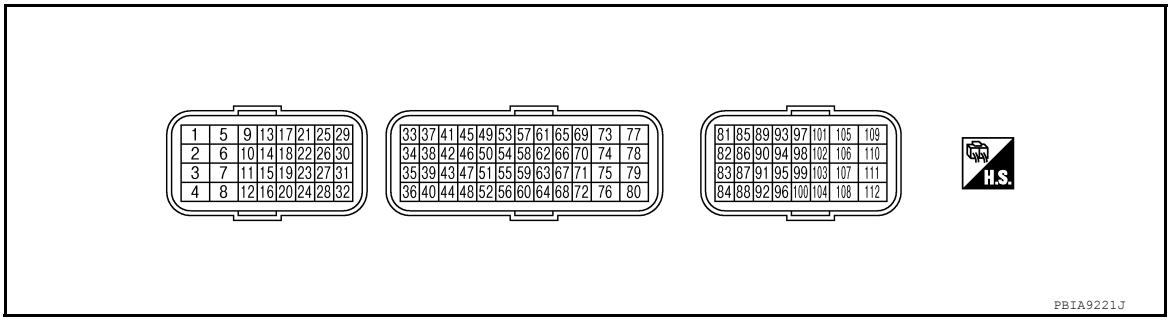
Monitor Item	Condition		Values/Status
INT/V TIM (B1)	• Engine: After warming up • Selector lever position: P or N • Air conditioner switch: OFF • No load	Idle	−5 - 5°CA
		2,000 rpm	Approx. 0 - 30°CA
INT/V TIM (B2)	• Engine: After warming up • Selector lever position: P or N • Air conditioner switch: OFF • No load	Idle	−5 - 5°CA
		2,000 rpm	Approx. 0 - 30°CA
INT/V SOL (B1)	• Engine: After warming up • Selector lever position: P or N • Air conditioner switch: OFF • No load	Idle	0 - 2%
		2,000 rpm	Approx. 0 - 50%
INT/V SOL (B2)	• Engine: After warming up • Selector lever position: P or N • Air conditioner switch: OFF • No load	Idle	0 - 2%
		2,000 rpm	Approx. 0 - 50%
VIAS S/V-1	• Engine: After warming up • Selector lever position: P or N • Air conditioner switch: OFF • No load	Rev engine quickly up to approximately 5,000 rpm	OFF →ON → OFF
VIAS S/V-2	• Engine: After warming up • Selector lever position: P or N • Air conditioner switch: OFF • No load	Rev engine quickly up to approximately 5,000 rpm	OFF →ON → OFF
AIR COND RLY	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
ENGINE MOUNT	• Engine: After warming up	Idle (With vehicle stopped)	IDLE
		Except above conditions	TRVL
FUEL PUMP RLY	• For 1 second after turning ignition switch: ON • Engine running or cranking		ON
	• Except above		OFF
VENT CONT/V	• Ignition switch: ON		OFF
THRTL RELAY	• Ignition switch: ON		ON
COOLING FAN	• Engine: After warming up, idle the engine • Air conditioner switch: OFF	Engine coolant temperature: 97°C (206°F) or less	OFF
		Engine coolant temperature: Between 98°C (208°F) and 99°C (210°F)	Low
		Engine coolant temperature: Between 100°C (212°F) and 104°C (219°F)	Mid
		Engine coolant temperature: 105°C (221°F) or more	Hi
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
HO2S2 HTR (B2)	• 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

Monitor Item	Condition		Values/Status
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
ENG OIL TEMP	• Engine: After warming up		More than 70°C (158°F)
TRVL AFTER MIL	• Ignition switch: ON	Vehicle has traveled after MIL has illuminated.	0 - 65,535 km (0 - 40,723 miles)
A/F S1 HTR (B1)	• Engine: After warming up, idle the engine (More than 140 seconds after starting engine)		4 - 100%
A/F S1 HTR (B2)	• Engine: After warming up, idle the engine (More than 140 seconds after starting engine)		4 - 100%
AC PRESS SEN	• Engine: Idle • Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0 V
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	ON
		Brake 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 is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF
ALT DUTY	• Engine: Idle		0 - 80%
A/F ADJ-B1	• Engine: Running		−0.330 - 0.330
A/F ADJ-B2	• Engine: Running		−0.330 - 0.330
ALT DUTY SIG	• Power generation voltage variable control: Operating		ON
	• Power generation voltage variable control: Not operating		OFF
I/P PULLY SPD	• Vehicle speed: More than 20 km/h (12 MPH)		Almost the same speed as the tachometer indication

*1: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

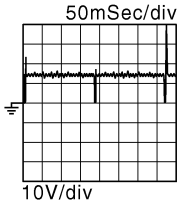
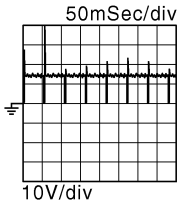
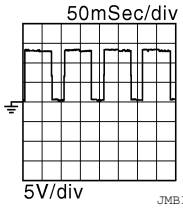
*2: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-71, "How to Handle Battery".

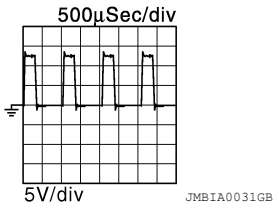
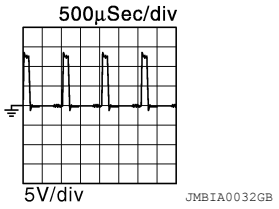
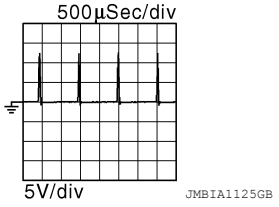
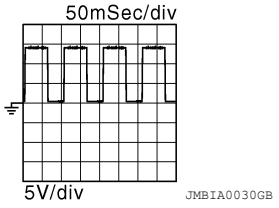
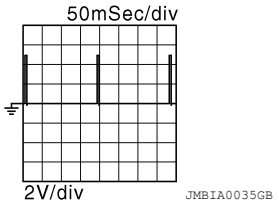
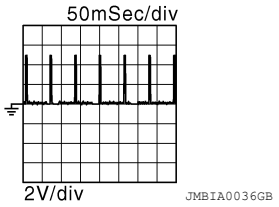
TERMINAL LAYOUT

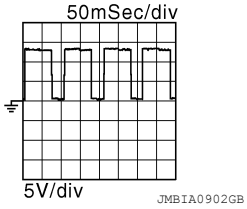
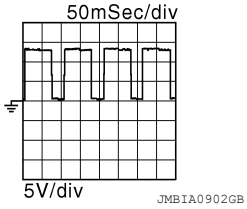


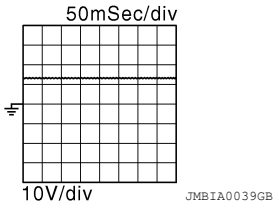
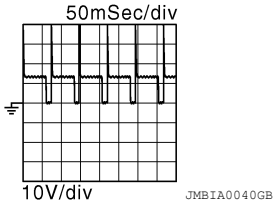
PHYSICAL VALUES

NOTE:
- ECM is located in the engine room left side near battery.
- Specification data are reference values.
- Pulse signal is measured by CONSULT-III.

Terminal No. +	Terminal No. —	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
1 (P) 3 (Y) 29 (LG) 30 (O) 31 (SB) 32 (V)	112 (B)	Fuel injector No. 6 Fuel injector No. 5 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 - 14 V)★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V)★ 
2 (GR)	112 (B)	Throttle control motor power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
4 (V)	112 (B)	A/F sensor 1 heater (bank 1)	Output	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8 V★ 

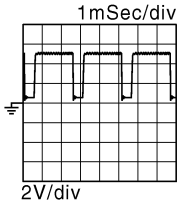
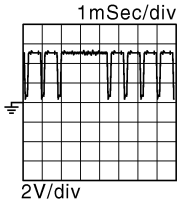
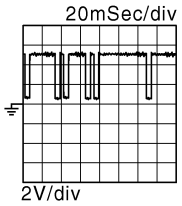
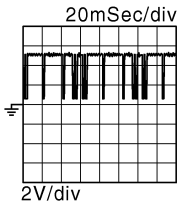
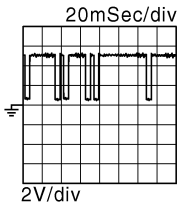
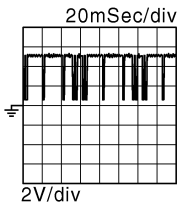
Terminal No.		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
5 (R)	112 (B)	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Selector lever position: D • Accelerator pedal: Fully depressed	0 - 14 V★ 
				[Ignition switch: ON] • Engine stopped • Selector lever position: D • Accelerator pedal: Fully released	0 - 14 V★ 
6 (BR)	112 (B)	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Selector lever position: D • Accelerator pedal: Fully released	0 - 14 V★ 
8 (SB)	112 (B)	A/F sensor 1 heater (bank 2)	Output	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8 V★ 
9 (P) 10 (G) 11 (Y) 18 (L) 19 (R) 21 (GR)	112 (B)	Ignition signal No. 3 Ignition signal No. 2 Ignition signal No. 1 Ignition signal No. 6 Ignition signal No. 5 Ignition signal No. 4	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.2 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.1 - 0.4 V★ 
12 (B)	—	ECM ground	—	—	—

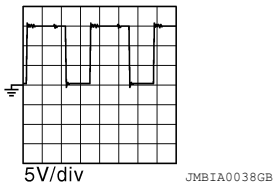
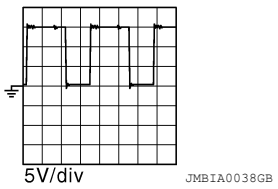
Terminal No. +	Terminal No. –	Description: Signal name	Description: Input/ Output	Condition	Value (Approx.)
13 (O)	112 (B)	Heated oxygen sensor 2 heater (bank 1)	Output	[Engine is running] • Engine speed: Below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	10 V★ 
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
14 (B/R)	112 (B)	Fuel pump relay	Output	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.5 V
				[Ignition switch: ON] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14 V)
15 (R)	112 (B)	Throttle control motor relay	Output	[Ignition switch: ON → OFF]	0 - 1.0 V ↓ BATTERY VOLTAGE (11 - 14 V) ↓ 0 V
				[Ignition switch: ON]	0 - 1.0 V
16 (B)	—	ECM ground	—	—	—
17 (G)	112 (B)	Heated oxygen sensor 2 heater (bank 2)	Output	[Engine is running] • Engine speed: Below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	10 V★ 
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
24 (SB)	112 (B)	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] • A few seconds after turning ignition switch OFF	0 - 1.5 V
				[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)

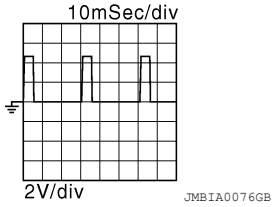
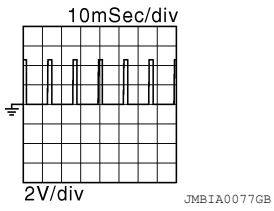
Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
25 (W)	112 (B)	EVAP canister purge volume control solenoid valve	Output	[Engine is running] • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14 V)★ 
				[Engine is running] • Engine speed: approximately 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14 V)★ 
26 (B)	112 (B)	VIAS control solenoid valve 2	Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
				[Engine is running] • Warm-up condition • When revving engine up to 5,000 rpm quickly	BATTERY VOLTAGE (11 - 14 V) ↓ 0 - 1.0 V ↓ BATTERY VOLTAGE (11 - 14 V)
27 (B/W)	112 (B)	VIAS control solenoid valve 1	Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
				[Engine is running] • Warm-up condition • When revving engine up to 5,000 rpm quickly	BATTERY VOLTAGE (11 - 14 V) ↓ 0 - 1.0 V ↓ BATTERY VOLTAGE (11 - 14 V)
28 (BR)	112 (B)	Electronic controlled engine mount control solenoid valve	Output	[Engine is running] • Engine speed: For 2 seconds after reaching 950 rpm or less	0 - 1.0 V
				[Engine is running] • Engine speed: After a lapse of 2 seconds after reaching 950 rpm or less	2.0 - 3.0 V
				[Engine is running] • Engine speed: 950 rpm or more	BATTERY VOLTAGE (11 - 14 V)
33 (Y)	35 (B)	Heated oxygen sensor 2 (bank 1)	Input	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0 V

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
34 (V)	35 (B)	Heated oxygen sensor 2 (bank 2)	Input	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0 V
35 (B)	—	Sensor ground (Heated oxygen sensor 2)	—	—	—
36 (G)	—	Sensor ground (Throttle position sensor)	—	—	—
37 (B)	36 (G)	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Selector lever position: D • Accelerator pedal: Fully released	More than 0.36 V
				[Ignition switch: ON] • Engine stopped • Selector lever position: D • Accelerator pedal: Fully depressed	Less than 4.75 V
38 (R)	36 (G)	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Selector lever position: D • Accelerator pedal: Fully released	Less than 4.75 V
				[Ignition switch: ON] • Engine stopped • Selector lever position: D • Accelerator pedal: Fully depressed	More than 0.36 V
39 (O)	40 (SB)	Refrigerant pressure sensor	Input	[Engine is running] • Warm-up condition • Both A/C switch and blower fan motor switch: ON (Compressor operates)	1.0 - 4.0 V
40 (SB)	—	Sensor ground (Refrigerant pressure sensor)	—	—	—
41 (SB)	48 (GR)	Power steering pressure sensor	Input	[Engine is running] • Steering wheel: Being turned	0.5 - 4.5 V
				[Engine is running] • Steering wheel: Not being turned	0.4 - 0.8 V
42 (G)	44 (O)	Battery current sensor	Input	[Engine is running] • Battery: Fully charged*2 • Idle speed	2.6 - 3.5 V
44 (O)	—	Sensor ground (Battery current sensor)	—	—	—
45 (L)	49 (G)	A/F sensor 1 (bank 1)	Input	[Ignition switch: ON]	2.2 V
46 (P)	52 (L)	Engine coolant temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
47 (W)	36 (G)	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5 V
48 (GR)	—	Sensor ground (Power steering pressure sensor)	—	—	—
49 (G)	112 (B)	A/F sensor 1 (bank 1)	Input	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	1.8 V Output voltage varies with air fuel ratio.
50 (O)	56 (Y)	Intake air temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.
51 (P)	44 (O)	Sensor power supply (Battery current sensor)	—	[Ignition switch: ON]	5 V
52 (L)	—	Sensor ground (Engine coolant temperature sensor/Engine oil temperature sensor)	—	—	—
53 (V)	112 (B)	A/F sensor 1 (bank 2)	Input	[Ignition switch: ON]	2.2 V
54 (GR)	52 (L)	Engine oil temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine oil temperature.
55 (LG)	48 (GR)	Sensor power supply (Power steering pressure sensor)	—	[Ignition switch: ON]	5 V
56 (Y)	—	Sensor ground (Mass air flow sensor/Intake air temperature sensor)	—	—	—
57 (LG)	112 (B)	A/F sensor 1 (bank 2)	Input	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	1.8 V Output voltage varies with air fuel ratio.
58 (BR)	56 (Y)	Mass air flow sensor	Input	[Engine is running] • Warm-up condition • Idle speed	0.9 - 1.2 V
				[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	1.6 - 1.9 V
59 (L)	64 (BR)	Sensor power supply [Camshaft position sensor (PHASE) (bank 1)]	—	[Ignition switch: ON]	5 V
60 (W)	—	Sensor ground [Crankshaft position sensor (POS)]	—	—	—
61 (GR)	67 (BR)	Knock sensor (bank 1)	Input	[Engine is running] • Idle speed	2.5 V*1
62 (W)	67 (BR)	Knock sensor (bank 2)	Input	[Engine is running] • Idle speed	2.5 V*1
63 (O)	68 (V)	Sensor power supply [Camshaft position sensor (PHASE) (bank 2)]	—	[Ignition switch: ON]	5 V
64 (BR)	—	Sensor ground [Camshaft position sensor (PHASE) (bank 1)]	—	—	—

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
65 (R)	60 (W)	Crankshaft position sensor (POS)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	4.0 - 5.0 V★  JMBIA0041GB
				[Engine is running] • Engine speed: 2,000 rpm	4.0 - 5.0 V★  JMBIA0042GB
67 (GR)	—	Sensor ground (Knock sensor)	—	—	—
68 (V)	—	Sensor ground [Camshaft position sensor (PHASE) (bank 2)]	—	—	—
69 (P)	68 (V)	Camshaft position sensor (PHASE) (bank 2)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	3.0 - 5.0 V★  JMBIA0045GB
				[Engine is running] • Engine speed is 2,000 rpm	3.0 - 5.0 V★  JMBIA0046GB
70 (Y)	64 (BR)	Camshaft position sensor (PHASE) (bank 1)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	3.0 - 5.0 V★  JMBIA0045GB
				[Engine is running] • Engine speed is 2,000 rpm	3.0 - 5.0 V★  JMBIA0046GB

Terminal No.		Description		Condition	Value (Approx.)
+	—	Signal name	Input/ Output		
72 (R)	40 (SB)	Sensor power supply (Refrigerant pressure sensor)	—	[Ignition switch: ON]	5 V
75 (Y)	112 (B)	Intake valve timing control solenoid valve (bank 2)	Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	7 - 12 V★ 
76 (BR)	60 (W)	Sensor power supply [Crankshaft position sensor (POS)]	—	[Ignition switch: ON]	5 V
77 (LG)	112 (B)	Power supply for ECM (Back-up)	Input	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
78 (L)	112 (B)	Intake valve timing control solenoid valve (bank 1)	Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	7 - 12 V★ 
81 (W)	84 (B)	Accelerator pedal position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.65 - 0.87 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	More than 4.3 V
82 (O)	100 (G)	Accelerator pedal position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully released	0.28 - 0.48 V
				[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	More than 2.0 V
83 (GR)	84 (B)	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5 V
84 (B)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
85 (Y)	92 (R)	ASCD steering switch	Input	[Ignition switch: ON] • ASCD steering switch: OFF	4 V
				[Ignition switch: ON] • MAIN switch: Pressed	0 V
				[Ignition switch: ON] • CANCEL switch: Pressed	1 V
				[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	3 V
				[Ignition switch: ON] • SET/COAST switch: Pressed	2 V
87 (BR)	100 (G)	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5 V
88 (O)	—	Data link connector	Input/ Output	—	—
92 (BR)	—	Sensor ground (ASCD steering switch)	—	—	—
93 (Y)	112 (B)	Ignition switch	Input	[Ignition switch: OFF]	0 V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
94 (GR)	112 (B)	Engine speed output signal	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1 V★ 
				[Engine is running] • Engine speed: 2,000 rpm	1 V★ 
95 (Y)	104 (P)	Fuel tank temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with fuel tank temperature.
97 (P)	—	CAN communication line	Input/ Output	—	—
98 (L)	—	CAN communication line	Input/ Output	—	—
100 (G)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
102 (R)	112 (B)	PNP signal	Input	[Ignition switch: ON] • Selector lever position: P or N	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON] • Selector lever position: Except above	0 V

Terminal No.		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
104 (P)	—	Sensor ground (Fuel tank temperature sensor)	—	—	—
105 (V)	112 (B)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
106 (SB)	112 (B)	Stop lamp switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0 V
				[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)
107 (B) 108 (B)	—	ECM ground	—	—	—
109 (W)	112 (B)	EVAP canister vent control valve	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
110 (G)	112 (B)	ASCD brake switch	Input	[Ignition switch: ON] • Brake pedal: Slightly depressed	0 V
				[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)
111 (B) 112 (B)	—	ECM ground	—	—	—

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

*1: This may vary depending on internal resistance of the tester.

*2: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-71, "How to Handle Battery".

Fail-safe

INFOID:0000000006392181

NON DTC RELATED ITEM

Engine operating condition in fail-safe mode	Detected items	Remarks	Reference page
Engine speed will not rise more than 2,500 rpm due to the fuel cut	Malfunction indicator lamp circuit	When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system. Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function. The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.	EC-634

DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition in fail-safe mode
P0011 P0021	Intake valve timing control	The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function.
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

<table>
<tr><th>DTC No.</th><th>Detected items</th><th colspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><td rowspan="6">P0117
P0118</td><td rowspan="6">Engine coolant temperature sensor circuit</td><td colspan="2">Engine coolant temperature will be determined by ECM based on the following condition.
CONSULT-III displays the engine coolant temperature decided by ECM.</td></tr>
<tr><td>Condition</td><td>Engine coolant temperature decided
(CONSULT-III display)</td></tr>
<tr><td>Just as ignition switch is turned ON or START</td><td>40°C (104°F)</td></tr>
<tr><td>Approx. 4 minutes or more after engine starting</td><td>80°C (176°F)</td></tr>
<tr><td>Except as shown above</td><td>40 - 80°C (104 - 176°F)
(Depends on the time)</td></tr>
<tr><td colspan="2">When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.</td></tr>
<tr><td>P0122
P0123
P0222
P0223
P2135</td><td>Throttle position sensor</td><td colspan="2">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.</td></tr>
<tr><td>P0196
P0197
P0198</td><td>Engine oil temperaturesensor</td><td colspan="2">Intake valve timing control does not function.</td></tr>
<tr><td>P0500</td><td>Vehicle speed sensor</td><td colspan="2">When the fail-safe system for vehicle speed sensor is activated, the cooling fan operates (Highest) while engine is running.</td></tr>
<tr><td>P0605</td><td>ECM</td><td colspan="2">(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.</td></tr>
<tr><td>P0643</td><td>Sensor power supply</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td rowspan="4">P1805</td><td rowspan="4">Brake switch</td><td colspan="2">ECM controls the electric throttle control actuator by regulating the throttle opening to a small range.
Therefore, acceleration will be poor.</td></tr>
<tr><td>Vehicle condition</td><td>Driving condition</td></tr>
<tr><td>When engine is idling</td><td>Normal</td></tr>
<tr><td>When accelerating</td><td>Poor acceleration</td></tr>
<tr><td>P2100
P2103</td><td>Throttle control motor relay</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td>P2101</td><td>Electric throttle control function</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td>P2118</td><td>Throttle control motor</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
</table>

DTC No.	Detected items	Engine operating condition in fail-safe mode
P2119	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
		(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position, and engine speed will not exceed 1,000 rpm or more.
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Inspection Priority Chart

INFOID:0000000006392182

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 • 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 • P0196 P0197 P0198 Engine oil temperature sensor • P0327 P0328 P0332 P0333 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 P0345 Camshaft position sensor (PHASE) • P0500 Vehicle speed sensor • P0605 P0607 ECM • P0643 Sensor power supply • P0705 Transmission range switch • P0850 Park/Neutral position (PNP) switch • P1550 P1551 P1552 P1553 P1554 Battery current sensor • P1610 - P1615 NATS • P1700 CVT control system • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor

Priority	Detected items (DTC)
2	• P0031 P0032 P0051 P0052 Air fuel ratio (A/F) sensor 1 heater • P0037 P0038 P0057 P0058 Heated oxygen sensor 2 heater • P0075 P0081 Intake valve timing control solenoid valve • P0130 P0131 P0132 P0150 P0151 P0152 Air fuel ratio (A/F) sensor 1 • P0138 P0158 Heated oxygen sensor 2 • P0444 EVAP canister purge volume control solenoid valve • P0550 Power steering pressure sensor • P0603 ECM power supply • P0710 P0715 P0720 P0740 P0745 P0746 P0776 P0778 P0840 P0845 P1740 CVT related sensors, solenoid valvesand switches • P1217 Engine over temperature (OVERHEAT) • P1720 Vehicle speed sensor • P1777 P1778 CVT step motor • P1805 Brake switch • P2101 Electric throttle control function • P2118 Throttle control motor • P2100 P2103 Throttle control motor relay
3	• P0011 P0021 Intake valve timing control • P1212 TCS communication line • P1564 ASCD steering switch • P1572 ASCD brake switch • P1574 ASCD vehicle speed sensor • P1715 Input speed sensor • P1800 P1801 VIAS control solenoid valve • P2119 Electric throttle control actuator

DTC Index

INFOID:0000000006392183

×:Applicable —: Not applicable

DTC*1		Items (CONSULT-III screen terms)	Trip	MIL	Reference page
CONSULT-III	ECM*2				
U1000	1000*3	CAN COMM CIRCUIT	2	—	EC-441
U1001	1001*3	CAN COMM CIRCUIT	2	—	EC-441
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	**—**
P0011	0011	INT/V TIM CONT-B1	2	—	EC-442
P0021	0021	INT/V TIM CONT-B2	2	—	EC-442
P0031	0031	A/F SEN1 HTR (B1)	2	×	EC-447
P0032	0032	A/F SEN1 HTR (B1)	2	×	EC-447
P0037	0037	HO2S2 HTR (B1)	2	×	EC-450
P0038	0038	HO2S2 HTR (B1)	2	×	EC-450
P0051	0051	A/F SEN1 HTR (B2)	2	×	EC-447
P0052	0052	A/F SEN1 HTR (B2)	2	×	EC-447
P0057	0057	HO2S2 HTR (B2)	2	×	EC-450
P0058	0058	HO2S2 HTR (B2)	2	×	EC-450
P0075	0075	INT/V TIM V/CIR-B1	2	×	EC-453
P0081	0081	INT/V TIM V/CIR-B2	2	×	EC-453
P0102	0102	MAF SEN/CIRCUIT-B1	1	×	EC-456
P0103	0103	MAF SEN/CIRCUIT-B1	1	×	EC-456
P0112	0112	IAT SEN/CIRCUIT-B1	2	×	EC-462
P0113	0113	IAT SEN/CIRCUIT-B1	2	×	EC-462
P0117	0117	ECT SEN/CIRC	2	×	EC-465

DTC*1		Items (CONSULT-III screen terms)	Trip	MIL	Reference page
CONSULT-III	ECM*2				
P0118	0118	ECT SEN/CIRC	2	×	EC-465
P0122	0122	TP SEN 2/CIRC-B1	1	×	EC-468
P0123	0123	TP SEN 2/CIRC-B1	1	×	EC-468
P0130	0130	A/F SENSOR1 (B1)	2	×	EC-471
P0131	0131	A/F SENSOR1 (B1)	2	×	EC-475
P0132	0132	A/F SENSOR1 (B1)	2	×	EC-479
P0138	0138	HO2S2 (B1)	2	×	EC-483
P0150	0150	A/F SENSOR1 (B2)	2	×	EC-471
P0151	0151	A/F SENSOR1 (B2)	2	×	EC-475
P0152	0152	A/F SENSOR1 (B2)	2	×	EC-479
P0158	0158	HO2S2 (B2)	2	×	EC-483
P0196	0196	EOT SEN/CIRC	2	—	EC-488
P0197	0197	EOT SEN/CIRC	2	×	EC-491
P0198	0198	EOT SEN/CIRC	2	×	EC-491
P0222	0222	TP SEN 1/CIRC-B1	1	×	EC-494
P0223	0223	TP SEN 1/CIRC-B1	1	×	EC-494
P0327	0327	KNOCK SEN/CIRC-B1	2	—	EC-497
P0328	0328	KNOCK SEN/CIRC-B1	2	—	EC-497
P0332	0332	KNOCK SEN/CIRC-B2	2	—	EC-497
P0333	0333	KNOCK SEN/CIRC-B2	2	—	EC-497
P0335	0335	CKP SEN/CIRCUIT	2	×	EC-500
P0340	0340	CMP SEN/CIRC-B1	2	×	EC-504
P0345	0345	CMP SEN/CIRC-B2	2	×	EC-504
P0444	0444	PURG VOLUME CONT/V	2	×	EC-508
P0500	0500	VEH SPEED SEN/CIRC	2	×	EC-511
P0550	0550	PW ST P SEN/CIRC	2	—	EC-513
P0603	0603	ECM BACK UP/CIRCUIT	2	×	EC-516
P0605	0605	ECM	1 or 2	× or —	EC-518
P0607	0607	ECM	2	—	EC-520
P0643	0643	SENSOR POWER/CIRC	1	×	EC-521
P0705	0705	T/M RANGE SENSOR A	2	—	TM-135
P0710	0710	FLUID TEMP SENSOR A	2	—	TM-138
P0715	0715	INPUT SPEED SENSOR A	2	—	TM-141
P0720	0720	OUTPUT SPEED SENSOR*4	2	—	TM-144
P0740	0740	TORQUE CONVERTER	2	—	TM-150
P0745	0745	PC SOLENOID A	2	—	TM-154
P0746	0746	PC SOLENOID A	2	—	TM-156
P0776	0776	PC SOLENOID B	2	—	TM-158
P0778	0778	PC SOLENOID B	2	—	TM-160
P0840	0840	FLUID PRESS SEN/SW A	2	—	TM-165
P0850	0850	P-N POS SW/CIRCUIT	2	×	EC-524
P1212	1212	TCS/CIRC	2	—	EC-527
P1217	1217	ENG OVER TEMP	1	×	EC-528

DTC*1		Items (CONSULT-III screen terms)	Trip	MIL	Reference page
CONSULT-III	ECM*2				
P1225	1225	CTP LEARNING-B1	2	—	EC-532
P1226	1226	CTP LEARNING-B1	2	—	EC-534
P1550	1550	BAT CURRENT SENSOR	2	—	EC-536
P1551	1551	BAT CURRENT SENSOR	2	—	EC-539
P1552	1552	BAT CURRENT SENSOR	2	—	EC-539
P1553	1553	BAT CURRENT SENSOR	2	—	EC-542
P1554	1554	BAT CURRENT SENSOR	2	—	EC-545
P1564	1564	ASCD SW	1	—	EC-548
P1572	1572	ASCD BRAKE SW	1	—	EC-551
P1574	1574	ASCD VHL SPD SEN	1	—	EC-559
P1610	1610	LOCK MODE	2	—	SEC-65 (COUPE) or SEC-281 (SEDAN)
P1611	1611	ID DISCORD, IMMU-ECM	2	—	SEC-70 (COUPE) or SEC-286 (SEDAN)
P1612	1612	CHAIN OF ECM-IMMU	2	—	SEC-71(COUPE) or SEC-287 (SEDAN)
P1615	1615	DIFFERENCE OF KEY	2	—	SEC-69(COUPE) or SEC-285 (SEDAN)
P1700	1700	CVT C/U FUNCT	2	—	EC-561
P1715	1715	IN PULY SPEED	2	—	EC-562
P1720	1720	V/SP SEN (A/T OUT)	2	—	EC-563
P1740	1740	SLCT SOLENOID	2	—	TM-181
P1777	1777	STEP MOTOR	2	—	TM-184
P1778	1778	STEP MOTOR	2	—	TM-187
P1800	1800	VIAS S/V-1	2	—	EC-565
P1801	1801	VIAS S/V-2	2	—	EC-567
P1805	1805	BRAKE SW/CIRCUIT	1	×	EC-570
P2100	2100	ETC MOT PWR-B1	1	×	EC-574
P2101	2101	ETC FNCTN/CIRC-B1	1	×	EC-576
P2103	2103	ETC MOT PWR	1	×	EC-574
P2118	2118	ETC MOT-B1	1	×	EC-580
P2119	2119	ETC ACTR-B1	1	×	EC-583
P2122	2122	APP SEN 1/CIRC	1	×	EC-585
P2123	2123	APP SEN 1/CIRC	1	×	EC-585
P2127	2127	APP SEN 2/CIRC	1	×	EC-588
P2128	2128	APP SEN 2/CIRC	1	×	EC-588
P2135	2135	TP SENSOR-B1	1	×	EC-592
P2138	2138	APP SENSOR	1	×	EC-595

*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.

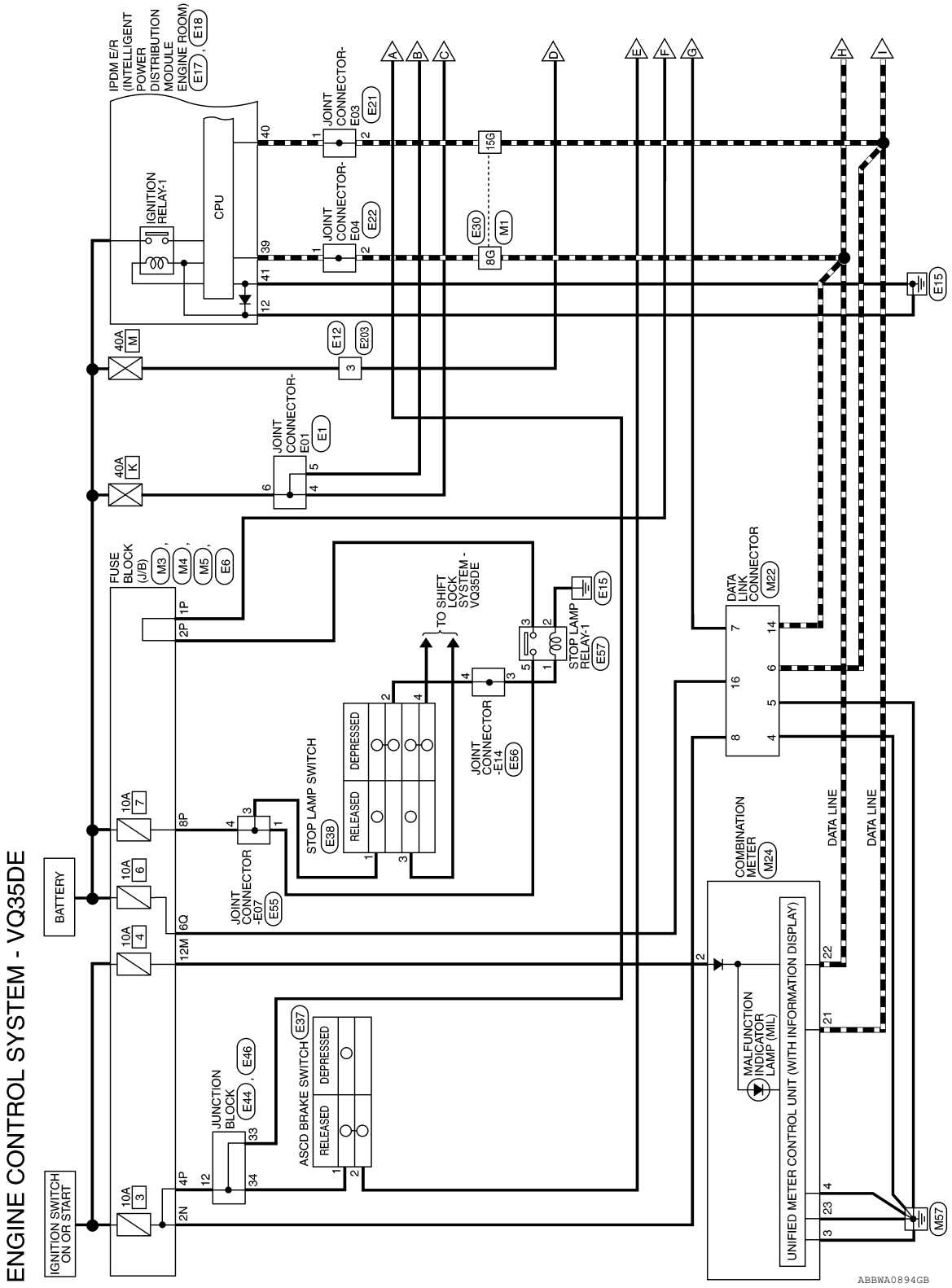
*4: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

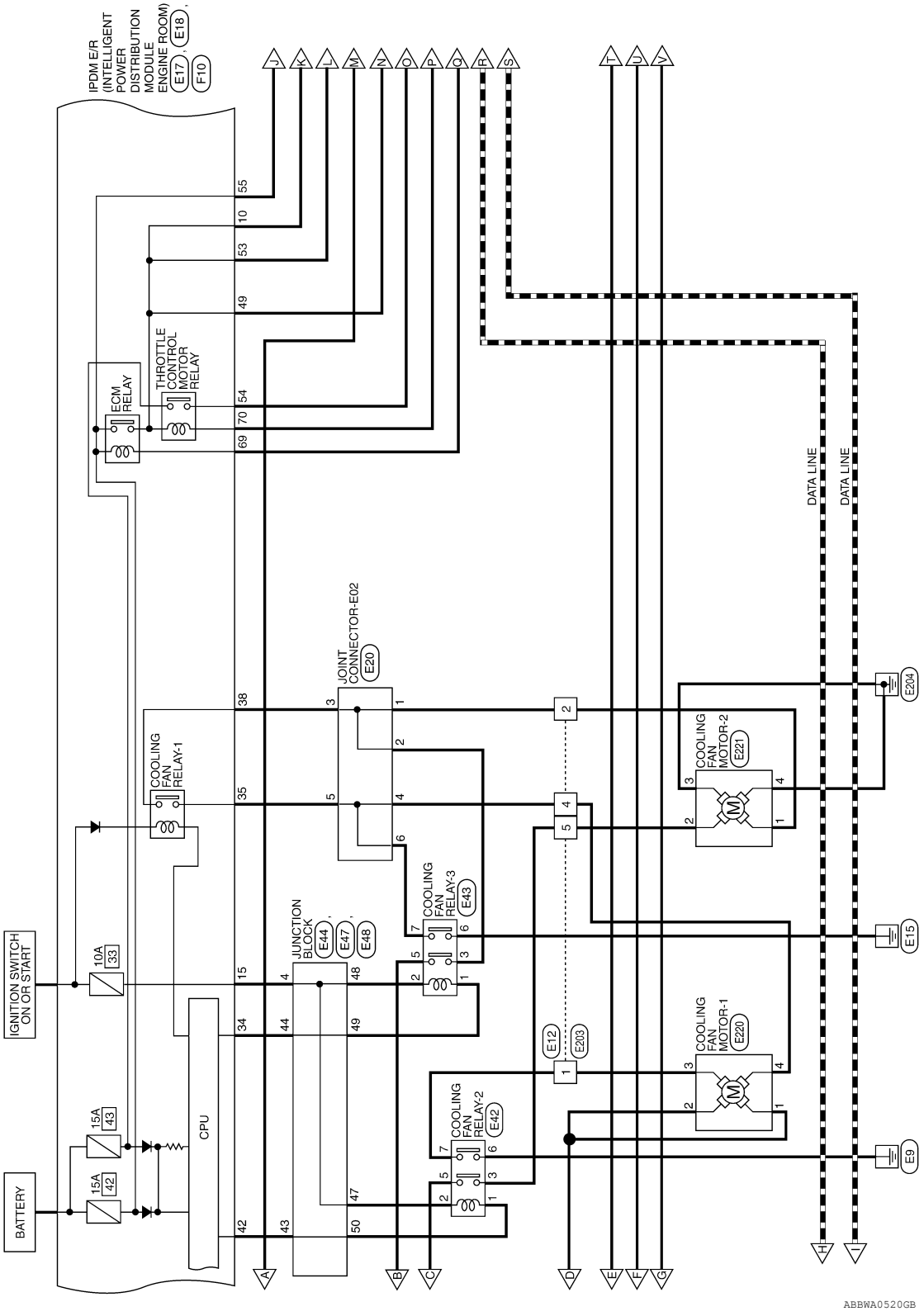
WIRING DIAGRAM

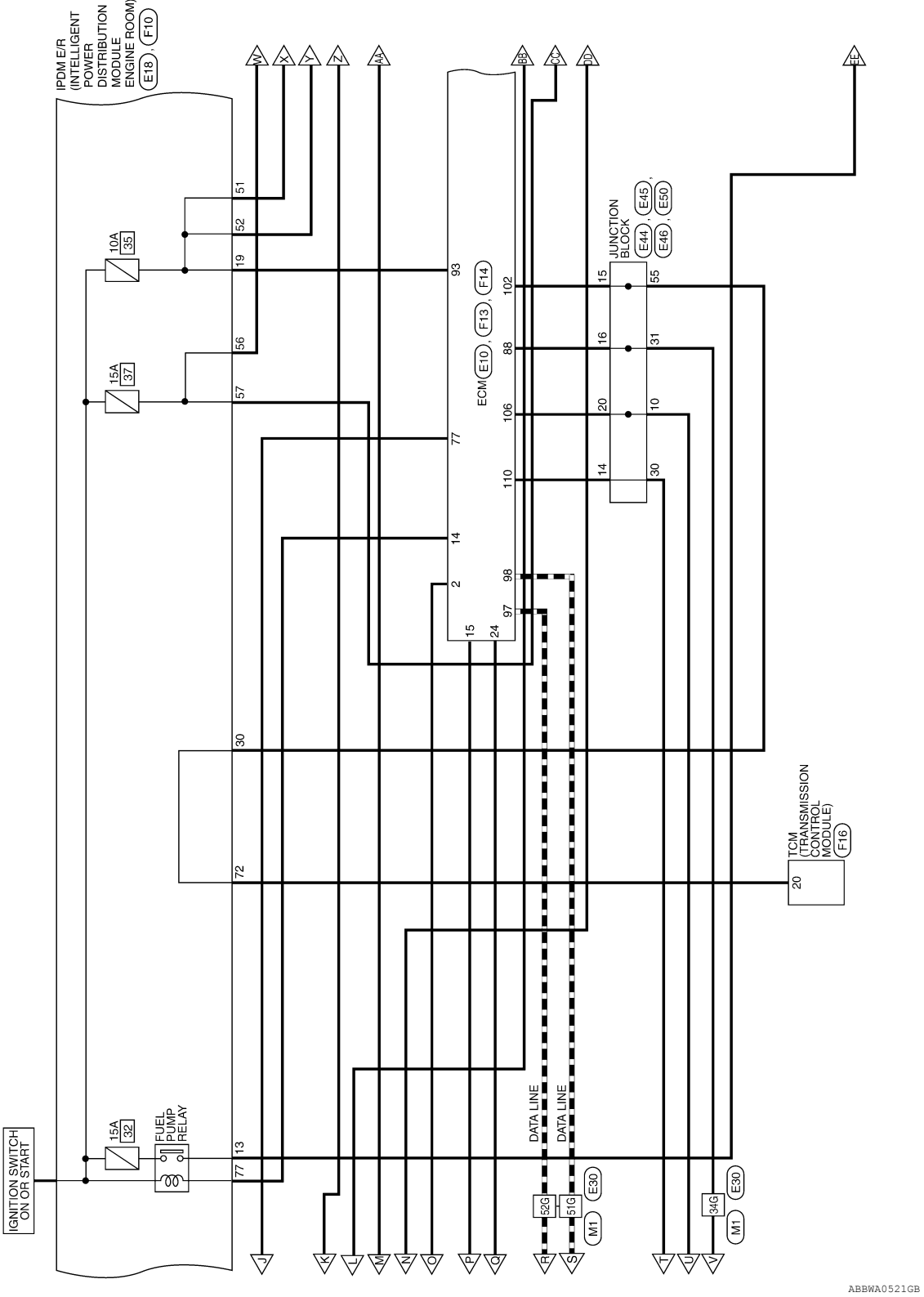
ENGINE CONTROL SYSTEM

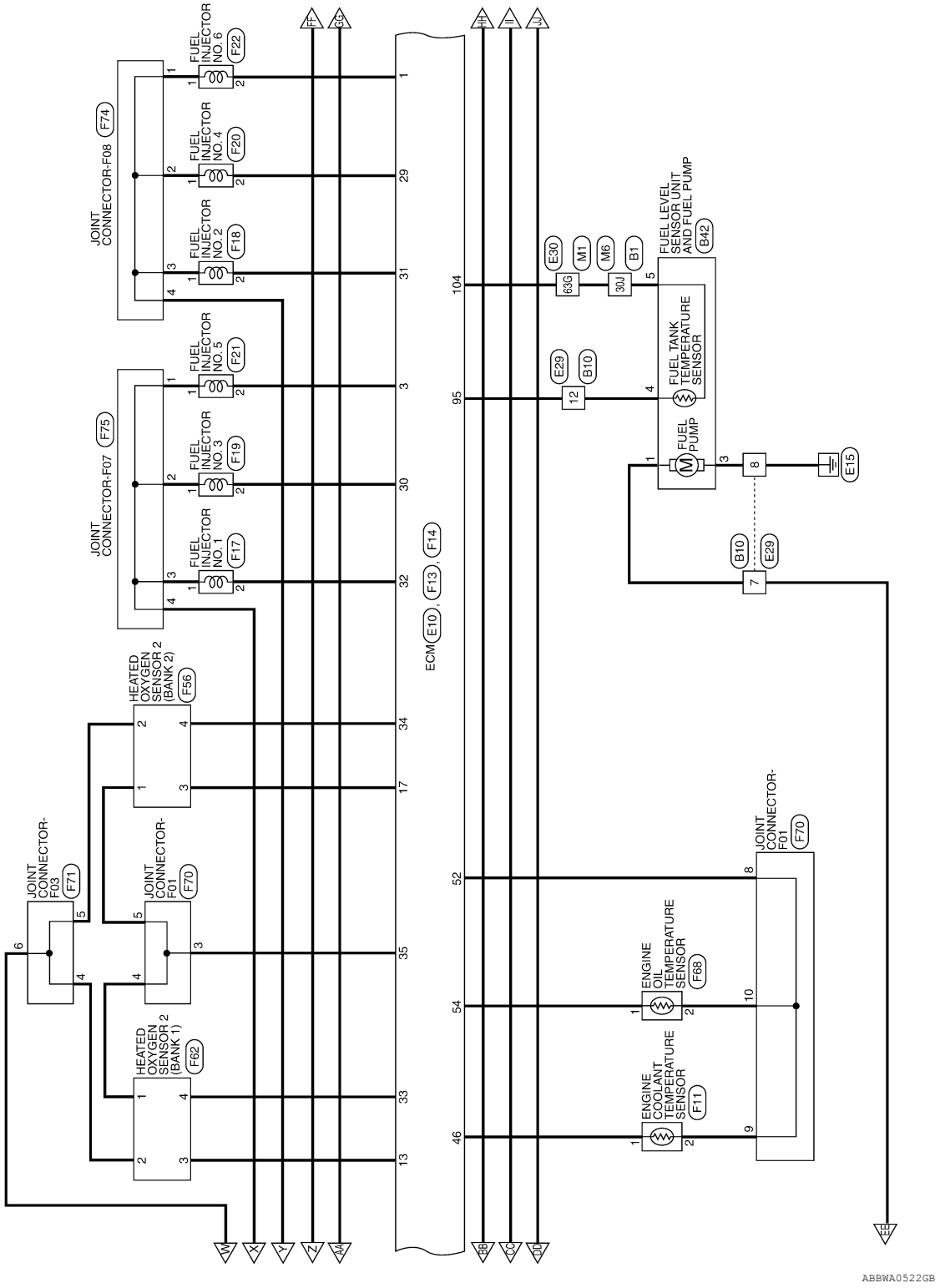
Wiring Diagram

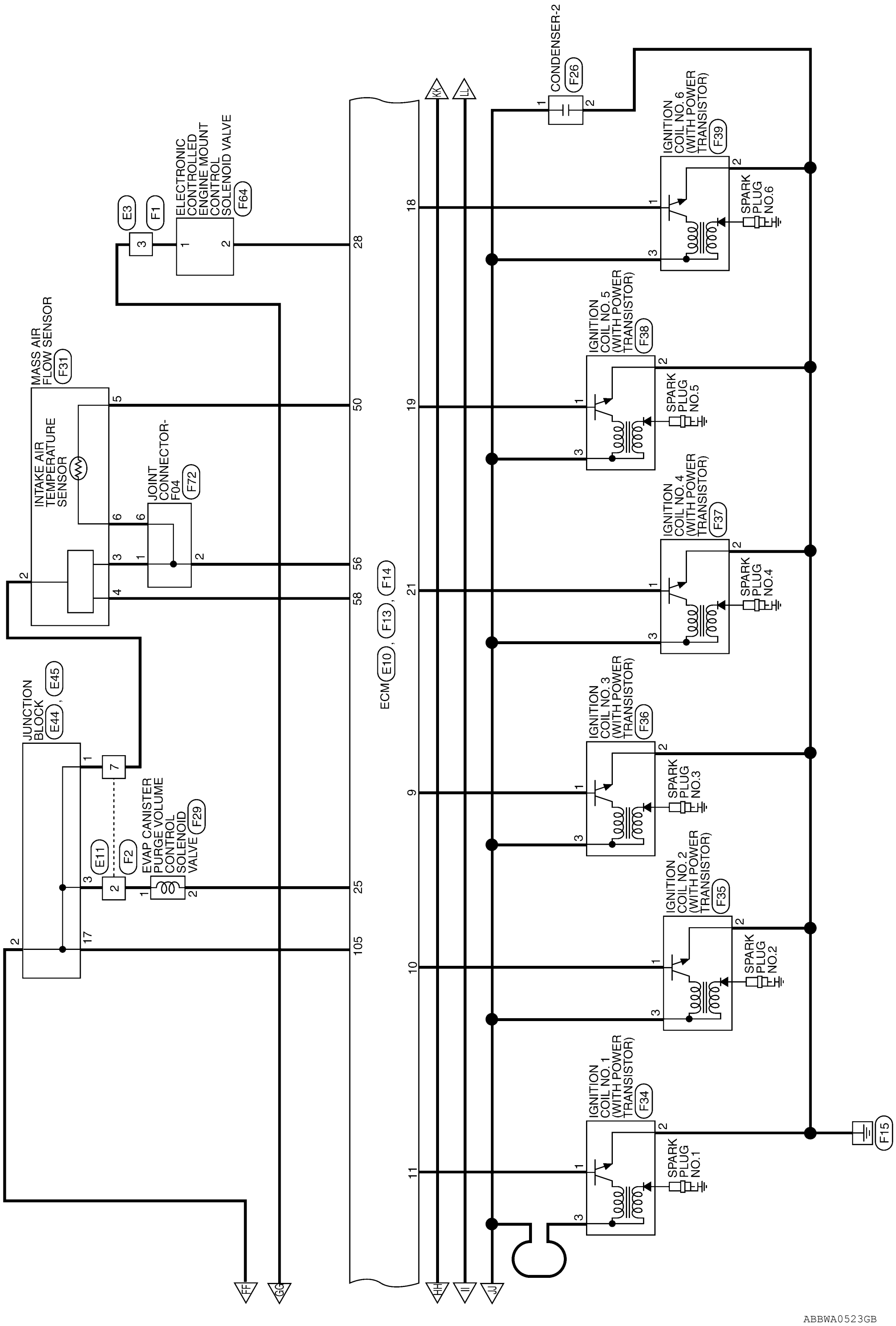
INFOID:0000000006392180

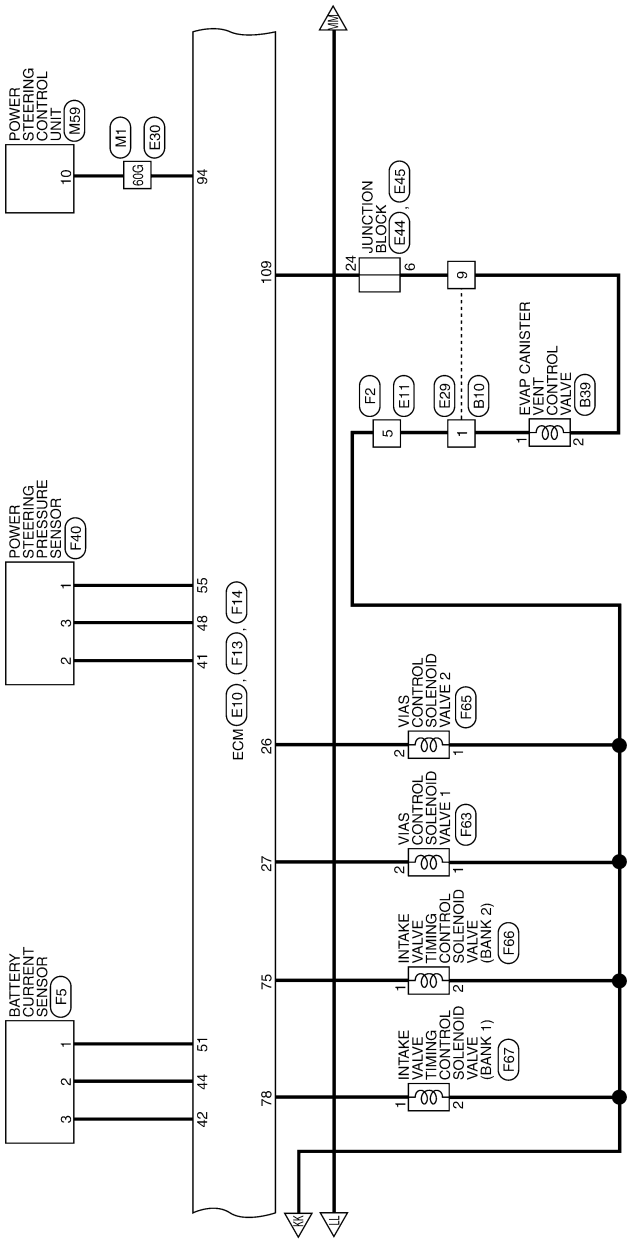



IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
E17, E18, F10
ECM RELAY
THROTTLE CONTROL MOTOR RELAY
COOLING FAN RELAY-1
JOINT CONNECTOR-E02
E20
JUNCTION BLOCK
E44, E47, E48
COOLING FAN RELAY-3
E43
COOLING FAN RELAY-2
E42
COOLING FAN MOTOR-1
E220
COOLING FAN MOTOR-2
E221
E12
E203
E204
E15
E9
DATA LINE
DATA LINE
IGNITION SWITCH ON OR START
BATTERY
10A 33
15A 43
15A 42
CPU
ABBWA0520GB


IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) E18, F10
10A 35
15A 37
15A 32
FUEL PUMP RELAY
IGNITION SWITCH ON OR START
ECM E10, F13, F14
JUNCTION BLOCK E44, E45, E46, E50
TCM (TRANSMISSION CONTROL MODULE) F16
DATA LINE
DATA LINE
52G
51G
34G
E30
M1
ABBWA0521GB


JOINT CONNECTOR-F08 F74
JOINT CONNECTOR-F07 F75
FUEL INJECTOR NO. 6 F22
FUEL INJECTOR NO. 4 F20
FUEL INJECTOR NO. 2 F18
FUEL INJECTOR NO. 5 F21
FUEL INJECTOR NO. 3 F19
FUEL INJECTOR NO. 1 F17
HEATED OXYGEN SENSOR 2 (BANK 2) F56
HEATED OXYGEN SENSOR 2 (BANK 1) F62
JOINT CONNECTOR-F03 F71
JOINT CONNECTOR-F01 F70
ECM E10, F13, F14
FUEL LEVEL SENSOR UNIT AND FUEL PUMP B42
FUEL TANK TEMPERATURE SENSOR
FUEL PUMP
ENGINE OIL TEMPERATURE SENSOR F68
ENGINE COOLANT TEMPERATURE SENSOR F11
E30 M1 M6 B1
63G 30J
E29 B10
12
B10 E29
7
8
E15
JOINT CONNECTOR-F01 F70
FF FG FH FI FJ
W X Y Z AA BB CC DD EE
ABBWA0522GB


CONDENSER-2
F26
IGNITION COIL NO.6 (WITH POWER TRANSISTOR)
F39
SPARK PLUG NO.6
IGNITION COIL NO.5 (WITH POWER TRANSISTOR)
F38
SPARK PLUG NO.5
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
F15
ELECTRONIC CONTROLLED ENGINE MOUNT CONTROL SOLENOID VALVE
F64
E3
F1
MASS AIR FLOW SENSOR
F31
INTAKE AIR TEMPERATURE SENSOR
JOINT CONNECTOR-F04
F72
JUNCTION BLOCK
E44
E45
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
F29
E11
F2
ECM
E10
F13
F14
KK
LL
FF
GG
HH
II
JJ
ABBWA0523GB



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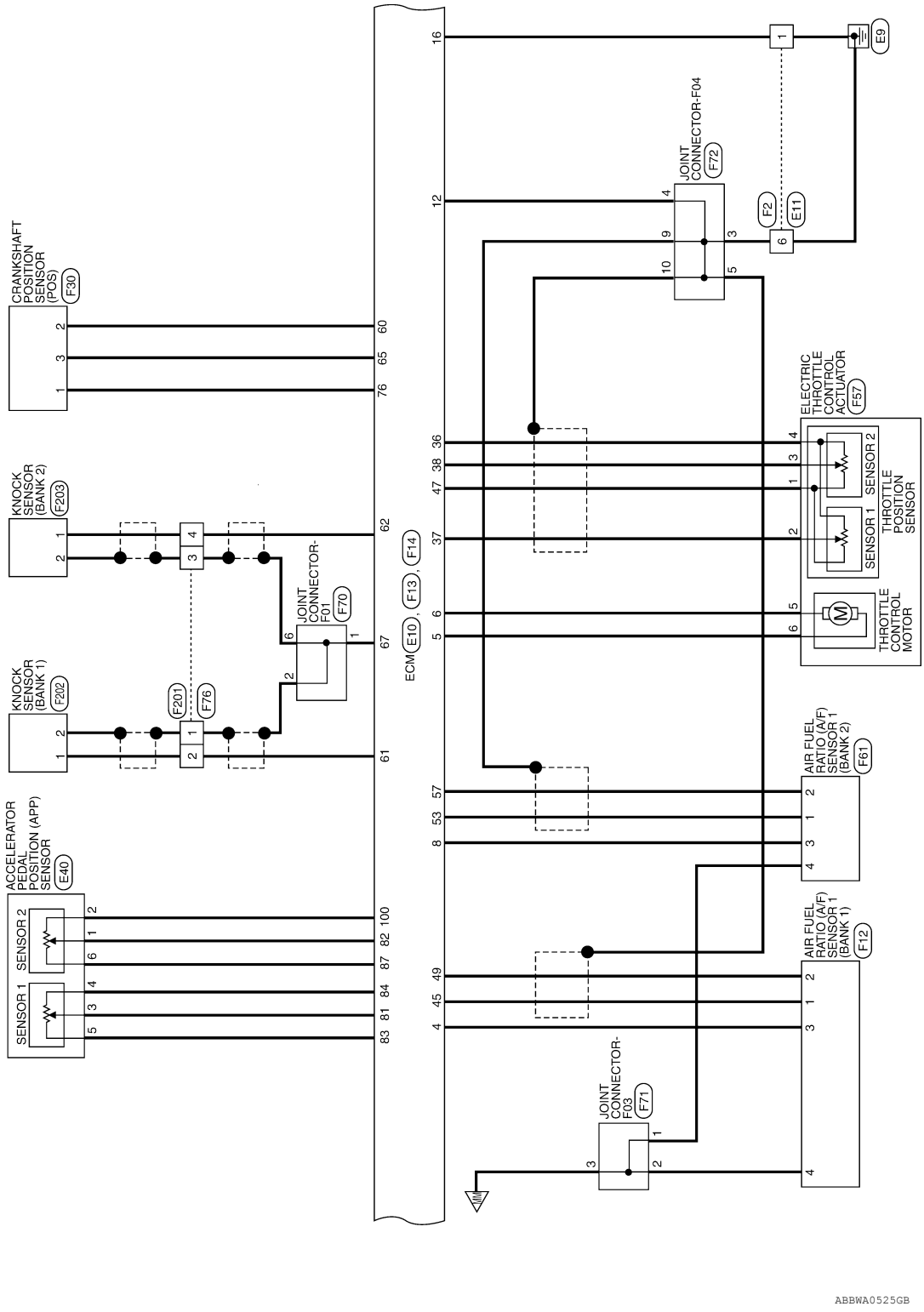
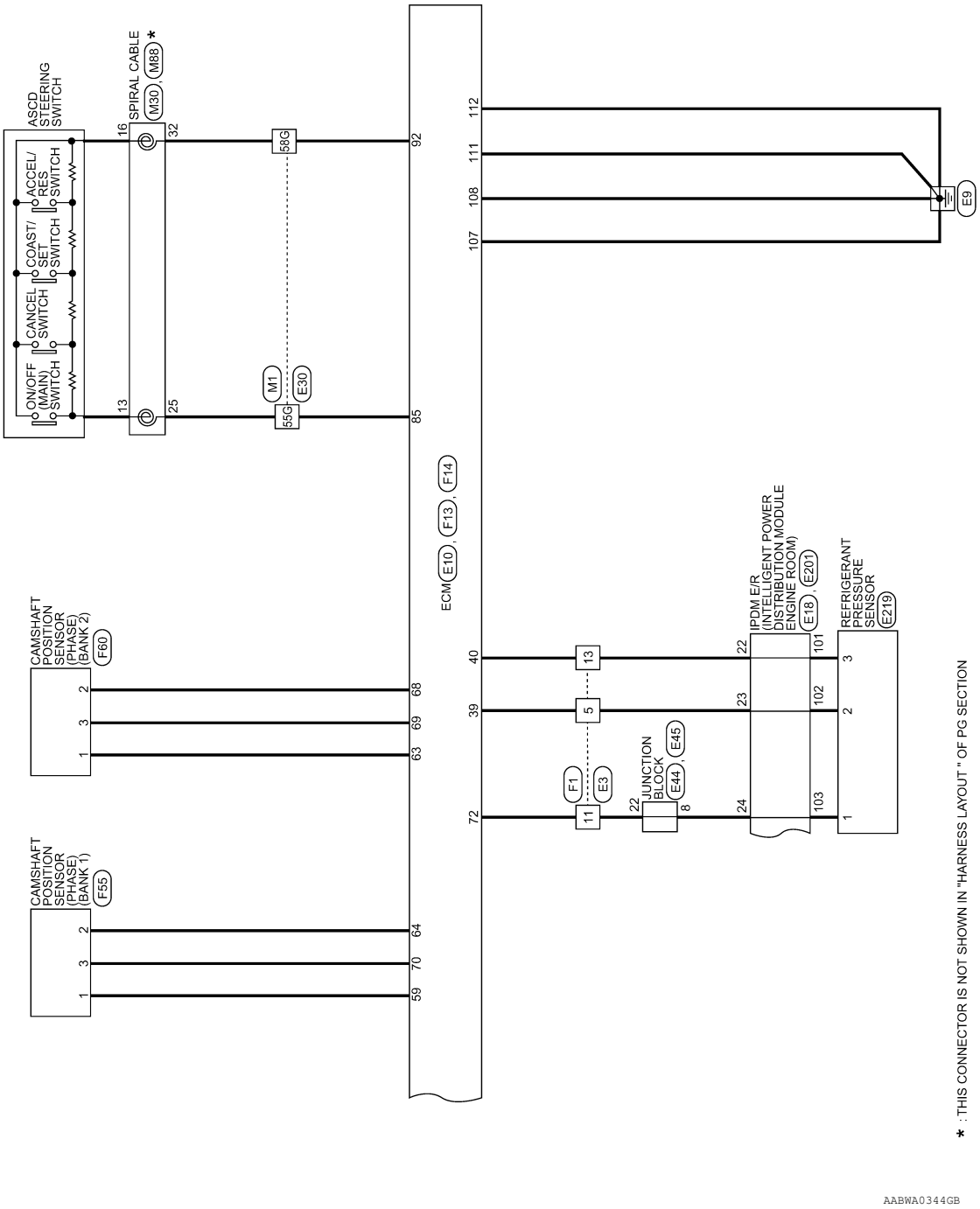
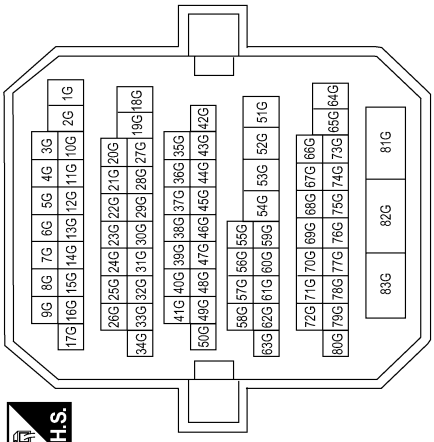

CRANKSHAFT POSITION SENSOR (POS) F30
KNOCK SENSOR (BANK 2) F203
KNOCK SENSOR (BANK 1) F202
ACCELERATOR PEDAL POSITION (APP) SENSOR E40
SENSOR 1
SENSOR 2
JOINT CONNECTOR-F01 F70
F201
F76
ECM E10, F13, F14
JOINT CONNECTOR-F04 F72
F2
E11
E9
ELECTRIC THROTTLE CONTROL ACTUATOR F57
THROTTLE POSITION SENSOR
SENSOR 1
SENSOR 2
THROTTLE CONTROL MOTOR
AIR FUEL RATIO (A/F) SENSOR 1 (BANK 2) F61
AIR FUEL RATIO (A/F) SENSOR 1 (BANK 1) F12
JOINT CONNECTOR-F03 F71
ABBWA0525GB


ASCD STEERING SWITCH
ON/OFF (MAIN) SWITCH
CANCEL SWITCH
COAST/ SET SWITCH
ACCEL/ RES SWITCH
SPIRAL CABLE (M30), (M88) *
16
32
13
25
58G
M1
55G
E30
92
85
ECM (E10), (F13), (F14)
112
111
108
107
E9
CAMSHAFT POSITION SENSOR (PHASE) (BANK 2) F60
CAMSHAFT POSITION SENSOR (PHASE) (BANK 1) F55
68
69
63
64
70
59
40
39
72
13
5
F1
11
E3
JUNCTION BLOCK (E44), (E45)
22
8
IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM) (E18), (E201)
22
23
24
101
102
103
REFRIGERANT PRESSURE SENSOR E219
3
2
1
* : THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT " OF PG SECTION
AABWA0344GB

ENGINE CONTROL SYSTEM CONNECTORS - VQ35DE

Connector No.	M1
Connector Name	WIRE TO WIRE
Connector Color	WHITE

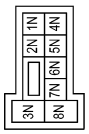
H.S.



Terminal No.	Color of Wire	Signal Name
8G	P	–
15G	L	–
34G	O	–
51G	L	–
52G	P	–
55G	G/Y	–
58G	R	–
60G	V/W	–
63G	B/W	–

Connector No.	M3
Connector Name	FUSE BLOCK (J/B)
Connector Color	WHITE

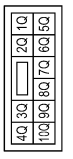
H.S.



Terminal No.	Color of Wire	Signal Name
2N	G	–

Connector No.	M4
Connector Name	FUSE BLOCK (J/B)
Connector Color	WHITE

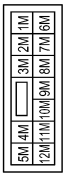
H.S.



Terminal No.	Color of Wire	Signal Name
6Q	Y/R	–

Connector No.	M5
Connector Name	FUSE BLOCK (J/B)
Connector Color	WHITE

H.S.

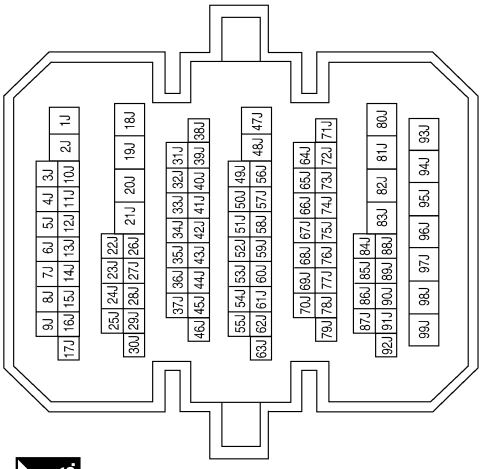


Terminal No.	Color of Wire	Signal Name
12M	O	–

AABIA0534GB

Connector No.	M6
Connector Name	WIRE TO WIRE
Connector Color	WHITE

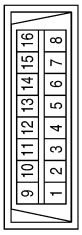
H.S.



Terminal No.	Color of Wire	Signal Name
30J	B/W	–

Connector No.	M22
Connector Name	DATA LINK CONNECTOR
Connector Color	WHITE

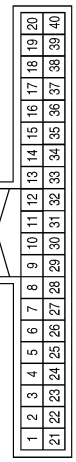
H.S.



Terminal No.	Color of Wire	Signal Name
4	B	–
5	B	–
6	L	–
7	O	–
8	G	–
14	P	–
16	Y/R	–

Connector No.	M24
Connector Name	COMBINATION METER
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
2	O	IGN
3	B	GND
4	B	GND
21	L	CAN-H
22	P	CAN-L
23	B	GND

Connector No.	M30
Connector Name	SPIRAL CABLE
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
25	G/Y	ASCD_SW
32	R	ASCD_GND

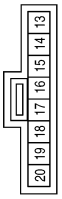
Connector No.	M59
Connector Name	POWER STEERING CONTROL UNIT
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
10	V/W	ENG_TACHO

Connector No.	M88
Connector Name	SPIRAL CABLE
Connector Color	GRAY

H.S.



Terminal No.	Color of Wire	Signal Name
13	Y	ASCD_SW
16	B	ASCD_GND

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Connector No.	E1
Connector Name	JOINT CONNECTOR-E01
Connector Color	WHITE

H.S.

3	2	1
6	5	4

Terminal No.	Color of Wire	Signal Name
4	Y	–
5	Y	–
6	Y	–

Connector No.	E3
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
3	Y	–
5	GR	–
11	GR	–
13	SB	–

Connector No.	E6
Connector Name	FUSE BLOCK (J/B)
Connector Color	WHITE

H.S.

7P	6P	5P	4P		3P	2P	1P
16P	15P	14P	13P	12P	11P	10P	9P	8P

Terminal No.	Color of Wire	Signal Name
1P	SB	–
2P	P	–
4P	P	–
8P	R	–

Connector No.	E10
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
81	W	APS1
82	O	APS2
83	GR	AVCC1-APS1
84	B	GNDA-APS1
85	Y	ASCDSW
86	–	–
87	BR	AVCC2-APS2
88	O	KLINE
89	–	–
90	–	–
91	–	–

Terminal No.	Color of Wire	Signal Name
92	BR	GNDA-ASCDSW
93	Y	IGNSW
94	GR	TACHO(CABIN)
95	Y	TF
96	–	–
97	P	CAN-L
98	L	CAN-H
99	–	–
100	G	GNDA-APS2
101	–	–
102	R	NEUT-H
103	–	–
104	P	GNDA-TF
105	V	VBR
106	SB	BRAKE
107	B	GND
108	B	GND
109	W	CDCV
110	G	BNCSW
111	B	GND
112	B	GND

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Connector No.	E11
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

1	2		3	4
5	6	7	8	9	10

Terminal No.	Color of Wire	Signal Name
1	B	–
2	L	–
5	R	–
6	B	–
7	O	–

Connector No.	E12
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

1	2	3
4	5	6

Terminal No.	Color of Wire	Signal Name
1	R	–
2	GR	–
3	BR	–
4	P	–
5	L	–

Connector No.	E17
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

42	41	40	39
46	45	44	43

Terminal No.	Color of Wire	Signal Name
39	P	CAN-L
40	L	CAN-H
41	B	GND (SIGNAL)
42	SB	MOTOR_FAN_RLY_MID

Connector No.	E18
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

9	10	11	12	13	14
3	4	5	6	7	8

25	26	27	28	29	30	31	32	33	34
15	16	17	18	19	20	21	22	23	24

37	38
35	36

Terminal No.	Color of Wire	Signal Name
10	BR	ECM VB
12	B	GND (POWER)
13	SB	FUEL PUMP
15	W	START IG-E/R
19	Y	BCM IGNSW
22	W/R	PD SENS GND-E/R
23	B/R	PD SENS SIG-E/R
24	BR/W	PD SEN PWR-E/R
30	R/B	CLUTCH_I/L SW
34	O/L	MOTOR FAN RLY HI
35	P	MOTOR FAN LO
38	R/W	F/L MOTOR FAN

Connector No.	E20
Connector Name	JOINT CONNECTOR-E02
Connector Color	WHITE

H.S.

3	2	1
6	5	4

Terminal No.	Color of Wire	Signal Name
1	GR	–
2	GR	–
3	GR	–
4	P	–
5	P	–
6	P	–

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Connector No.	E21
Connector Name	JOINT CONNECTOR-E03
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	L	–
2	L	–

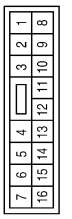
Connector No.	E22
Connector Name	JOINT CONNECTOR-E04
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	P	–
2	P	–

Connector No.	E29
Connector Name	WIRE TO WIRE
Connector Color	WHITE

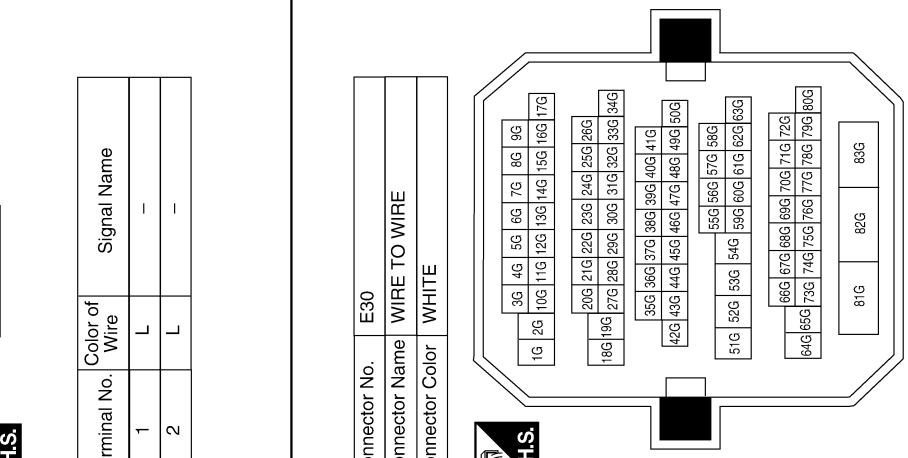
H.S.



Terminal No.	Color of Wire	Signal Name
1	R	–
7	SB	–
8	B/Y	–
9	W	–
12	Y	–

Connector No.	E30
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.



Terminal No.	Color of Wire	Signal Name
8G	P	–
15G	L	–
34G	O	–
51G	L	–
52G	P	–
55G	Y	–
58G	BR	–
60G	GR	–
63G	P	–

Connector No.	E37
Connector Name	ASCD BRAKE SWITCH
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1	L	–
2	W	–

ABBIA0706GB

Connector No.	E38
Connector Name	STOP LAMP SWITCH
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	–
2	LG	–
3	V	–
4	L	–

Connector No.	E40
Connector Name	ACCELERATOR PEDAL POSITION (APP) SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	APS2
2	G	GND-A2
3	W	APS1
4	B	GND-A1
5	GR	AVCC1
6	BR	AVCC2

Connector No.	E42
Connector Name	COOLING FAN RELAY-2
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	–
2	G	–
3	L	–
5	Y	–
6	B	–
7	R	–

Connector No.	E43
Connector Name	COOLING FAN RELAY-3
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	–
2	Y	–
3	GR	–
5	Y	–
6	B	–
7	P	–

Connector No.	E44
Connector Name	JUNCTION BLOCK
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	–
2	BR	–
3	L	–
4	W	–
6	W	–
8	G	–
10	SB	–
12	G/R	–

Connector No.	E45
Connector Name	JUNCTION BLOCK
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
14	G	–
15	R	–
16	O	–
17	V	–
20	SB	–
22	GR	–
24	W	–

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Connector No.	E46
Connector Name	JUNCTION BLOCK
Connector Color	WHITE

H.S.

31	30	29	28		27	26	25
40	39	38	37	36	35	34	33	32

Terminal No.	Color of Wire	Signal Name
30	W	–
31	O	–
33	Y	–
34	L	–

Connector No.	E47
Connector Name	JUNCTION BLOCK
Connector Color	WHITE

H.S.

42		41
46	45	44	43

Terminal No.	Color of Wire	Signal Name
43	SB	–
44	O	–

Connector No.	E48
Connector Name	JUNCTION BLOCK
Connector Color	WHITE

H.S.

50	49	48	47

Terminal No.	Color of Wire	Signal Name
47	G	–
48	Y	–
49	O	–
50	SB	–

Connector No.	E50
Connector Name	JUNCTION BLOCK
Connector Color	WHITE

H.S.

56	55

Terminal No.	Color of Wire	Signal Name
55	BR	–

Connector No.	E55
Connector Name	JOINT CONNECTOR-E07
Connector Color	WHITE

H.S.

4	3	2	1

Terminal No.	Color of Wire	Signal Name
1	W	–
3	R	–
4	R	–

Connector No.	E56
Connector Name	JOINT CONNECTOR-E14
Connector Color	WHITE

H.S.

4	3	2	1

Terminal No.	Color of Wire	Signal Name
3	LG	–
4	LG	–

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Connector No.	E57
Connector Name	STOP LAMP RELAY-1
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	LG	–
2	B	–
3	Y	–
5	W	–

Connector No.	E201
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
101	O/L	PD_SENS_GND
102	R/B	PD_SENS_SIG
103	P	PD_SEND_PWR

Connector No.	E203
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	–
2	R/W	–
3	R/Y	–
4	L/B	–
5	L	–

Connector No.	E219
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	P	AVCC2
2	R	SIGNAL
3	W	GND

Connector No.	E220
Connector Name	COOLING FAN MOTOR-1
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	R/Y	LO +
2	R/Y	HI +
3	R	HI -
4	L/B	LO -

Connector No.	E221
Connector Name	COOLING FAN MOTOR-2
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	R/W	LO +
2	L	HI +
3	B	HI -
4	B	LO -

AABIA0538GB

Connector No.	F1
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

7	6	5	4		3	2	1
16	15	14	13	12	11	10	9	8

Terminal No.	Color of Wire	Signal Name
3	GR	–
5	O	–
11	R	–
13	SB	–

Connector No.	F2
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

4	3		2	1
10	9	8	7	6	5

Terminal No.	Color of Wire	Signal Name
1	B	–
2	Y	–
5	G	–
6	B	–
7	W	–

Connector No.	F5
Connector Name	BATTERY CURRENT SENSOR
Connector Color	BLACK

H.S.

1	2	3

Terminal No.	Color of Wire	Signal Name
1	P	AVCC1
2	O	GND
3	G	SIGNAL

Connector No.	F11
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Color	GRAY

H.S.

1	2

Terminal No.	Color of Wire	Signal Name
1	P	TW
2	L	GND

Connector No.	F10
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

H.S.

53	54	55	56	57	58
47	48	49	50	51	52

69	70	71	72	73		74	75	76	77	78
59	60	61	62	63		64	65	66	67	68

81	82
79	80

Terminal No.	Color of Wire	Signal Name
49	V	IGN_COIL
51	SB	INJECTOR_#1
52	Y	INJECTOR_#2
53	G	ENG_SOL
54	GR	ETC
55	LG	ECM_BAT
56	R	O2_SENS_#1
57	O	O2_SENS #2
69	SB	SSOFF
70	G	MOTRLY
72	R/B	NPSW
77	GR	FPR

AABIA0539GB

Connector No.	F12
Connector Name	AIR FUEL RATIO (A/F) SENSOR 1 (BANK 1)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	L	AF (+)
2	G	AF (-)
3	V	HEATER (-)
4	O	HEATER (+)

Connector No.	F13
Connector Name	ECM
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
33	Y	O2SR1
34	V	O2SR2
35	B	GNDA-O2SR1, O2SR2
36	G	GNDA-TPS-B1
37	B	TPS1-B1
38	R	TPS2-B1
39	O	PDPRES
40	SB	GNDA-PDPRES

Terminal No.	Color of Wire	Signal Name
41	SB	PSPRES
42	G	CURSEN
43	–	–
44	O	GNDA-CURSEN, INTPRES1
45	L	AF+1
46	P	TW
47	W	AVCC1-TPS-B1
48	GR	GNDA-PSPRES
49	G	AF-1
50	O	TA1
51	P	AVCC1-CURSEN, INTPRES1
52	L	GNDA-TW, T01
53	V	AF+2
54	GR	TO1
55	LG	AVCC1-PSPRES
56	Y	QA1, GNDA-TA1
57	LG	AF-2
58	BR	QA1+

Terminal No.	Color of Wire	Signal Name
59	L	AVCC1-PHASE 1
60	W	GND-POS
61	GR	KNK1
62	W	KNK2
63	O	AVCC1-PHASE 2, E-PHASE#2
64	BR	AVCC1-PHASE 1, E-PHASE#1
65	R	POS
66	–	–
67	GR	GNDA-KNK 1, KNK 2
68	V	GND-PHASE 2, E-PHASE#2
69	P	PHASE 2
70	Y	PHASE 1
71	–	–
72	R	AVCC2-PDPRES
73	–	–
74	–	–
75	Y	CVTC#2
76	BR	AVCC2-POS
77	LG	BATT
78	L	CVTC#1
79	–	–
80	–	–

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Connector No.	F14
Connector Name	ECM
Connector Color	GRAY

H.S.

1	5	9	13	17	21	25	29
2	6	10	14	18	22	26	30
3	7	11	15	19	23	27	31
4	8	12	16	20	24	28	32

Terminal No.	Color of Wire	Signal Name
1	P	INJ #6
2	GR	VMOT-B1
3	Y	INJ #5
4	V	AFH1
5	R	MOTOR1-B1
6	BR	MOTOR2-B1
7	–	–
8	SB	AFH2
9	P	IGN #3
10	G	IGN #2
11	Y	IGN #1
12	B	GND
13	O	O2HR1
14	B/R	FPR
15	R	MOTRLY-B1
16	B	GND
17	G	O2HR2
18	L	IGN #6
19	R	IGN #5
20	–	–
21	GR	IGN #4
22	–	–
23	–	–
24	SB	SSOFF
25	W	EVAP
26	B	VIAS2
27	B/W	VIAS1
28	BR	EMMNV
29	LG	INJ #4
30	O	INJ #3
31	SB	INJ #2
32	V	INJ #1

Connector No.	F16
Connector Name	TCM (TRANSMISSION CONTROL MODULE)
Connector Color	BLACK

H.S.

31	32	33	34	35	36	37	38	39	40	47	48
21	22	23	24	25	26	27	28	29	30	45	46
11	12	13	14	15	16	17	18	19	20	43	44
1	2	3	4	5	6	7	8	9	10	41	42

Terminal No.	Color of Wire	Signal Name
20	W	ST_RLY

Connector No.	F17
Connector Name	FUEL INJECTOR NO. 1
Connector Color	GRAY

H.S.

1	2

Terminal No.	Color of Wire	Signal Name
1	SB	IGN
2	V	GND

Connector No.	F18
Connector Name	FUEL INJECTOR NO. 2
Connector Color	GRAY

H.S.

1	2

Terminal No.	Color of Wire	Signal Name
1	Y	IGN
2	SB	C/U

AABIA0541GB

Connector No.	F19
Connector Name	FUEL INJECTOR NO. 3
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	IGN
2	O	C/U

Connector No.	F20
Connector Name	FUEL INJECTOR NO. 4
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	IGN
2	LG	C/U

Connector No.	F21
Connector Name	FUEL INJECTOR NO. 5
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	IGN
2	Y	C/U

Connector No.	F22
Connector Name	FUEL INJECTOR NO. 6
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	IGN
2	P	GND

Connector No.	F26
Connector Name	CONDENSER-2
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	V	VBR
2	B	GND

Connector No.	F29
Connector Name	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	VBR
2	W	GND

AABIA0542GB

Connector No.	F30
Connector Name	CRANKSHAFT POSITION SENSOR (POS)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	BR	AVCC2
2	W	GND
3	R	POS

Connector No.	F31
Connector Name	MASS AIR FLOW SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
2	W	VB
3	Y	GND
4	BR	QA+
5	O	TA+
6	L	TA-

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	Y	SIGNAL
2	B	GND
3	V	VBR

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	G	SIGNAL
2	B	GND
3	V	VBR

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	P	SIGNAL
2	B	GND
3	V	VBR

Connector No.	F37
Connector Name	IGNITION COIL NO. 4 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	GR	SIGNAL
2	B	GND
3	V	VBR

AABIA0543GB

Connector No.	F38
Connector Name	IGNITION COIL NO. 5 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	SIGNAL
2	B	GND
3	V	VBR

Connector No.	F39
Connector Name	IGNITION COIL NO. 6 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	L	SIGNAL
2	B	GND
3	V	VBR

Connector No.	F40
Connector Name	POWER STEERING PRESSURE SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	LG	AVCC1
2	SB	OUTPUT
3	GR	GND

Connector No.	F55
Connector Name	CAMSHAFT POSITION SENSOR (PHASE) (BANK 1)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	L	AVCC1
2	BR	GND
3	Y	PHASE

Connector No.	F56
Connector Name	HEATED OXYGEN SENSOR 2 (BANK 2)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	B	SENSOR(-)
2	L	HEATER(+)
3	G	HEATER(-)
4	V	SENSOR(+)

Connector No.	F57
Connector Name	ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	INPUT
2	B	OUTPUT1
3	R	OUTPUT2
4	G	GND
5	BR	MOTOR2
6	R	MOTOR1

AABIA0544GB

Connector No.	F60
Connector Name	CAMSHAFT POSITION SENSOR (PHASE) (BANK 2)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	AVCC1
2	V	GND
3	P	PHASE

Connector No.	F61
Connector Name	AIR FUEL RATIO (A/F) SENSOR 1 (BANK 2)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	V	AF(+)
2	LG	AF(-)
3	SB	HEATER(-)
4	O	HEATER(+)

Connector No.	F62
Connector Name	HEATED OXYGEN SENSOR 2 (BANK 1)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	B	SENSOR(-)
2	L	HEATER(+)
3	O	HEATER(-)
4	Y	SENSOR(+)

Connector No.	F63
Connector Name	VIAS CONTROL SOLENOID VALVE 1
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	G	VBR
2	B/W	GND

Connector No.	F64
Connector Name	ELECTRONIC CONTROLLED ENGINE MOUNT CONTROL SOLENOID VALVE
Connector Color	BROWN

H.S.

Terminal No.	Color of Wire	Signal Name
1	GR	IGN
2	BR	ENMN1

Connector No.	F65
Connector Name	VIAS CONTROL SOLENOID VALVE 2
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	G	VBR
2	B	GND

AABIA0545GB

Connector No.	F66
Connector Name	INTAKE VALVE TIMING CONTROL SOLENOID VALVE (BANK 2)
Connector Color	GREEN

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	CVTC
2	G	VBR

Connector No.	F67
Connector Name	INTAKE VALVE TIMING CONTROL SOLENOID VALVE (BANK 1)
Connector Color	GREEN

H.S.

Terminal No.	Color of Wire	Signal Name
1	L	CVTC
2	G	VBR

Connector No.	F68
Connector Name	ENGINE OIL TEMPERATURE SENSOR
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	GR	TO
2	L	GND

Connector No.	F70
Connector Name	JOINT CONNECTOR-F01
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	GR	–
2	SHIELD	–
3	B	–
4	B	–
5	B	–
6	SHIELD	–
8	L	–
9	L	–
10	L	–

Connector No.	F71
Connector Name	JOINT CONNECTOR-F03
Connector Color	GREEN

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	–
2	O	–
3	O	–
4	L	–
5	L	–
6	R	–

Connector No.	F72
Connector Name	JOINT CONNECTOR-F04
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	Y	–
3	B	–
4	B	–
5	SHIELD	–
6	L	–
9	SHIELD	–
10	SHIELD	–

AABIA0546GB

Connector No.	F74
Connector Name	JOINT CONNECTOR-F08
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	Y	–
3	Y	–
4	Y	–

Connector No.	F75
Connector Name	JOINT CONNECTOR-F07
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	SB	–
2	SB	–
3	SB	–
4	SB	–

Connector No.	F76
Connector Name	WIRE TO WIRE
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	SHIELD	–
2	GR	–
3	SHIELD	–
4	W	–

Connector No.	F201
Connector Name	WIRE TO WIRE
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	SHIELD	–
2	GR	–
3	SHIELD	–
4	W	–

Connector No.	F202
Connector Name	KNOCK SENSOR (BANK 1)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	KNK
2	SHIELD	–

Connector No.	F203
Connector Name	KNOCK SENSOR (BANK 2)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	GR	KNK
2	SHIELD	–

AABIA0547GB

Connector No.	B1
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

1J	2J	3J	4J	5J	6J	7J	8J	9J
	10J	11J	12J	13J	14J	15J	16J	17J
18J	19J	20J	21J	22J	23J	24J	25J	
				26J	27J	28J	29J	30J
31J	32J	33J	34J	35J	36J	37J		
38J	39J	40J	41J	42J	43J	44J	45J	46J
47J	48J	49J	50J	51J	52J	53J	54J	55J
		56J	57J	58J	59J	60J	61J	62J
63J	64J	65J	66J	67J	68J	69J	70J	
71J	72J	73J	74J	75J	76J	77J	78J	79J
80J	81J	82J	83J	84J	85J	86J	87J	
				88J	89J	90J	91J	92J
93J	94J	95J	96J	97J	98J	99J		

Terminal No.	Color of Wire	Signal Name
30J	B	–

Connector No.	B10
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	R	–
7	W	–
8	B	–
9	W	–
12	Y	–

Connector No.	B39
Connector Name	EVAP CANISTER VENT CONTROL VALVE
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	BATT
2	W	C/U

Connector No.	B42
Connector Name	FUEL LEVEL SENSOR UNIT AND FUEL PUMP
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	IGN
3	B	GND
4	Y	TEMP SENS
5	B	SENSOR -

ABBIA0895GB

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:0000000006392184

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-619
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-701
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-616
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-394
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-635
	Incorrect idle speed adjustment						1	1	1	1		1			EC-331
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-576, EC-583
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-331
	Ignition circuit	1	1	2	2	2		2	2			2			EC-629
Power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-438
Mass air flow sensor circuit		1	1	2	2	2		2	2			2			EC-456
Engine coolant temperature sensor circuit							3			3					EC-465
Air fuel ratio (A/F) sensor 1 circuit					3										EC-471, EC-475, EC-479
Throttle position sensor circuit							2			2					EC-468, EC-494, EC-532, EC-534, EC-592
Accelerator pedal position sensor circuit				3	2	1									EC-521, EC-585, EC-588, EC-595
Knock sensor circuit				2								3			EC-497
Crankshaft position sensor (POS) circuit		2	2												EC-500
Camshaft position sensor (PHASE) circuit		3	2												EC-504

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Vehicle speed signal circuit		2	3		3						3			EC-511
Power steering pressure sensor circuit		2					3	3						EC-513
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-516, EC-518
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-453
PNP signal circuit			3		3		3	3			3			EC-524
VIAS control solenoid valve 1 circuit					1									EC-565
VIAS control solenoid valve 2 circuit					1									EC-567
Refrigerant pressure sensor circuit		2				3			3		4			EC-636
Electrical load signal circuit							3							EC-608
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-4, HAC-107
ABS actuator and electric unit (control unit)			4											BRC-7, BRC-69, BRC-141

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-14
	Fuel piping			5	5	5		5	5			5			FL-5
	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-131
	Air cleaner														EM-125
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)														EM-131
	Electric throttle control actuator														EM-132
	Air leakage from intake manifold/ Collector/Gasket														EM-132, EM-135
Cranking	Battery	1	1	1		1		1	1			1		1	PG-3, PG-71
	Generator circuit														STR-32, STR-35
	Starter circuit	3													STR-32, STR-35
	Signal plate	6													EM-218
	PNP signal circuit	4													TM-22, TM-136
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-193
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-218
	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-170
	Camshaft														EM-180
	Intake valve timing control														EM-170
	Intake valve												3		EM-193
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-138, EX-12
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			LU-25, LU-27, LU-29, LU-32
	Oil level (Low)/Filthy oil														LU-25
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-38
	Thermostat									5					CO-47
	Water pump														CO-42
	Water gallery														CO-49
	Cooling fan									5					CO-40
	Coolant level (Low)/Contaminated coolant														CO-34
NATS (Nissan Anti-theft System)		1	1												SEC-20, SEC-234

1 - 6: The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

Description

INFOID:0000000006392185

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 2,000 rpm under no load [for example, the selector lever position is P or N and engine speed is over 2,000 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 1,000 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, EC-346, "System Description".

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000006904081

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted.
Information necessary to service the system safely is included in the “SRS AIR BAG” and “SEAT BELT” of this Service Manual.

WARNING:

Always observe the following items for preventing accidental activation.

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see “SRS AIR BAG”.**
- **Never use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

Always observe the following items for preventing accidental activation.

- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.**

Precaution Necessary for Steering Wheel Rotation After Battery Disconnect

INFOID:0000000008680967

NOTE:

- Before removing and installing any control units, first turn the push-button ignition switch to the LOCK position, then disconnect both battery cables.
- After finishing work, confirm that all control unit connectors are connected properly, then re-connect both battery cables.
- Always use CONSULT to perform self-diagnosis as a part of each function inspection after finishing work. If a DTC is detected, perform trouble diagnosis according to self-diagnosis results.

This vehicle is equipped with a push-button ignition switch and a steering lock unit.
If the battery is disconnected or discharged, the steering wheel will lock and cannot be turned.
If turning the steering wheel is required with the battery disconnected or discharged, follow the procedure below before starting the repair operation.

OPERATION PROCEDURE

1. Connect both battery cables.
   NOTE:
   Supply power using jumper cables if battery is discharged.
2. Carry the Intelligent Key or insert it to the key slot and turn the push-button ignition switch to ACC position. (At this time, the steering lock will be released.)
3. Disconnect both battery cables. The steering lock will remain released with both battery cables disconnected and the steering wheel can be turned.
4. Perform the necessary repair operation.

5. When the repair work is completed, re-connect both battery cables. With the brake pedal released, turn the push-button ignition switch from ACC position to ON position, then to LOCK position. (The steering wheel will lock when the push-button ignition switch is turned to LOCK position.)
6. Perform self-diagnosis check of all control units using CONSULT.

Precautions For Xenon Headlamp Service

INFOID:0000000006904084

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:

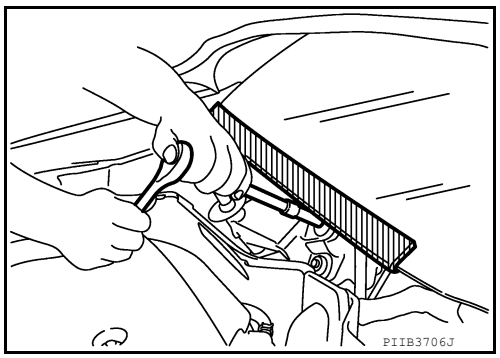
Comply with the following cautions to prevent any error and malfunction.

- **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.).**

Precaution for Procedure without Cowl Top Cover

INFOID:0000000006904316

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



On Board Diagnostic (OBD) System of Engine and CVT

INFOID:0000000006392189

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

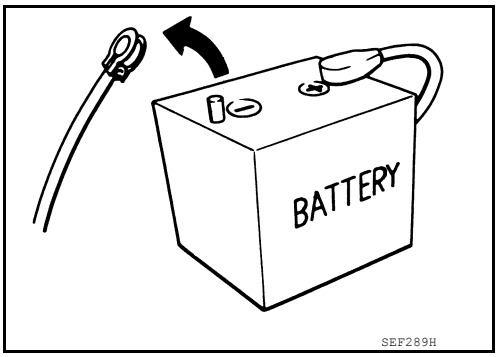
CAUTION:

- **Always to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Always to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Always the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-57, "Description" (COUPE models) or PG-129, "Description" (SEDAN models).**
- **Always to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.**
- **Always to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.**

General Precautions

INFOID:0000000006392190

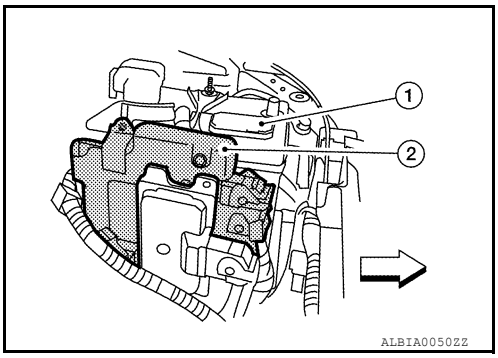
- **Always use a 12 volt battery as power source.**
- **Never attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery ground cable.**



- **Never disassemble ECM (2).**

1 : Battery

⇦ : Vehicle front



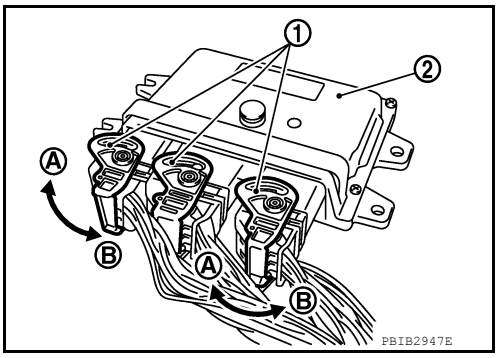
- **If a battery cable is disconnected, the memory will return to the ECM value.**
  The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Never replace parts because of a slight variation.
- **If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.**

- **Diagnostic trouble codes**
- **1st trip diagnostic trouble codes**
- **Freeze frame data**
- **1st trip freeze frame data**

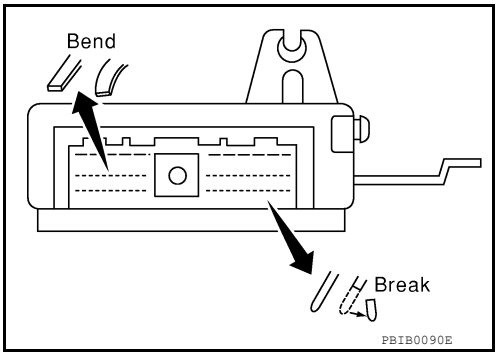
- **When connecting ECM harness connector, fasten (B) it securely with a lever (1) as far as it will go as shown in the figure.**

2 : ECM

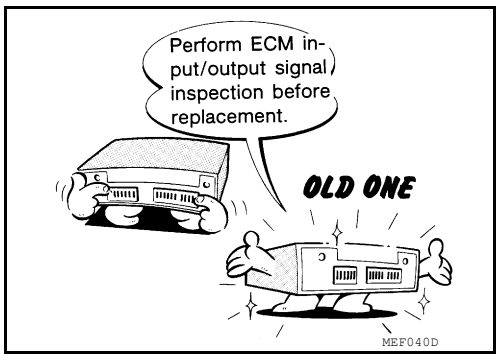
A : Loosen



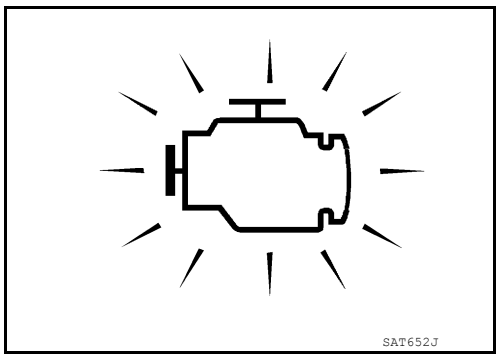
- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can 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.**



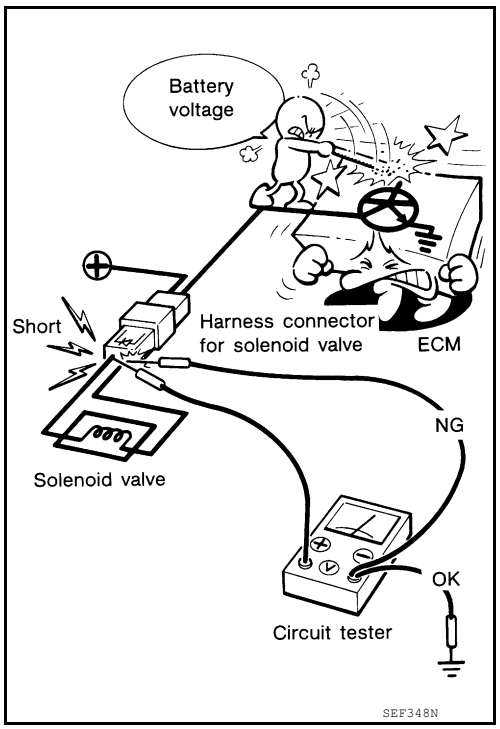
- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-643, "Reference Value".**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Never clean mass air flow sensor with any type of detergent.**
- **Never disassemble electric throttle control actuator.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Never shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**



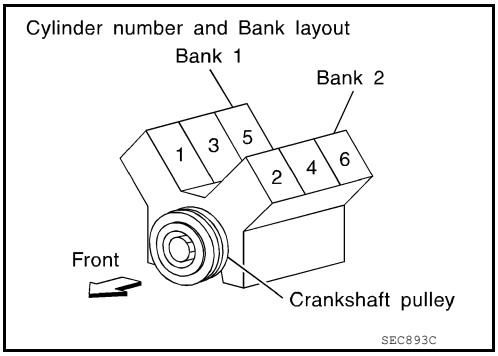
- **After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Component Function Check.**
  The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.



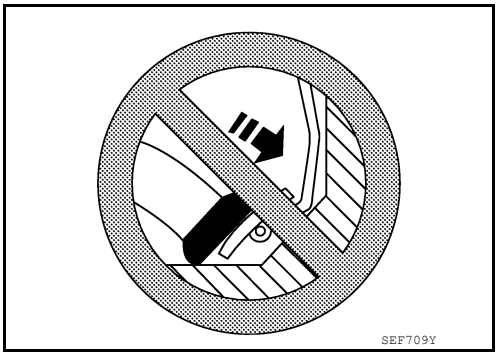
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.



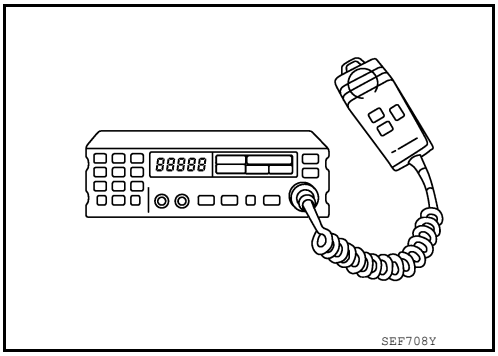
- **B1 indicates the bank 1, B2 indicates the bank 2 as shown in the figure.**
- **Never operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**



- **Never depress accelerator pedal when starting.**
- **Immediately after starting, never rev up engine unnecessarily.**
- **Never rev up engine just prior to shutdown.**



- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
- **Keep the antenna as far as possible from the electronic control units.**
- **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
  Never let them run parallel for a long distance.
- **Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.**
- **Be sure to ground the radio to vehicle body.**

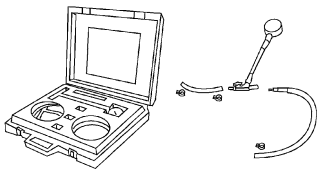
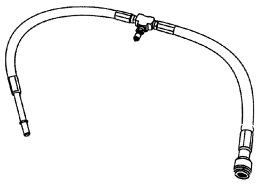


PREPARATION

PREPARATION

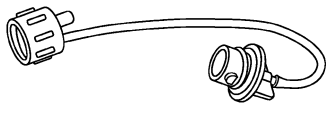
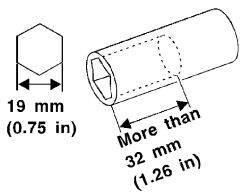
Special Service Tools

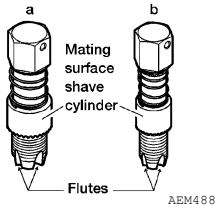
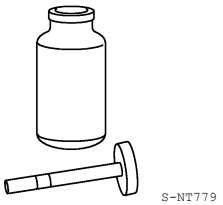
INFOID:0000000006392191

Tool number (SPX-North America No.) Tool name	Description
(J-44321) Fuel pressure gauge kit  LEC642	Checking fuel pressure
(J-44321-6) Fuel pressure adapter  LBIA0376E	Connecting fuel pressure to quick connector type fuel lines.

Commercial Service Tools

INFOID:0000000006392192

Tool name (SPX-North America No.)	Description
Fuel filler cap adapter i.e.: (MLR-8382)  S-NT815	Checking fuel tank vacuum relief valve opening pressure
Socket wrench  S-NT705	Removing and installing engine coolant temperature sensor

Tool name (SPX-North America No.)		Description
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)		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)		Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

PERIODIC MAINTENANCE

FUEL PRESSURE

Inspection

INFOID:0000000006392193

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.

Without CONSULT-III

1. Remove fuel pump fuse located in IPDM E/R. Refer to PG-64, "Fuse, Connector and Terminal Arrangement" or PG-136, "Fuse, Connector and Terminal Arrangement".
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.

FUEL PRESSURE CHECK

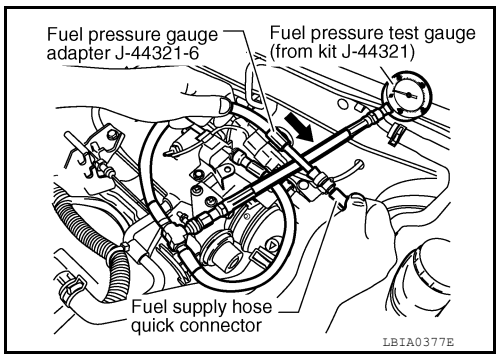
CAUTION:

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

NOTE:

- **Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because L32 models do not have fuel return system.**
- **Be careful not to scratch or get the fuel hose connection area dirty when servicing, so that the quick connector o-ring maintains seal ability.**
- **Use Fuel Pressure Gauge Kit [SST (J-44321)] and Fuel Pressure Adapter [SST (J-44321-6)] to check fuel pressure.**

1. Release fuel pressure to zero.
2. Remove fuel hose. Refer to EM-148, "Removal and Installation".
3. Install Fuel Pressure Adapter [SST (J-44321-6)] and Fuel Pressure Gauge [SST (J-44321)] as shown in figure.
   - Do not distort or bend fuel rail tube when installing fuel pressure gauge adapter.
   - When reconnecting fuel hose, check the original fuel hose for damage and abnormality.
4. Turn ignition switch ON (reactivate fuel pump) and check for fuel leakage.
5. Start engine and check for fuel leakage.
6. Read the indication of fuel pressure gauge.
   - During fuel pressure check, check for fuel leakage from fuel connection every 3 minutes.



At idling : Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2, 51 psi)

7. If result is unsatisfactory, go to next step.
8. Check the following.
   - Fuel hoses and fuel tubes for clogging
   - Fuel filter for clogging
   - Fuel pump
   - Fuel pressure regulator for clogging
9. If OK, replace fuel pressure regulator.

If NG, repair or replace.

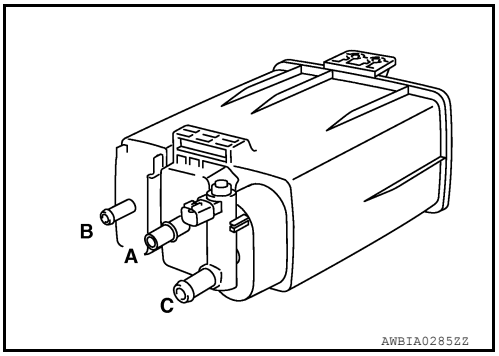
EVAPORATIVE EMISSION SYSTEM

Inspection

INFOID:0000000006392194

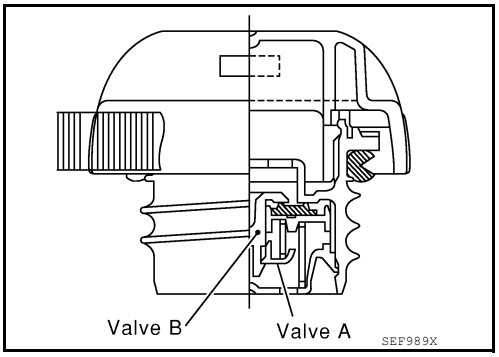
1. Visually inspect EVAP vapor lines for improper attachment and for cracks, damage, loose connections, chafing and deterioration.
2. Check EVAP canister as follows:

a. Block port (B).
b. Blow air into port (A) and check that it flows freely out of port (C).
c. Release blocked port (B).
d. Apply vacuum pressure to port (B) and check that vacuum pressure exists at the ports (A) and (C).
e. Block port (A) and (B).
f. Apply pressure to port (C) and check that there is no leakage.



3. Inspect fuel tank filler cap vacuum relief valve for clogging, sticking, etc.

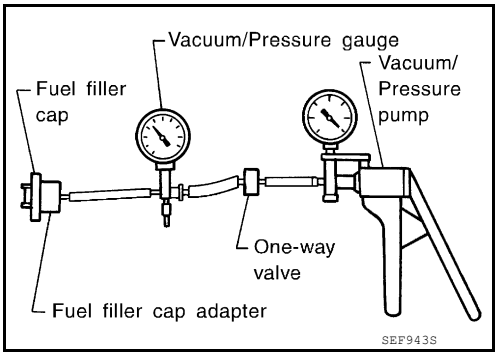
a. Wipe clean valve housing.



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 –3.3 kPa (–0.060 to –0.033 bar, – 0.061 to –0.034 kg/cm^2, –0.87 to –0.48 psi)

c. If out of specification, replace fuel filler cap as an assembly. Refer to FL-11, "Exploded View".



SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000006392195

Condition	Specification
No load* (in P or N position)	600 ± 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:0000000006392196

Condition	Specification
No load* (in P or N position)	18 ± 2°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