SECTION EC
ENGINE CONTROL SYSTEM

CONTENTS

HR16DE

MR TYPE 1

MR TYPE 2

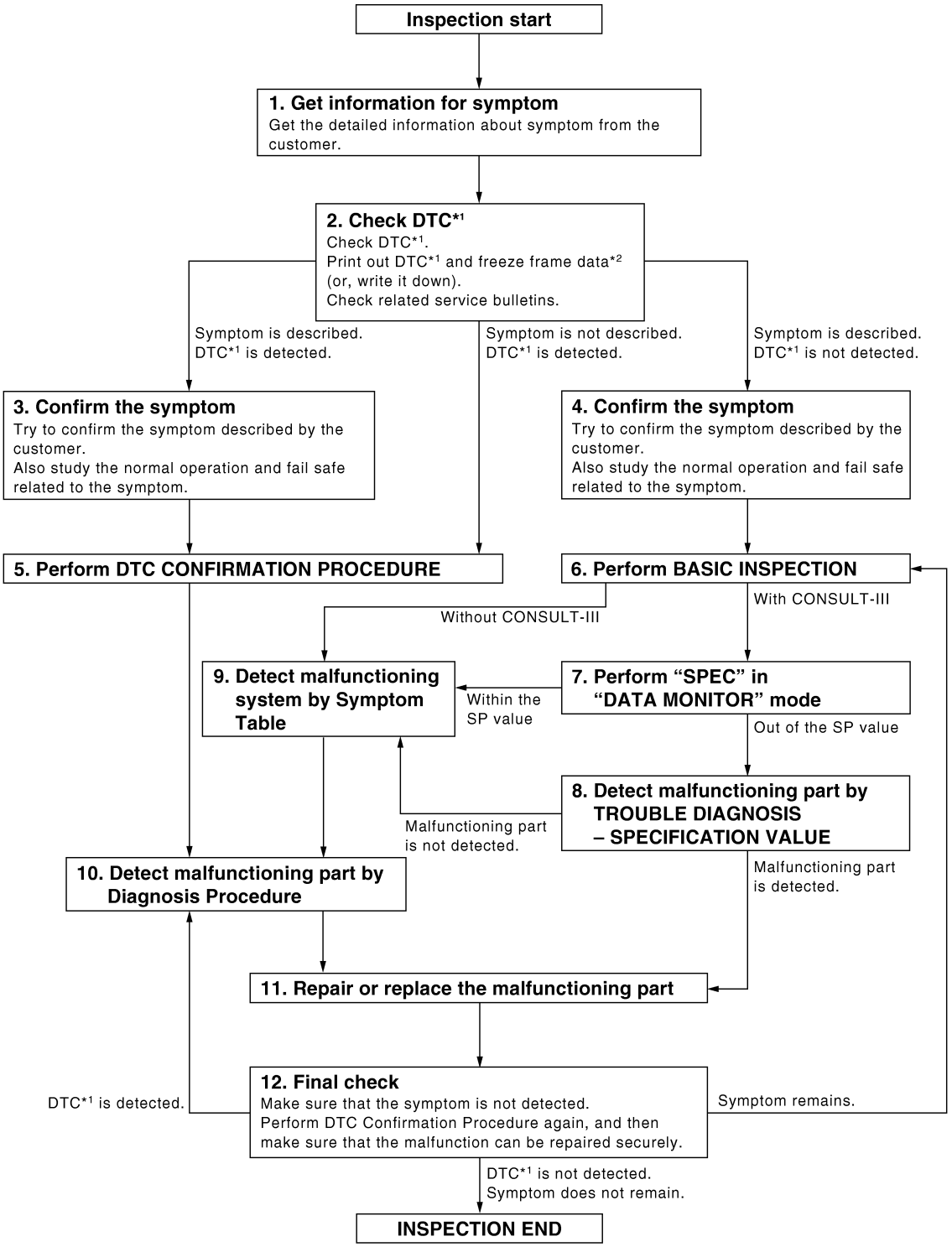
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:0000000004779987

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-25, "Diagnostic Work Sheet".)

>> GO TO 2.

2.CHECK DTC

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

- Record DTC and freeze frame data. (Print them out with CONSULT-III or GST.)
- Erase DTC. (Refer to “How to Erase DTC and 1st Trip DTC” in EC-90, "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-487, "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-491, "Description" and EC-472, "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-491, "Description" and EC-472, "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-474, "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 Intermittent Incident according to EC-120, "Diagnosis Procedure".

6.PERFORM BASIC INSPECTION

Perform EC-26, "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 “SPEC” of “DATA MONITOR” mode with CONSULT-III. Refer to EC-112, "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-113, "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-487, "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-25, "How to Perform Efficient Diagnosis for an Electrical Incident".

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-461, "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 “How to Erase DTC and 1st Trip DTC” in EC-90, "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 >> 1. Before returning the vehicle to the customer, make sure to erase unnecessary DTC in ECM (Refer to “How to Erase DTC and 1st Trip DTC” in EC-90, "Diagnosis Description".) and TCM (Refer to AT-39, "OBD-II Diagnostic Trouble Code (DTC)".).
2. If the completion of SRT is needed, drive vehicle under the specific “DRIVING PATTERN” in EC-478, "How to Set SRT Code".
3. INSPECTION END

Diagnostic Work Sheet

INFOID:0000000004779988

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.

Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

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

KEY POINTS

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

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WORKSHEET SAMPLE

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

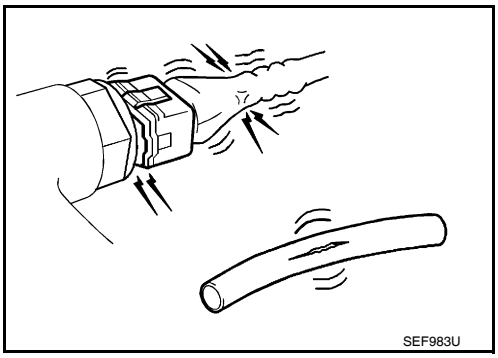
MTBL0017

INSPECTION AND ADJUSTMENT
BASIC INSPECTION
BASIC INSPECTION : Special Repair Requirement

INFOID:0000000004779989

1.INSPECTION START

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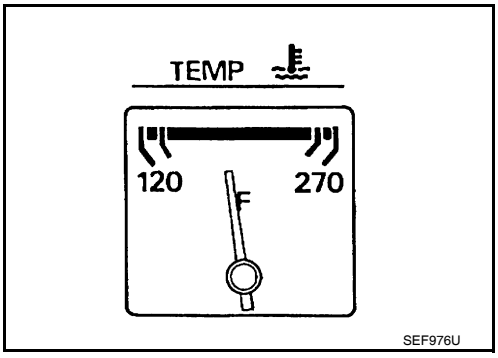

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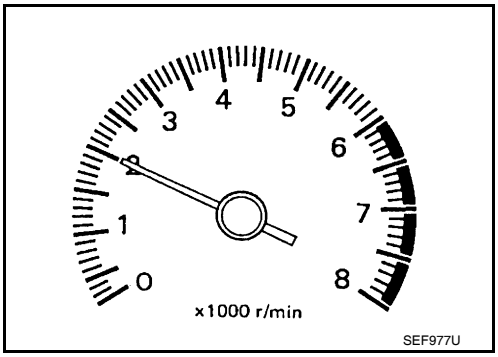
5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT-III or GST.

Is any DTC detected?

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



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2.REPAIR OR REPLACE

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

>> GO TO 3

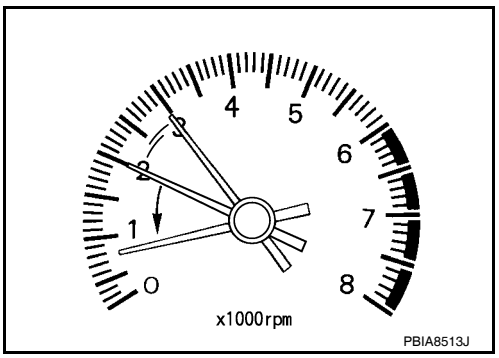
3.CHECK IDLE SPEED

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-30, "IDLE SPEED : Special Repair Requirement". For specification, refer to EC-504, "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-31, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-32, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

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

7. CHECK IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   For procedure, refer to EC-30, "IDLE SPEED : Special Repair Requirement".
   For specification, refer to EC-504, "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-268, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-263, "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 rare.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-249, "ECM Re-communicating Function".

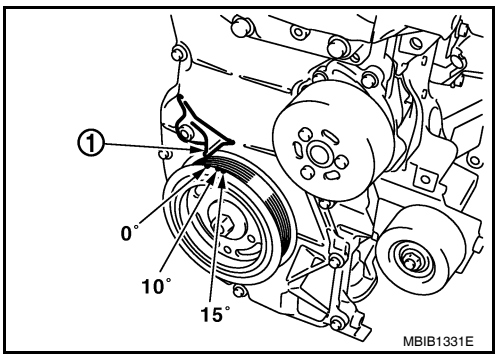
>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.

2. Check ignition timing with a timing light.
For procedure, refer to EC-30, "IGNITION TIMING : Special Repair Requirement". For specification, refer to EC-504, "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-31, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-32, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

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

14. CHECK IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
For procedure, refer to EC-30, "IDLE SPEED : Special Repair Requirement".
For specification, refer to EC-504, "Idle Speed".

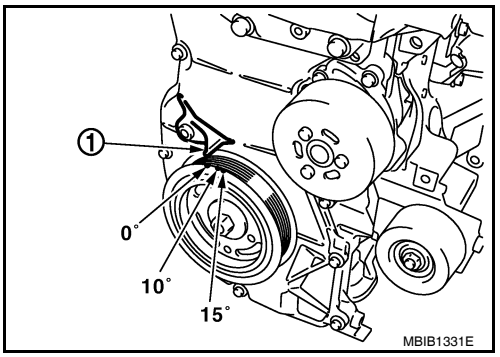
Is the inspection result normal?

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-30, "IGNITION TIMING : Special Repair Requirement". For specification, refer to EC-504, "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-161, "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-268, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-263, "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 rare.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to EC-29, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 4.

19.INSPECTION END

If ECM is replaced during this BASIC INSPECTION procedure, perform EC-29, "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:0000000004779990

When replacing ECM, this procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement

INFOID:0000000004779991

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

Refer to BL-249, "ECM Re-communicating Function".

>> GO TO 2.

2.PERFORM VIN REGISTRATION

Refer to EC-31, "VIN REGISTRATION : Special Repair Requirement".

>> GO TO 3.

3.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-31, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 4.

4.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 5.

5.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-32, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

>> END

IDLE SPEED

IDLE SPEED : Description

INFOID:0000000004779992

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

IDLE SPEED : Special Repair Requirement

INFOID:0000000004779993

1.CHECK IDLE SPEED

With CONSULT-III
Check idle speed in “DATA MONITOR” mode with CONSULT-III.

With GST
Check idle speed with Service $01 of GST.

>> INSPECTION END

IGNITION TIMING

IGNITION TIMING : Description

INFOID:0000000004779994

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

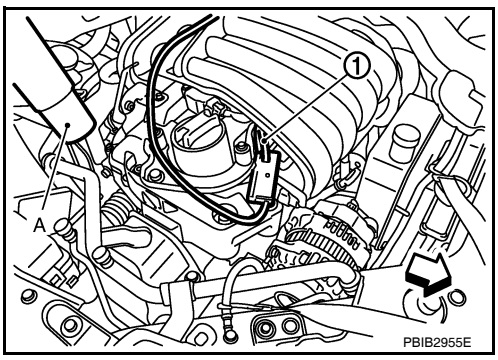
IGNITION TIMING : Special Repair Requirement

INFOID:0000000004779995

1.CHECK IGNITION TIMING

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

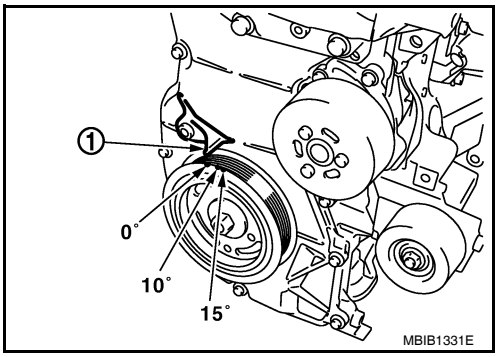
2 : Timing light
: Vehicle front



2. Check ignition timing.

1 : Timing indicator

>> INSPECTION END



VIN REGISTRATION

VIN REGISTRATION : Description

INFOID:0000000004779996

VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced.
NOTE:
Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).

VIN REGISTRATION : Special Repair Requirement

INFOID:0000000004779997

1.CHECK VIN

Check the VIN of the vehicle and note it. Refer to GI-43, "Model Variation".

>> GO TO 2.

2.PERFORM VIN REGISTRATION

With CONSULT-III

1. Turn ignition switch ON and engine stopped.
2. Select “VIN REGISTRATION” in “WORK SUPPORT” mode.
3. Follow the instruction of CONSULT-III display.

>> END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

ACCELERATOR PEDAL RELEASED POSITION LEARNING : Description

INFOID:0000000004779998

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:0000000004779999

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:0000000004780000

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:0000000004780001

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:0000000004780002

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:0000000004780003

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 12.9 V (At idle)
- Engine coolant temperature: 70 - 100°C (158 - 212°F)
- Selector lever: P or N (A/T), Neutral (M/T)
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
  On vehicles equipped with daytime light systems, if the parking brake is applied before the engine is started the headlamp will not be illuminated.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up

- A/T models

- With CONSULT-III: Drive vehicle until “FLUID TEMP SE” in “DATA MONITOR” mode of “TRANSMISSION” system indicates less than 0.9 V.
- 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-31, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-31, "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:

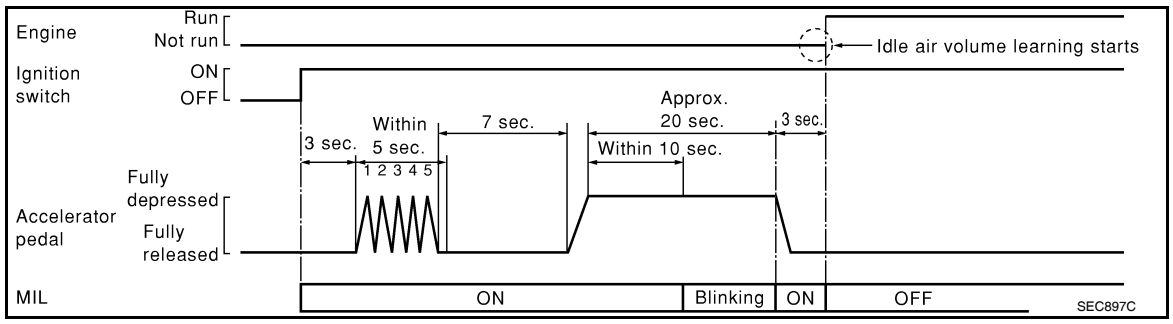
- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**

1. Perform Accelerator Pedal Released Position Learning. Refer to EC-31, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-31, "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	A/T: 700 ± 50 rpm (in P or N position) M/T: 650 ± 50 rpm (in Neutral position)
Ignition timing	A/T: 6 ± 5°BTDC (in P or N position) M/T: 6 ± 5°BTDC (in Neutral position)

Is the inspection result normal?

YES >> INSPECTION END

5. DETECT MALFUNCTIONING PART

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

Is the inspection result normal?

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

6. DETECT MALFUNCTIONING PART

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.
It is useful to perform “TROUBLE DIAGNOSIS - SPECIFICATION VALUE”. Refer to EC-112, "Description".
If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning again:
- Engine stalls.
- Erroneous idle.

>> INSPECTION END

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Description

INFOID:0000000004780004

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:0000000004780005

1. START

With CONSULT-III

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

With GST

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

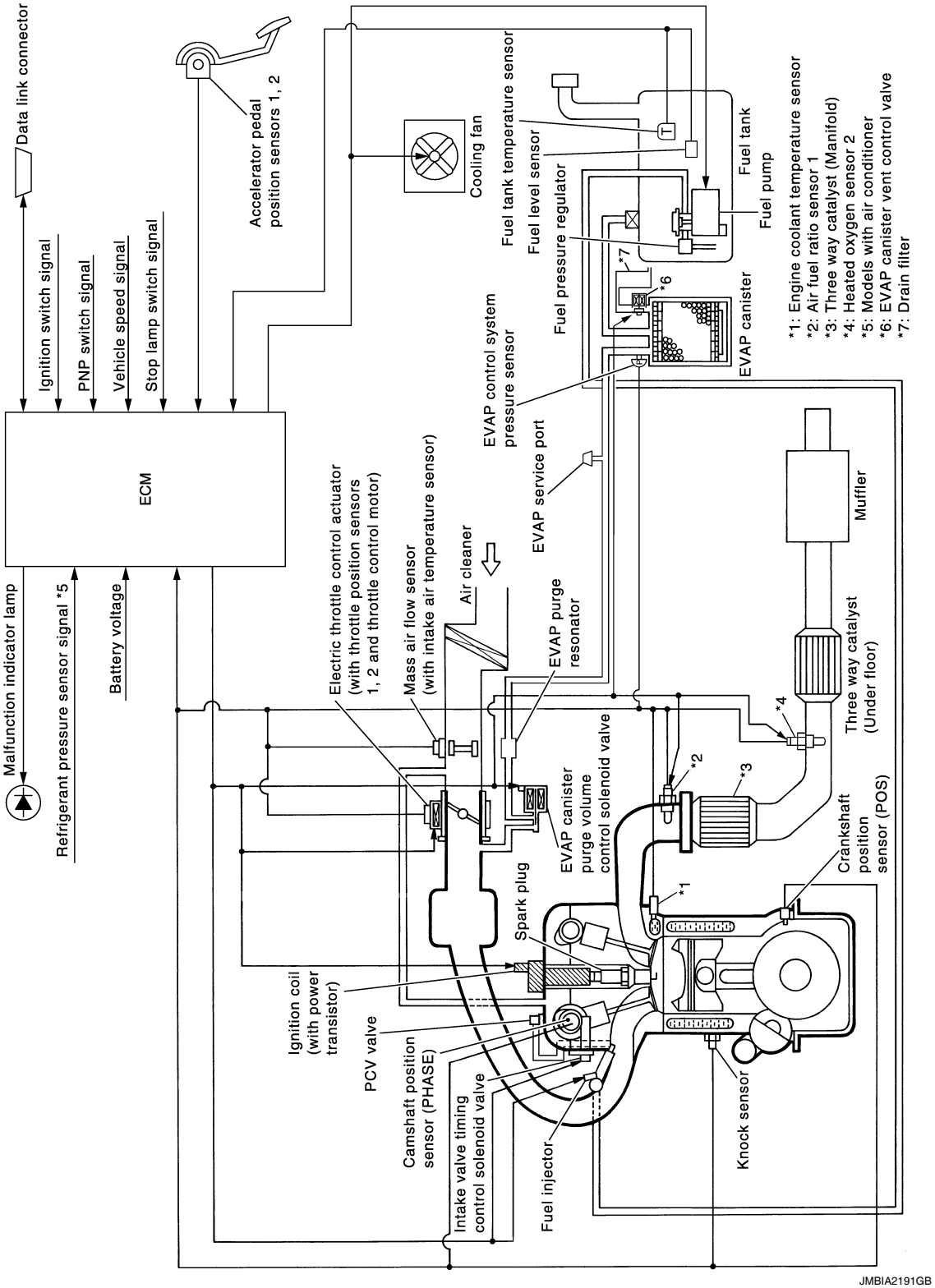
>> END

FUNCTION DIAGNOSIS

ENGINE CONTROL SYSTEM

System Diagram

INFOID:0000000004780006



JMBIA2191GB

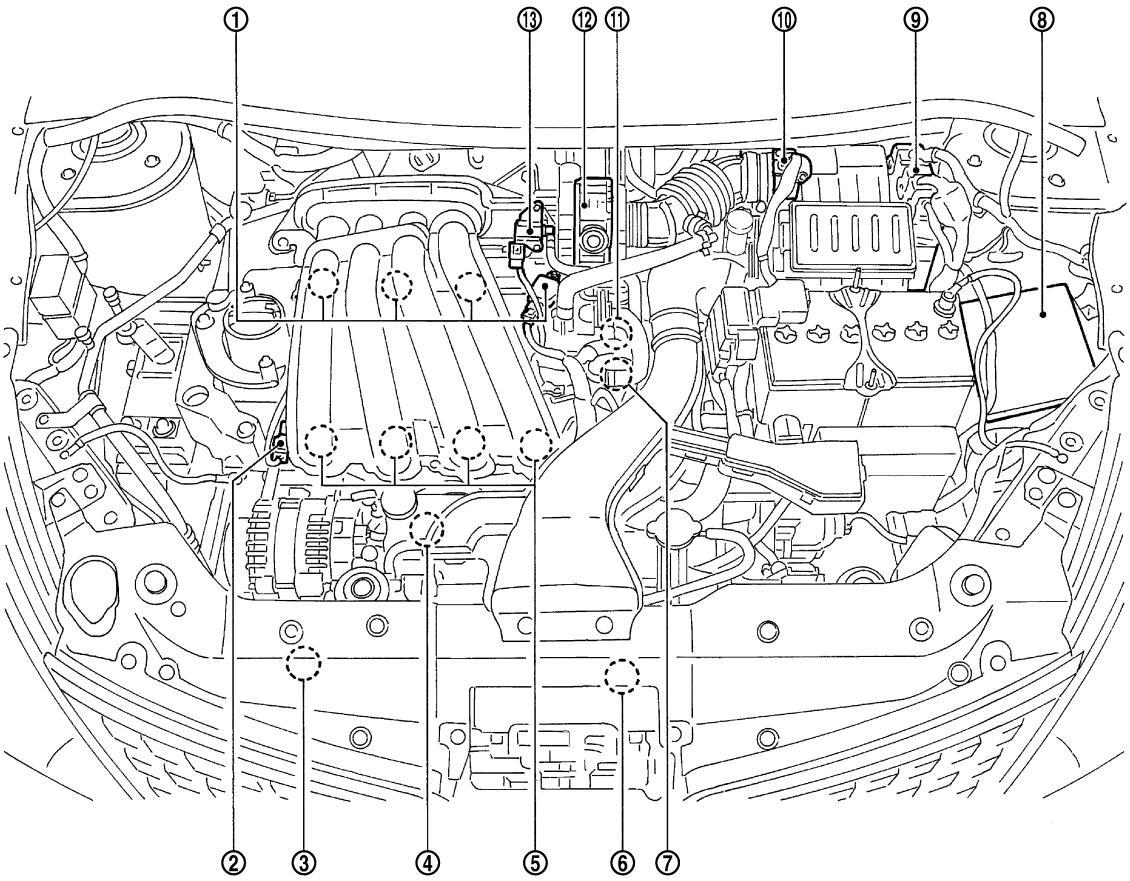
System Description

INFOID:0000000004780007

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

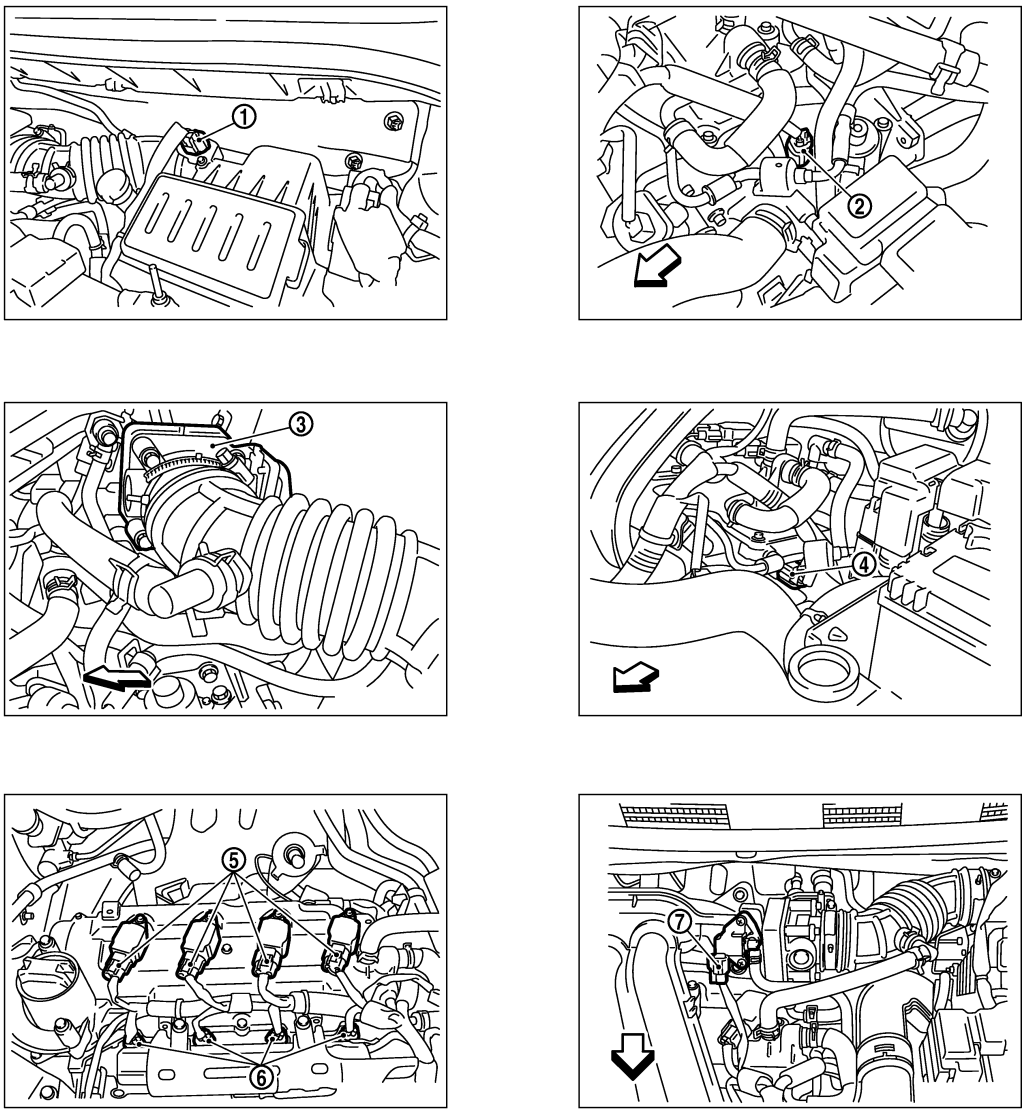
Component Parts Location

INFOID:0000000004780008



PBIB2939E

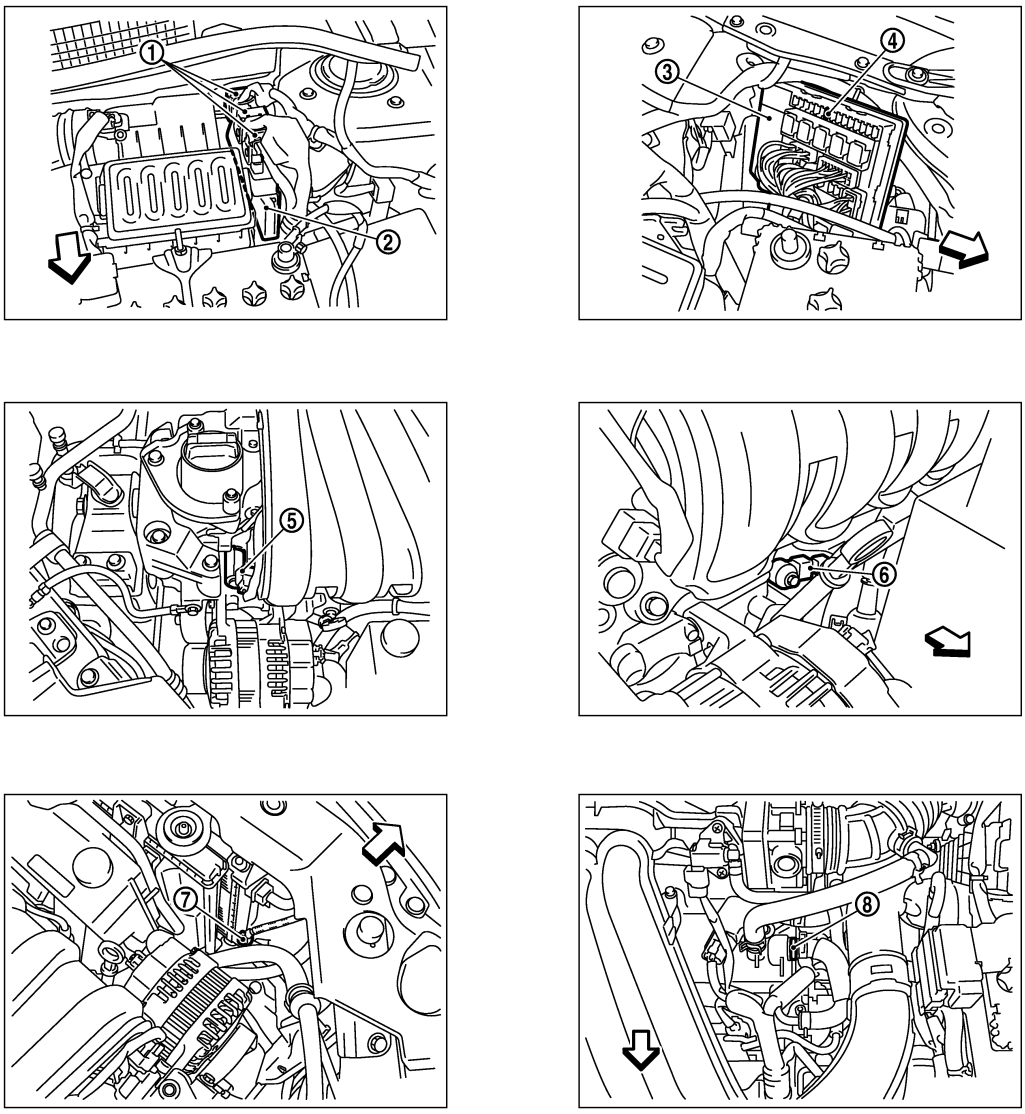
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

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

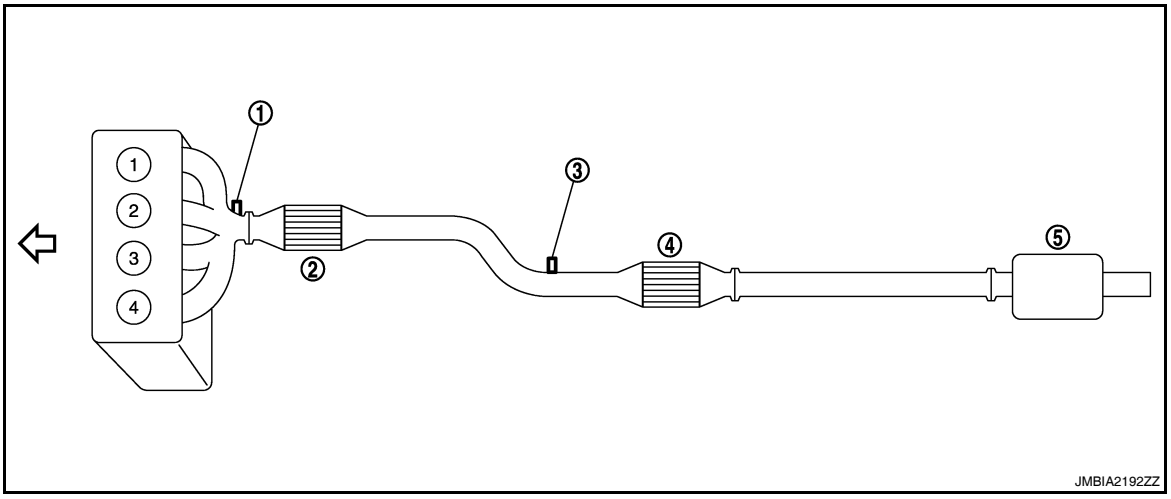
Vehicle front



PBIB2941E

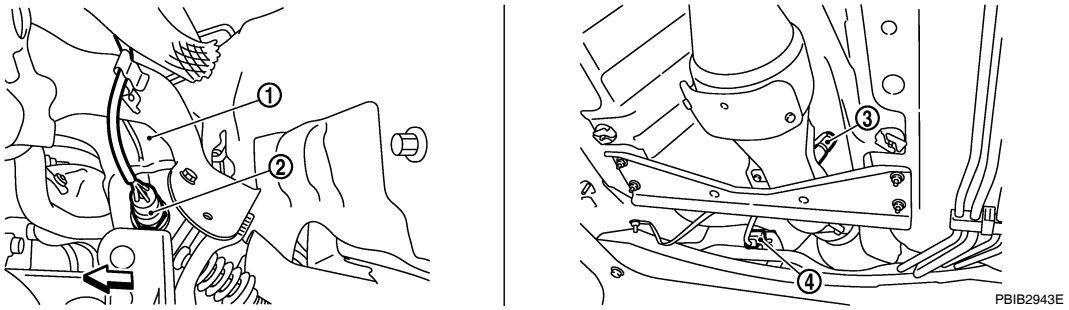
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

Vehicle front



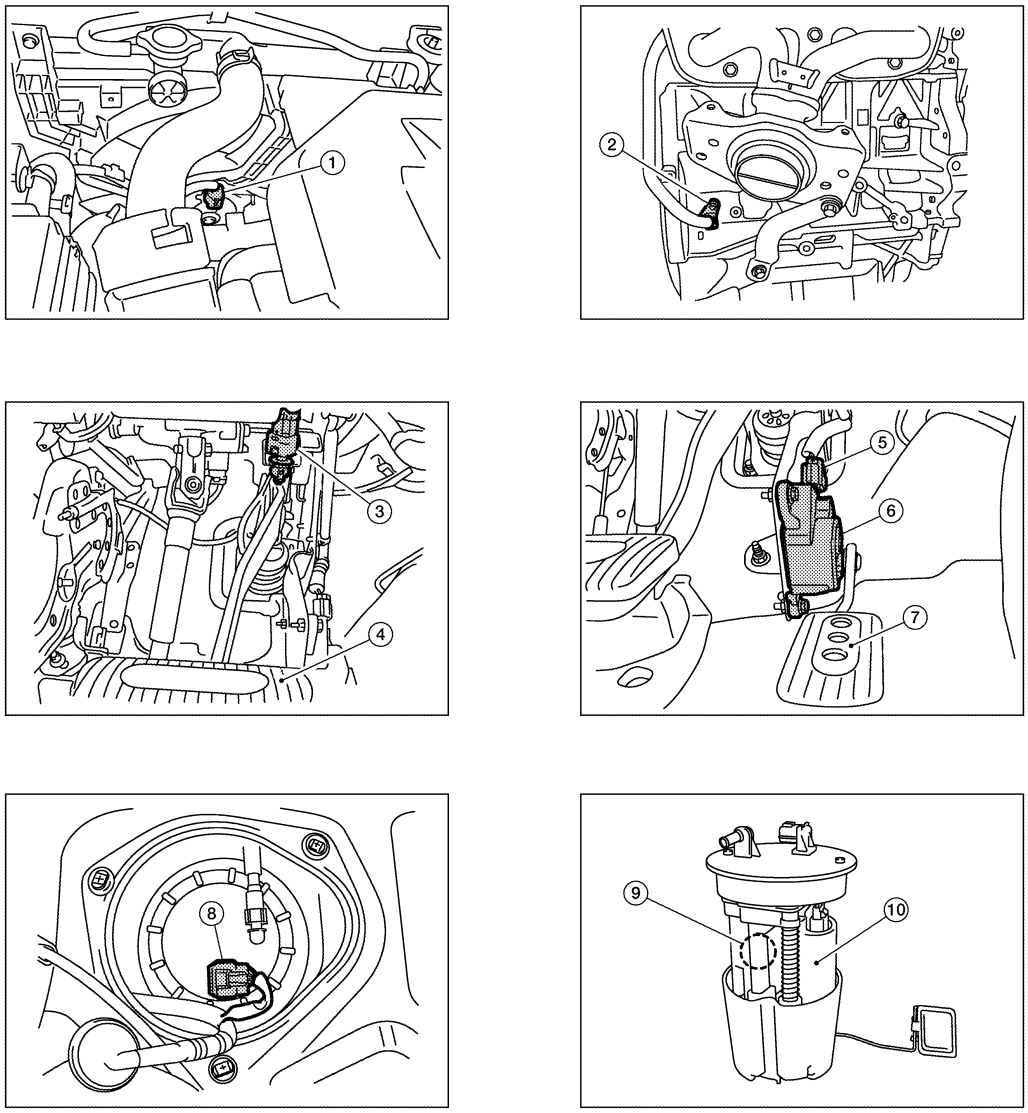
1. Air fuel ratio (A/F) sensor 1
2. Three way catalyst (Manifold)
3. Heated oxygen sensor 2
4. Three way catalyst (Under flloor)
5. Muffler

Vehicle front



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

Vehicle front



AWBIA0044ZZ

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

Component Description

INFOID:0000000004780009

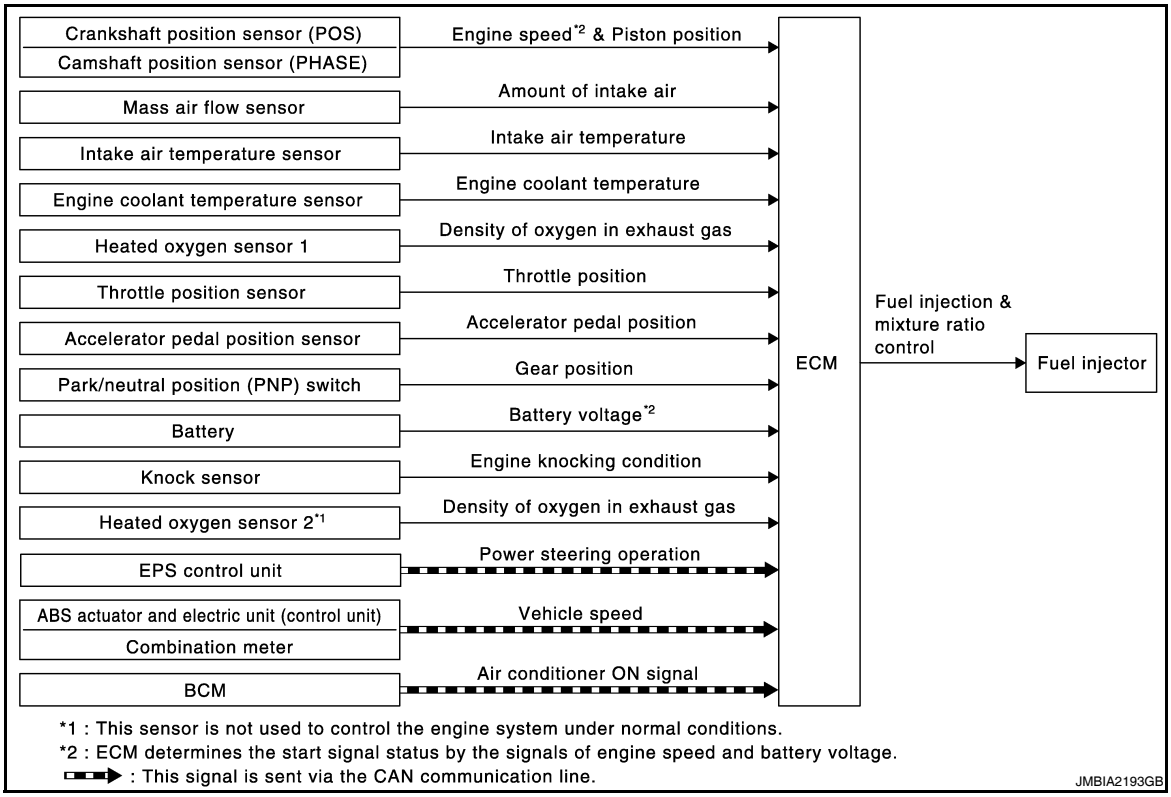
Component	Reference
A/F sensor 1	EC-182, "Description"
A/F sensor 1 heater	EC-136, "Description"
Accelerator pedal position sensor	EC-399, "Description"
Camshaft position sensor (PHASE)	EC-268, "Description"

Component	Reference
Crankshaft position sensor (POS)	EC-263, "Description"
Cooling fan motor	EC-66, "System Description"
Electric throttle control actuator	EC-397, "Description"
Engine coolant temperature sensor	EC-167, "Description"
EVAP canister purge volume control solenoid valve	EC-291, "Description"
EVAP canister vent control valve	EC-301, "Description"
EVAP control system pressure sensor	EC-312, "Description"
Fuel injector	EC-430, "Description"
Fuel level sensor	EC-342, "Description"
Fuel pump	EC-434, "Description"
Fuel tank temperature sensor	EC-240, "Description"
Heated oxygen sensor 2	EC-204, "Description"
Heated oxygen sensor 2 heater	EC-140, "Description"
Ignition signal	EC-439, "Description"
Intake air temperature sensor	EC-162, "Description"
Intake valve timing control solenoid valve	EC-84, "System Description"
Knock sensor	EC-259, "Description"
Mass air flow sensor	EC-148, "Description"
Park/neutral position switch	EC-362, "Description"
PCV valve	EC-456, "Description"
Refrigerant pressure sensor	EC-457, "Description"
Stop lamp switch	EC-380, "Description"
Throttle control motor	EC-393, "Description"
Throttle control motor relay	EC-384, "Description"
Throttle position sensor	EC-171, "Description"

MULTIPORT FUEL INJECTION SYSTEM

System Diagram

INFOID:0000000004780010



System Description

INFOID:0000000004780011

INPUT/OUTPUT SIGNAL CHART

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

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

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

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

SYSTEM DESCRIPTION

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

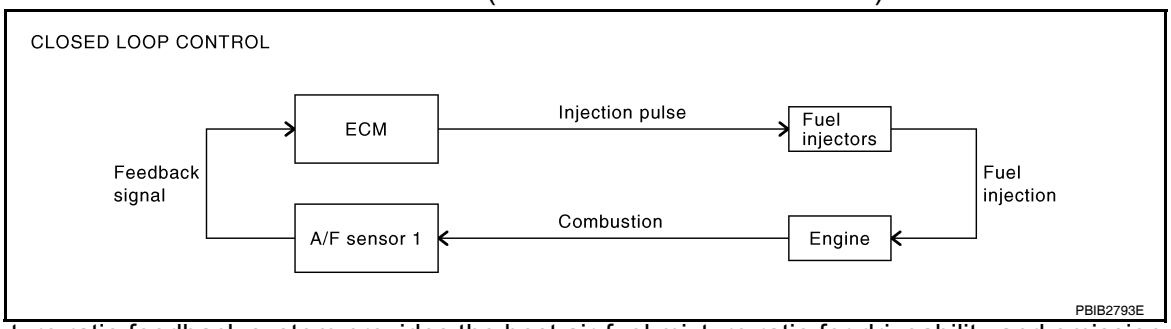
VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

<Fuel increase>
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (A/T models)
- High-load, high-speed operation

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

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can 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-182, "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.

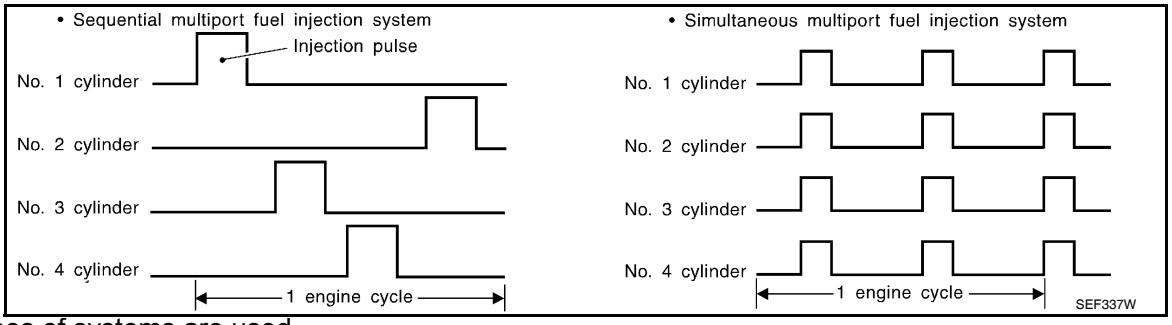
- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of A/F sensor 1 or its circuit
- Insufficient activation of A/F sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (A/T models)
- When starting the engine

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

FUEL INJECTION TIMING



Two types of systems are used.

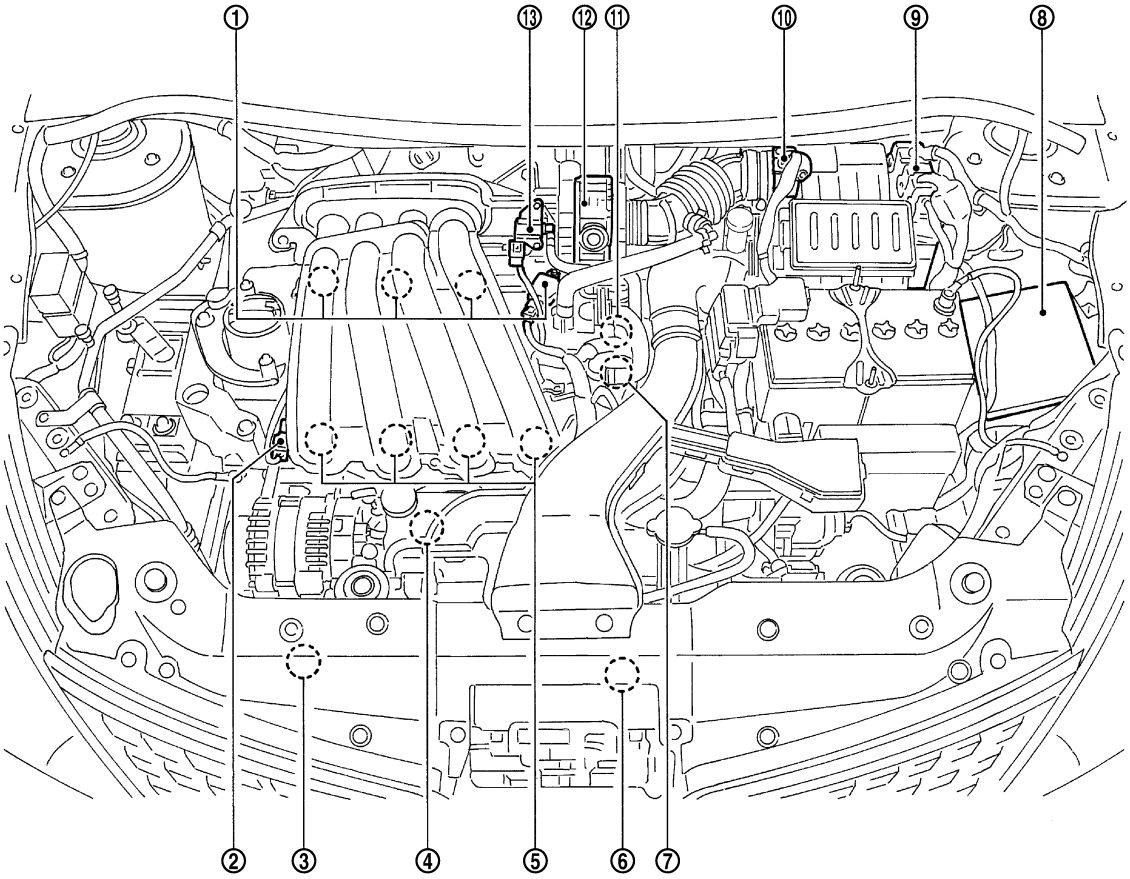
- Sequential Multiport Fuel Injection System
  Fuel is injected into each cylinder during each engine cycle according to the ignition order. This system is used when the engine is running.
- Simultaneous Multiport Fuel Injection System
  Fuel is injected simultaneously into all four cylinders twice each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

FUEL SHUT-OFF

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

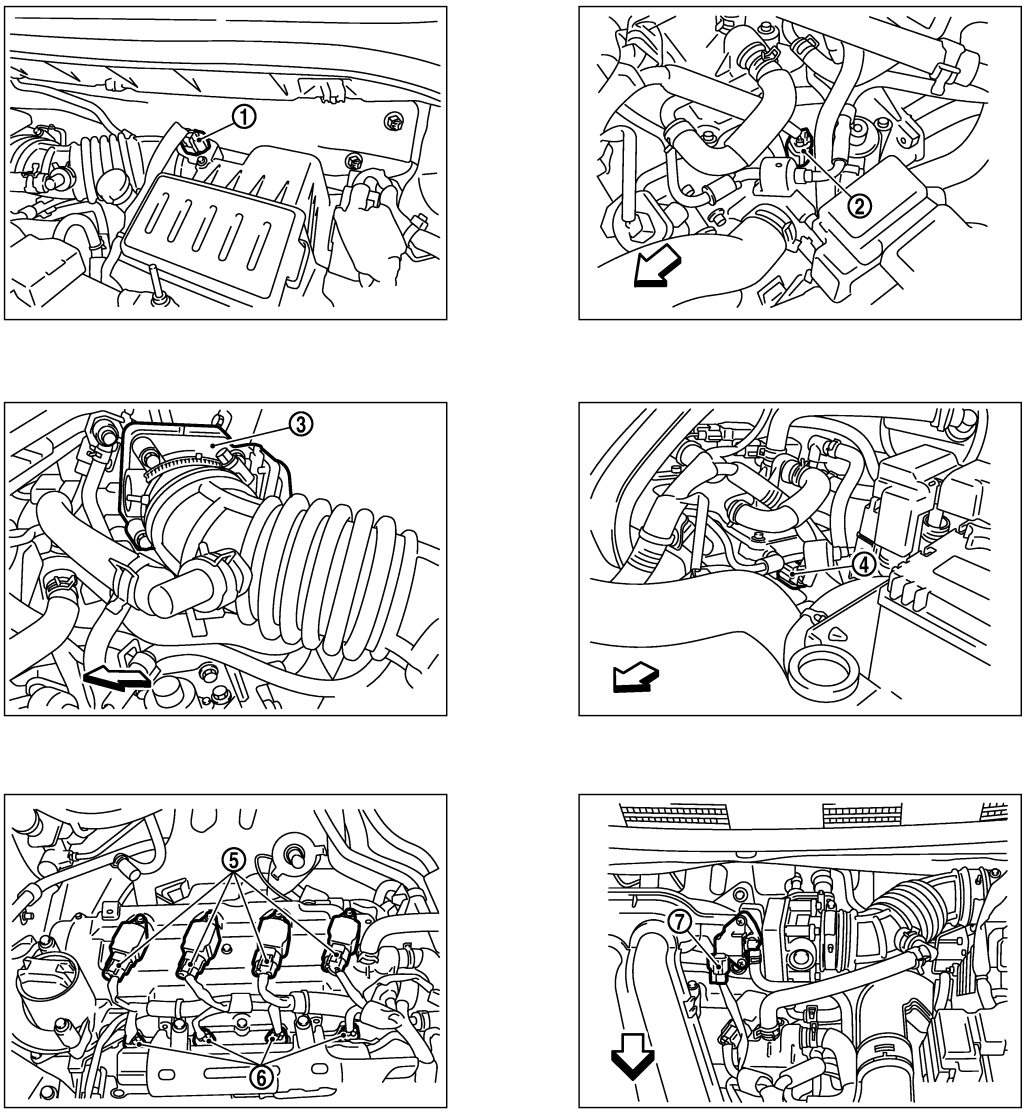
Component Parts Location

INFOID:0000000004780012



PBIB2939E

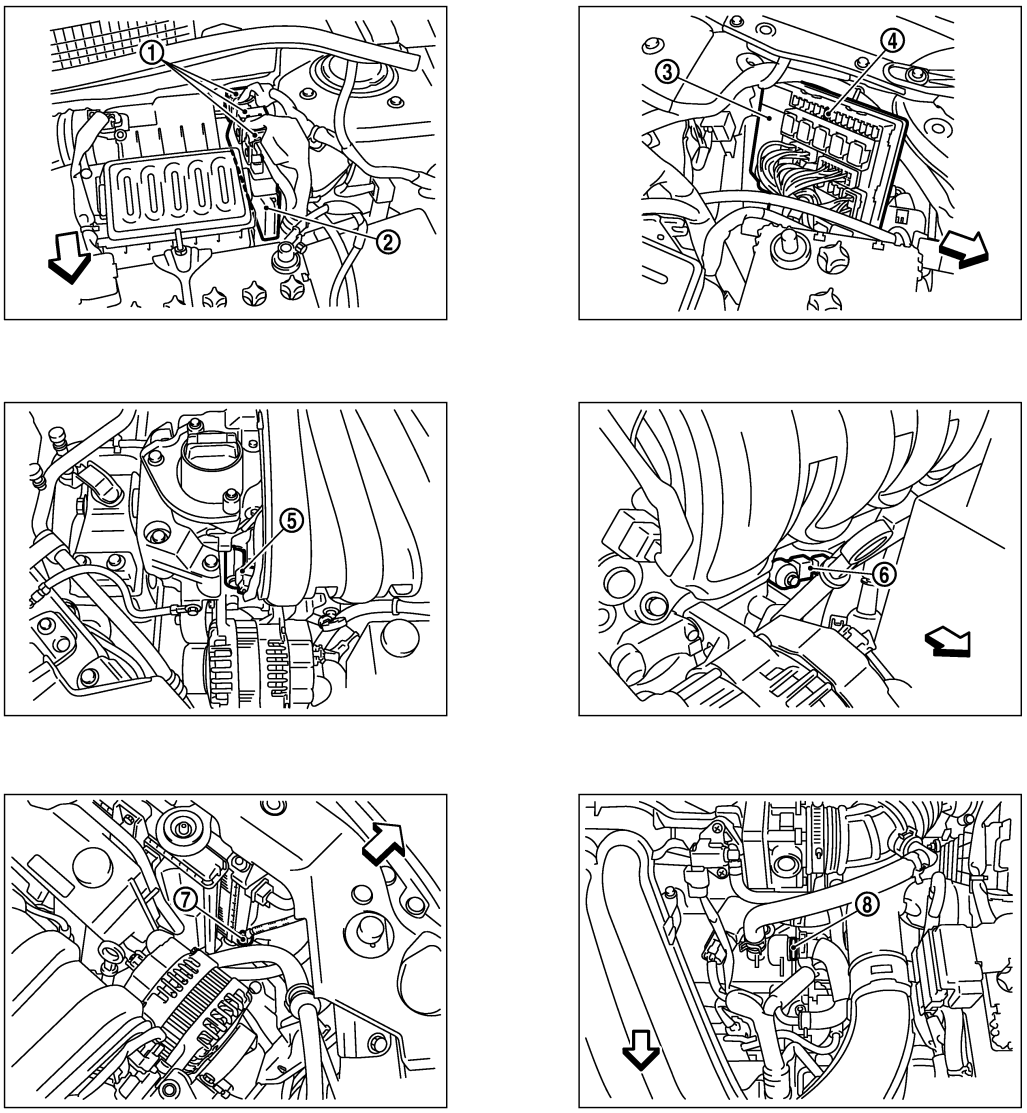
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

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

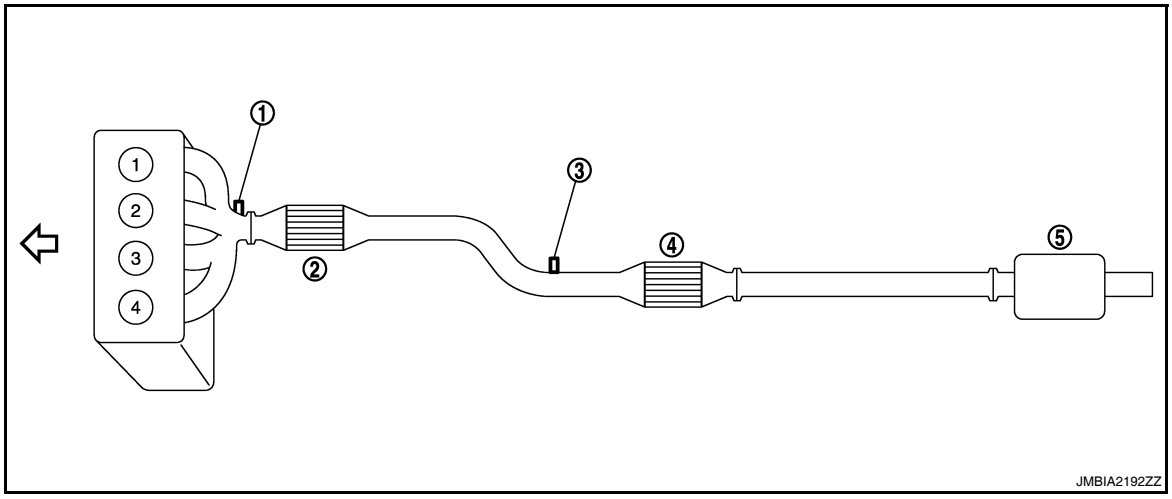
Vehicle front



PBIB2941E

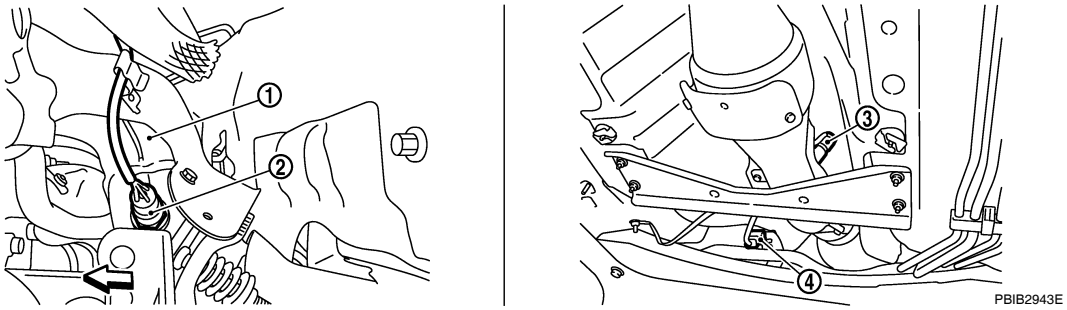
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

Vehicle front



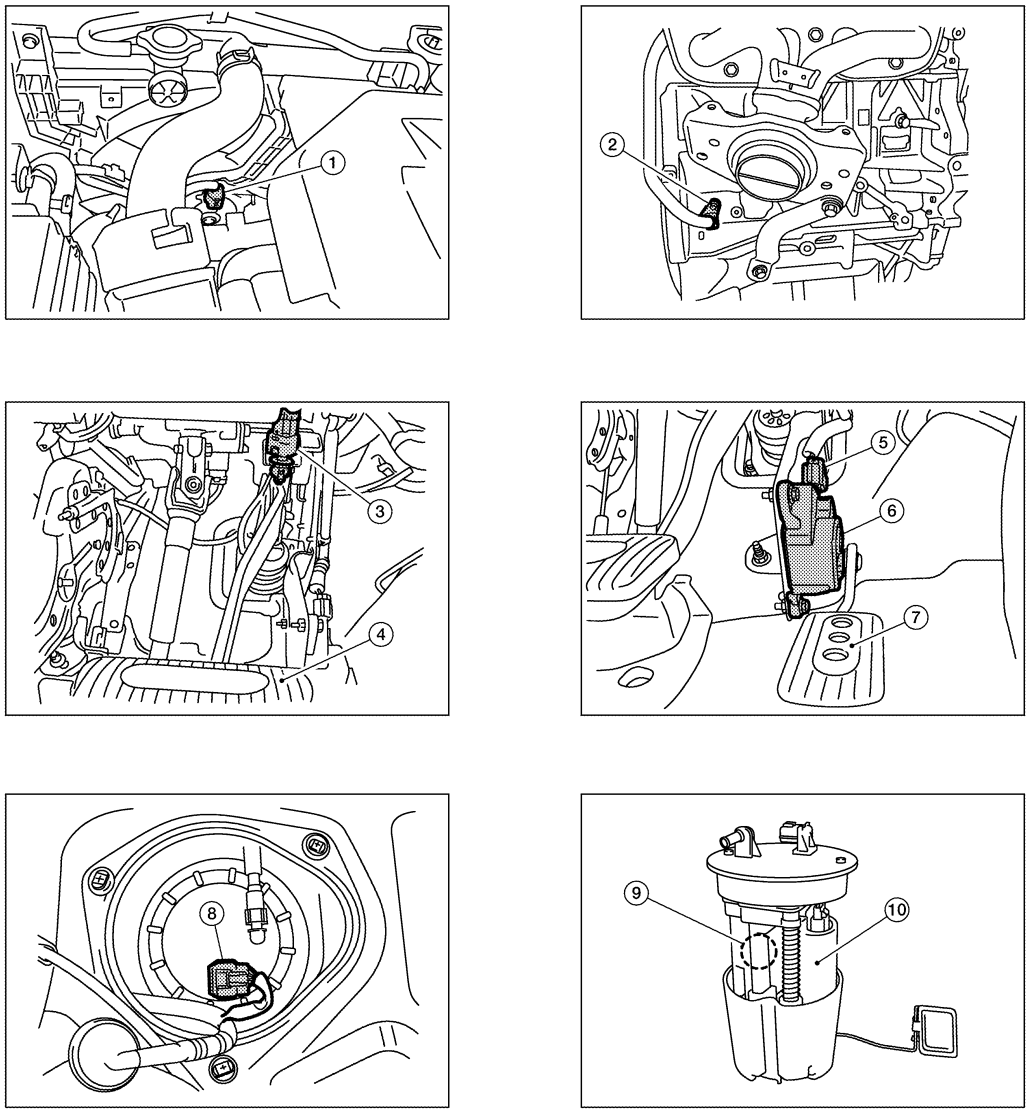
1. Air fuel ratio (A/F) sensor 1
2. Three way catalyst (Manifold)
3. Heated oxygen sensor 2
4. Three way catalyst (Under flloor)
5. Muffler

Vehicle front



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

Vehicle front



AWBIA0044ZZ

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

Component Description

INFOID:0000000004780013

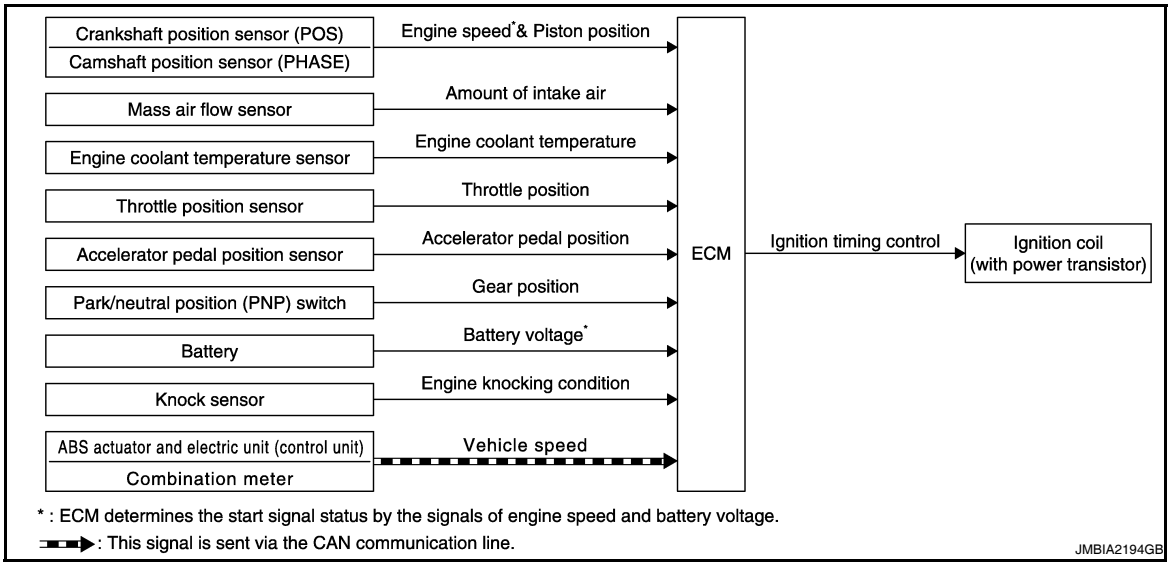
Component	Reference
A/F sensor 1	EC-182, "Description"
Accelerator pedal position sensor	EC-399, "Description"
Camshaft position sensor (PHASE)	EC-268, "Description"
Crankshaft position sensor (POS)	EC-263, "Description"

Component	Reference
Engine coolant temperature sensor	EC-167, "Description"
Fuel injector	EC-430, "Description"
Heated oxygen sensor 2	EC-204, "Description"
Intake air temperature sensor	EC-162, "Description"
Knock sensor	EC-259, "Description"
Mass air flow sensor	EC-148, "Description"
Park/neutral position switch	EC-362, "Description"
Throttle position sensor	EC-171, "Description"

ELECTRIC IGNITION SYSTEM

System Diagram

INFOID:0000000004780014



System Description

INFOID:0000000004780015

INPUT/OUTPUT SIGNAL CHART

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

*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 - 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.

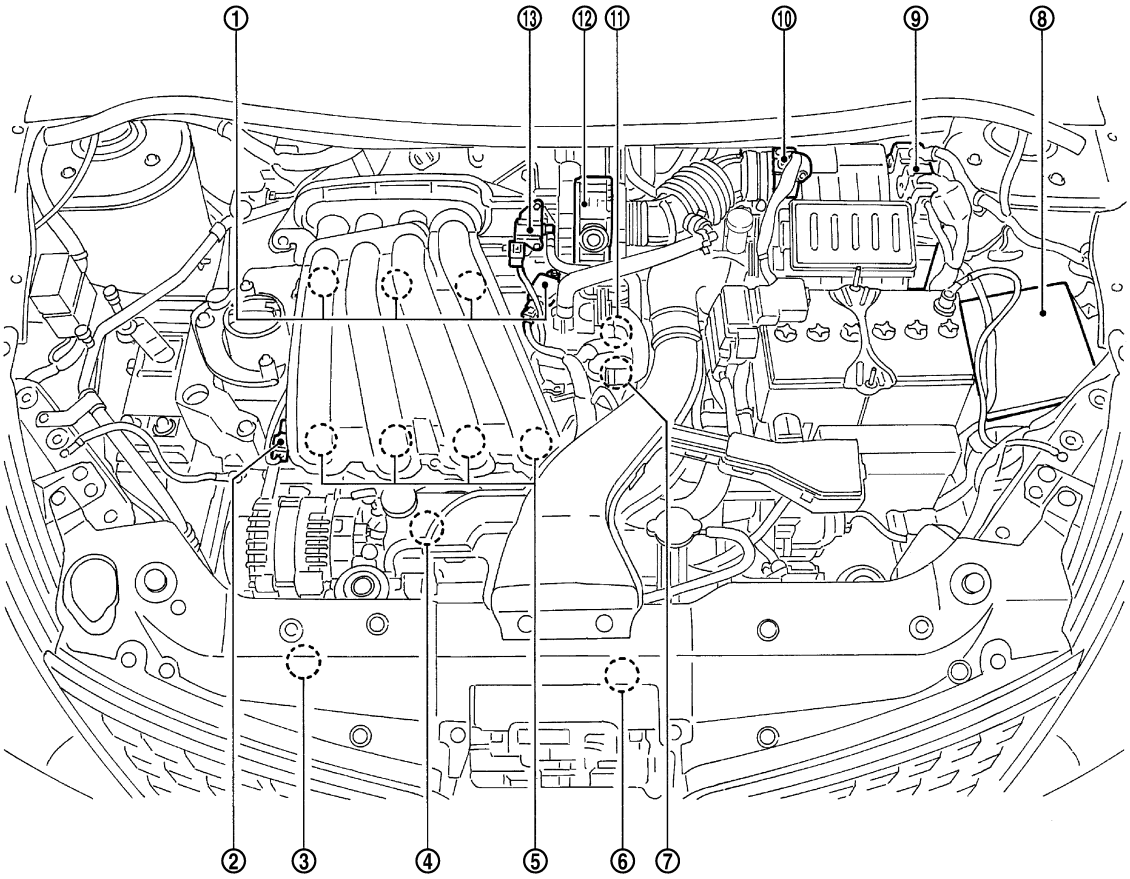
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- 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.

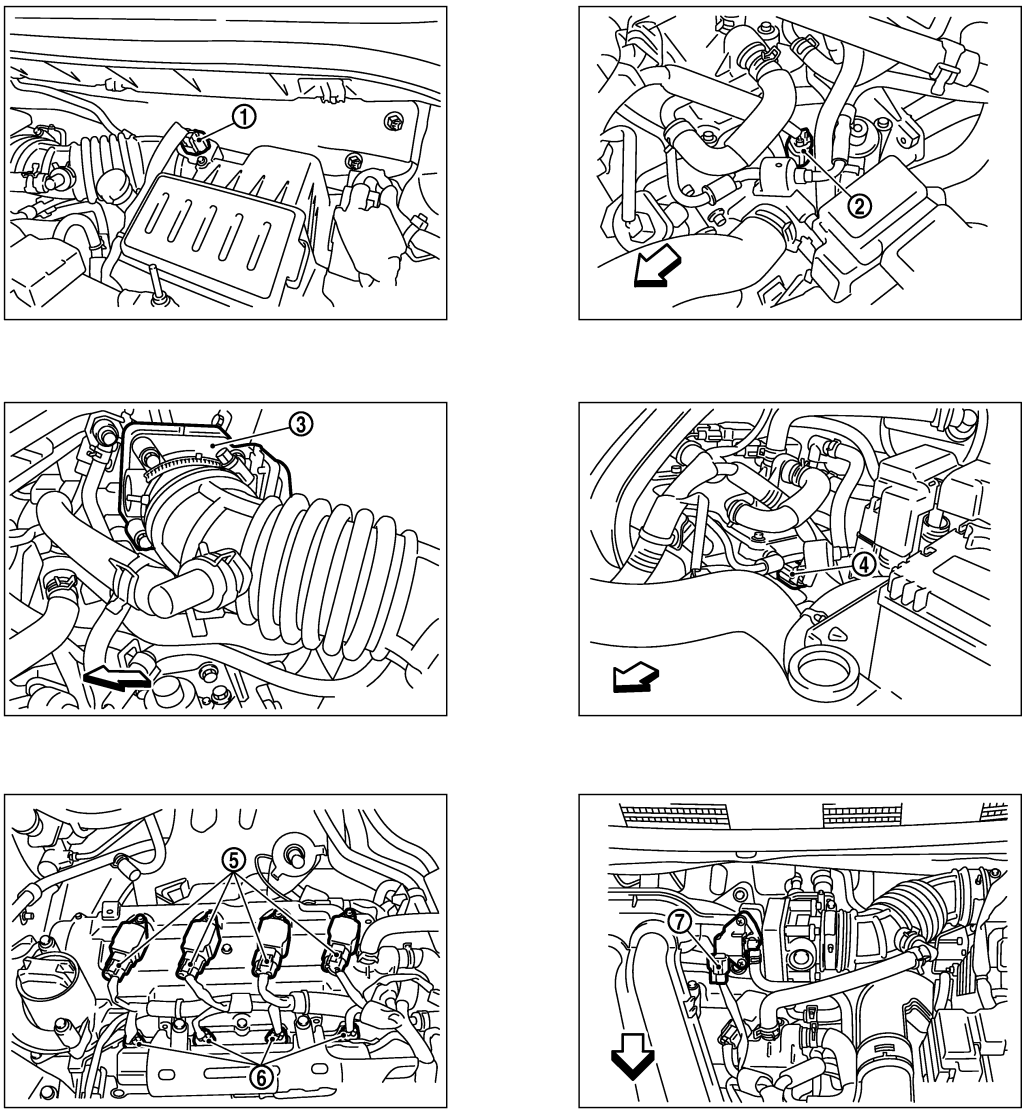
Component Parts Location

INFOID:0000000004780016



PBIB2939E

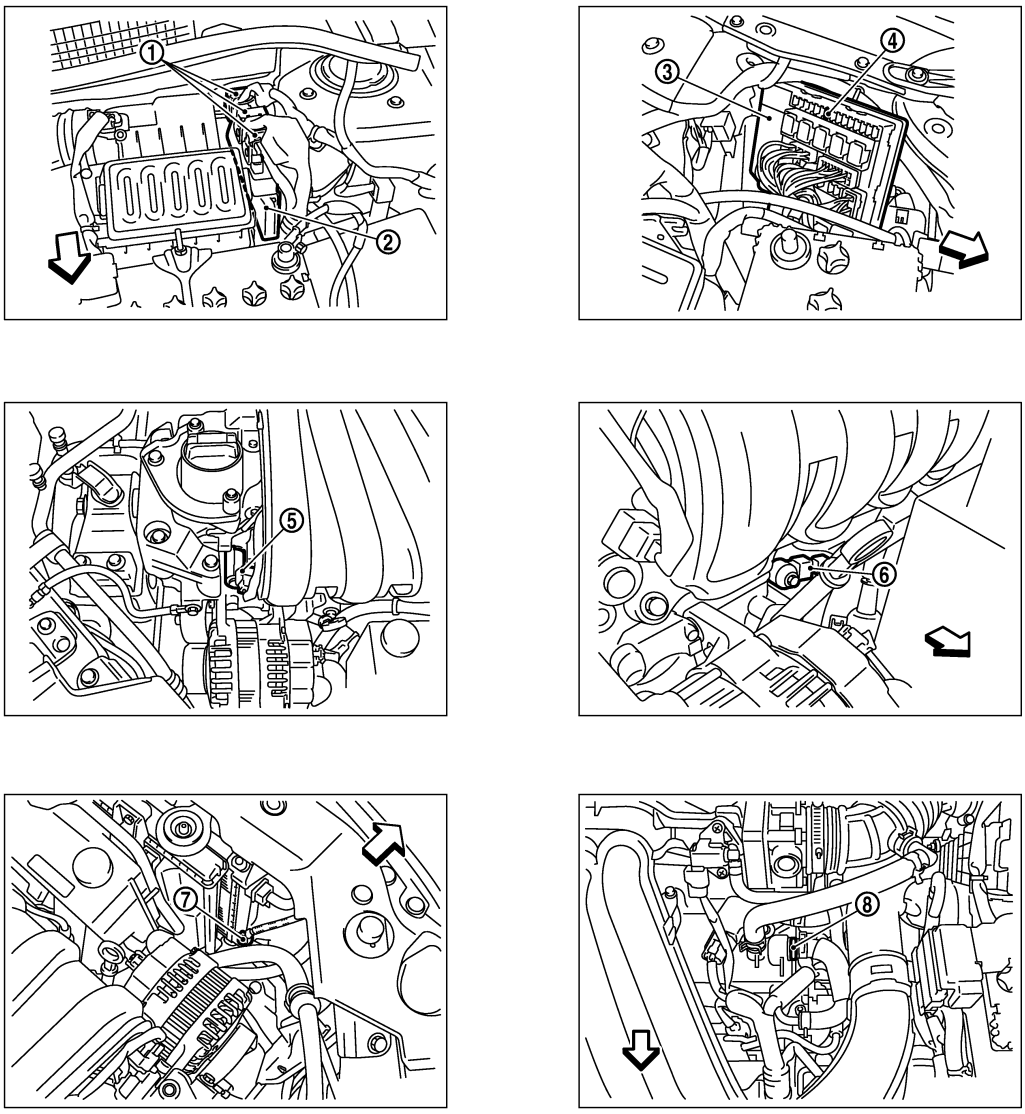
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

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

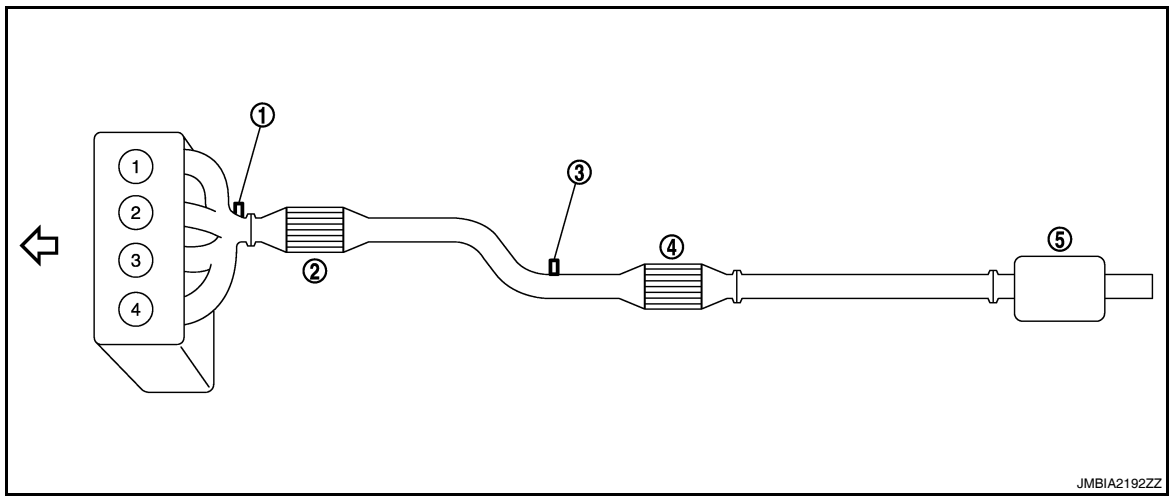
Vehicle front



PBIB2941E

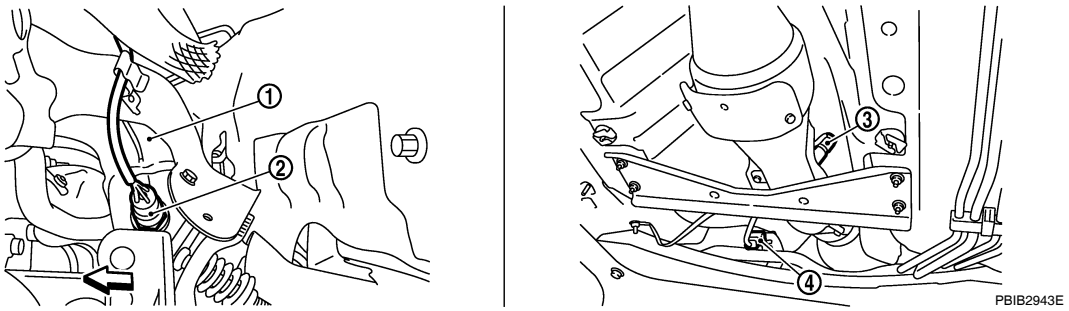
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

Vehicle front



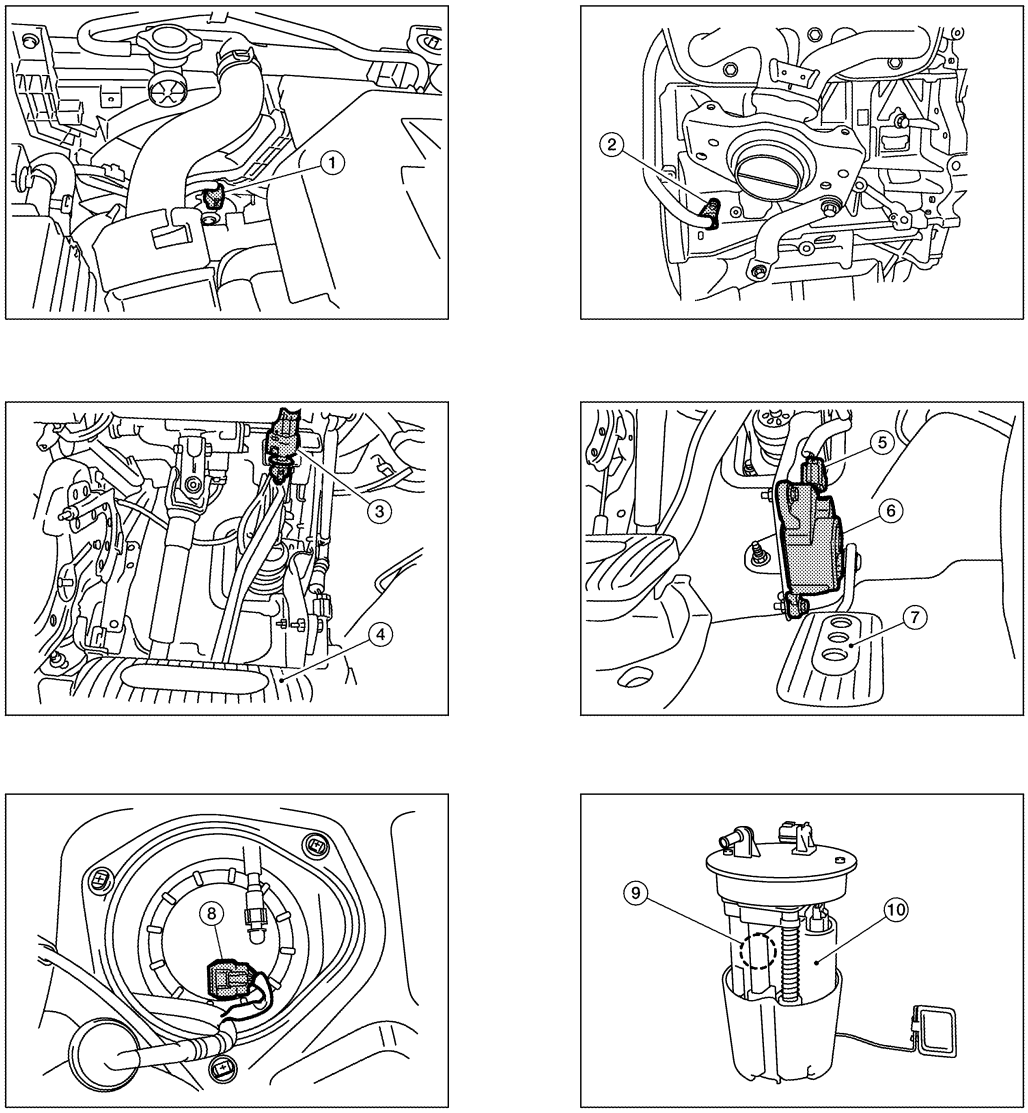
1. Air fuel ratio (A/F) sensor 1
2. Three way catalyst (Manifold)
3. Heated oxygen sensor 2
4. Three way catalyst (Under flloor)
5. Muffler

Vehicle front



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

Vehicle front



AWBIA0044ZZ

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

Component Description

INFOID:0000000004780017

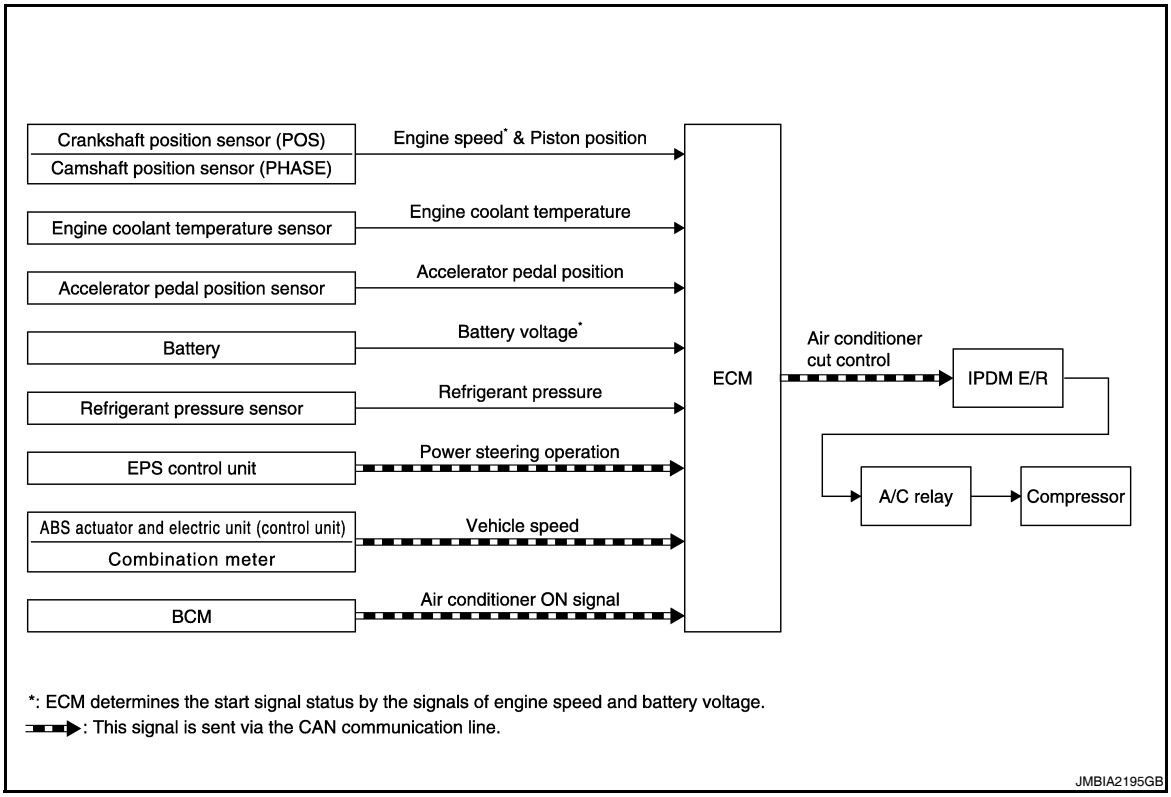
Component	Reference
Accelerator pedal position sensor	EC-399, "Description"
Camshaft position sensor (PHASE)	EC-268, "Description"
Crankshaft position sensor (POS)	EC-263, "Description"
Engine coolant temperature sensor	EC-167, "Description"

Component	Reference
Ignition signal	EC-439, "Description"
Knock sensor	EC-259, "Description"
Mass air flow sensor	EC-148, "Description"
Park/neutral position switch	EC-362, "Description"
Throttle position sensor	EC-171, "Description"
Vehicle speed sensor	EC-347, "Description"

AIR CONDITIONING CUT CONTROL

System Diagram

INFOID:0000000004780018



System Description

INFOID:0000000004780019

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch*1	Air conditioner ON signal	Air conditioner cut control	IPDM E/R ↓ Air conditioner relay ↓ Compressor
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*2		
Refrigerant pressure sensor	Refrigerant pressure		
EPS control unit	Power steering operation		
ABS actuator and electric unit (control unit)	Vehicle speed*1		
Combination meter			
BCM	Air conditioner ON signal*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

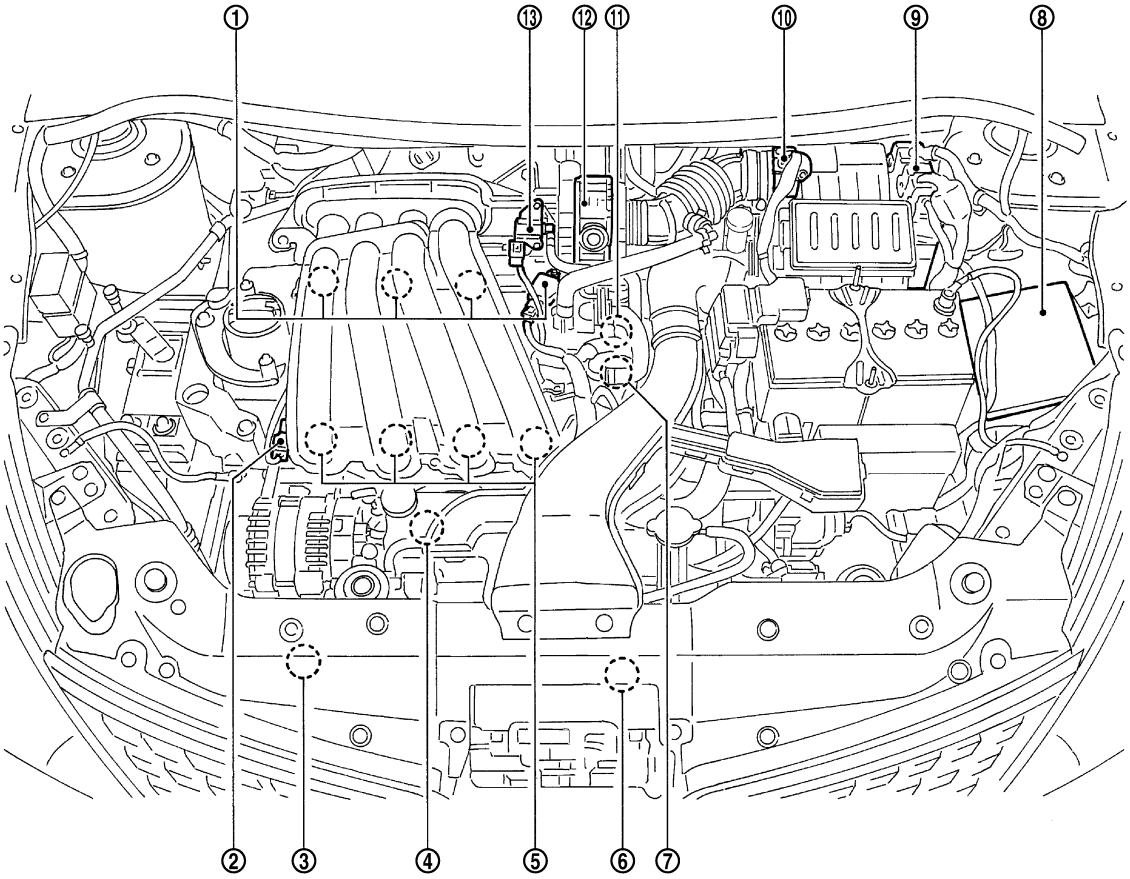
This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

- 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.

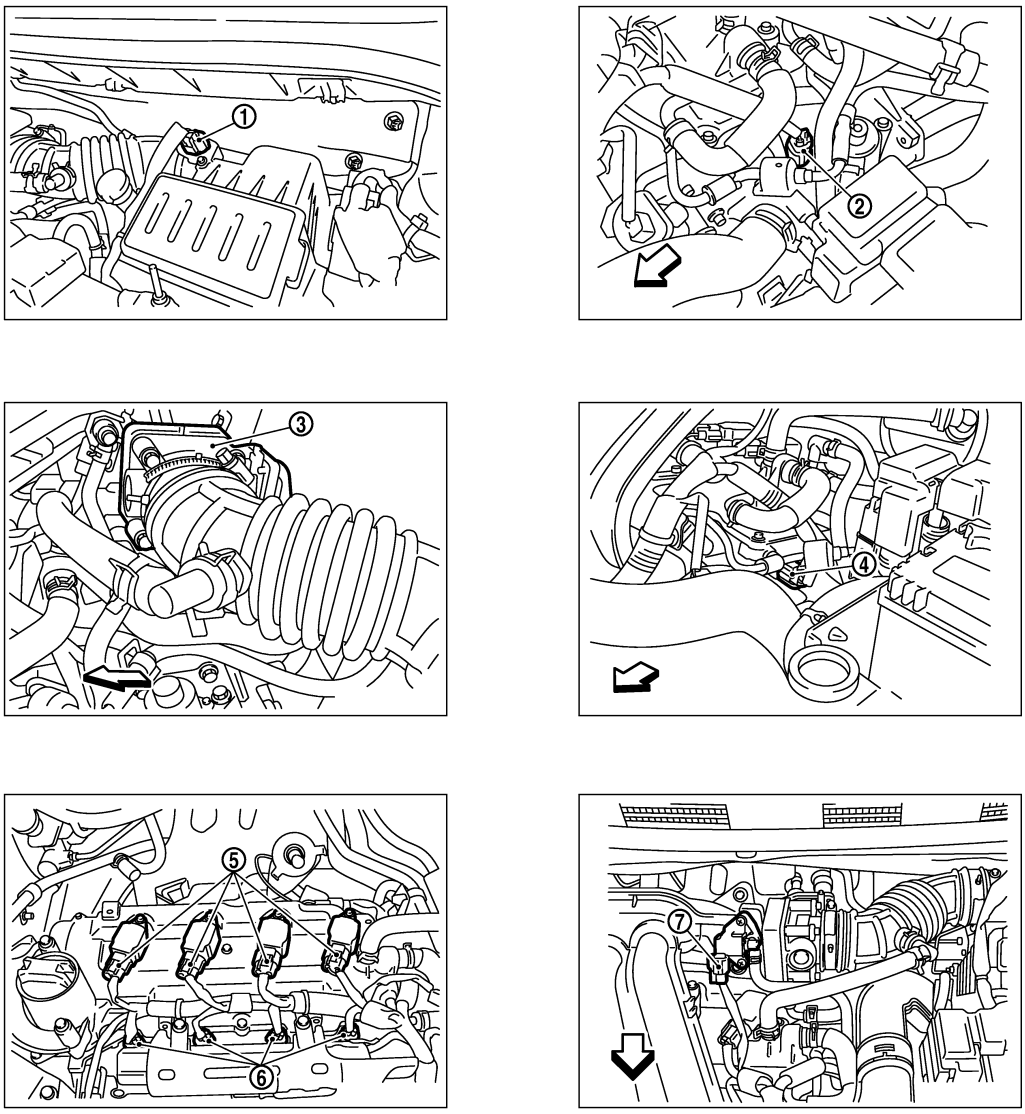
Component Parts Location

INFOID:0000000004780020



PBIB2939E

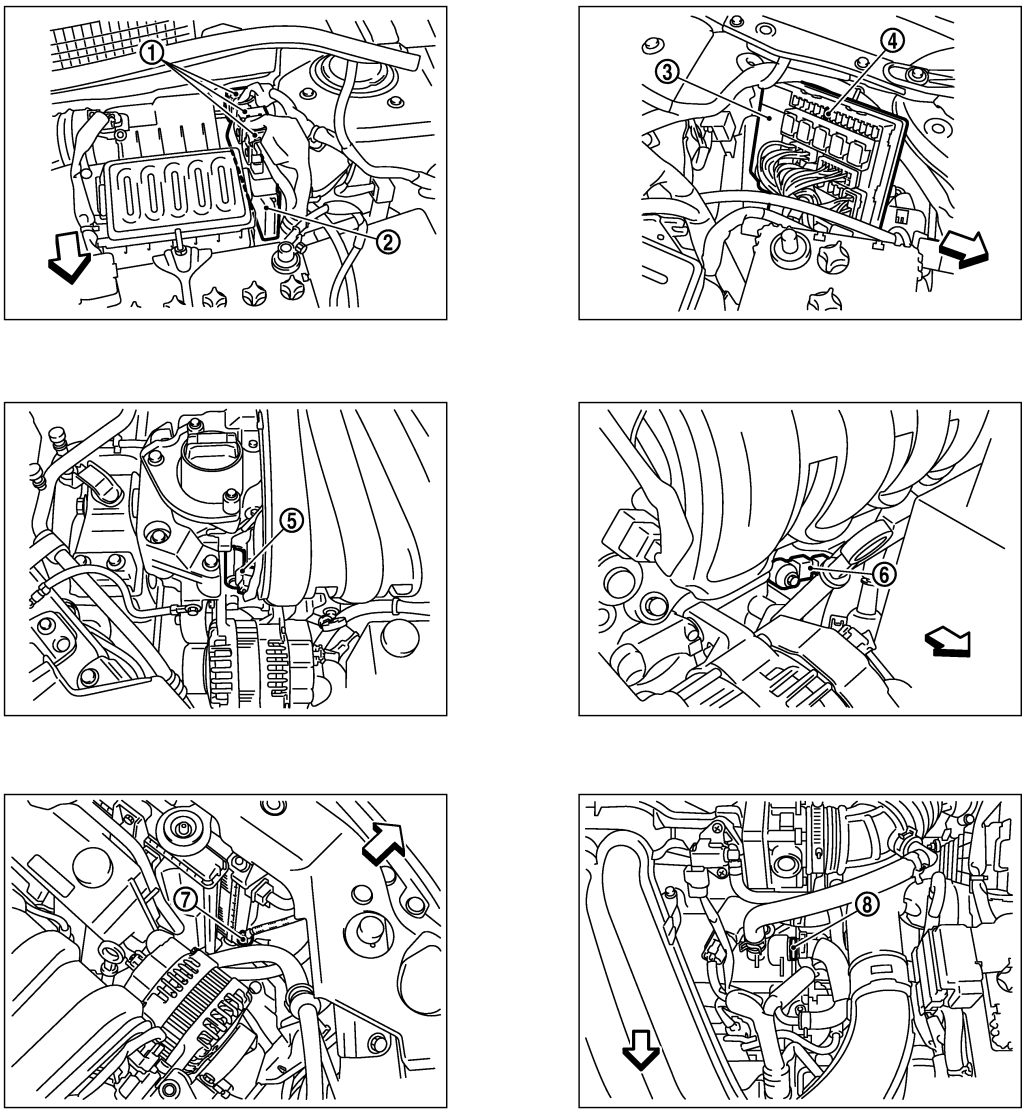
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

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

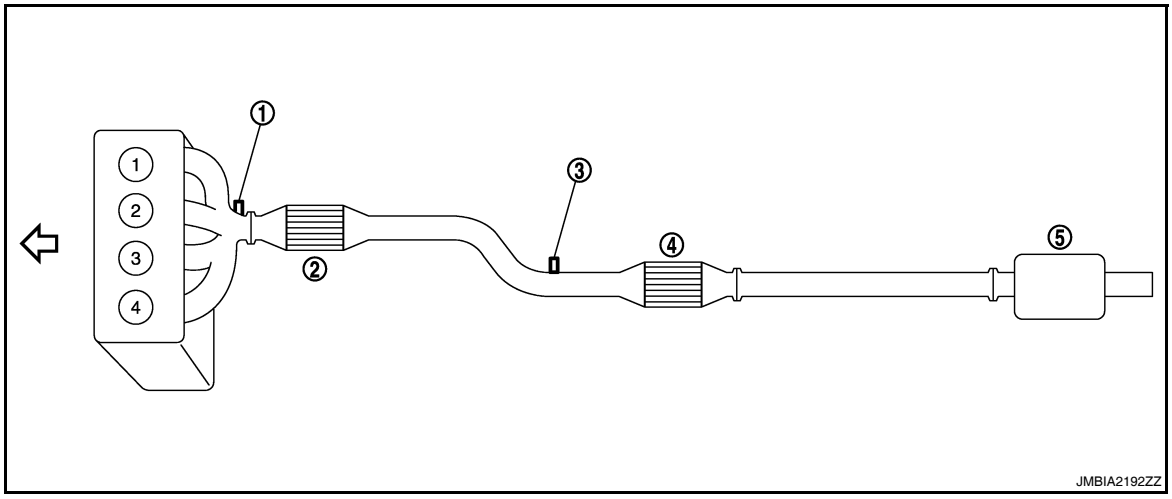
Vehicle front



PBIB2941E

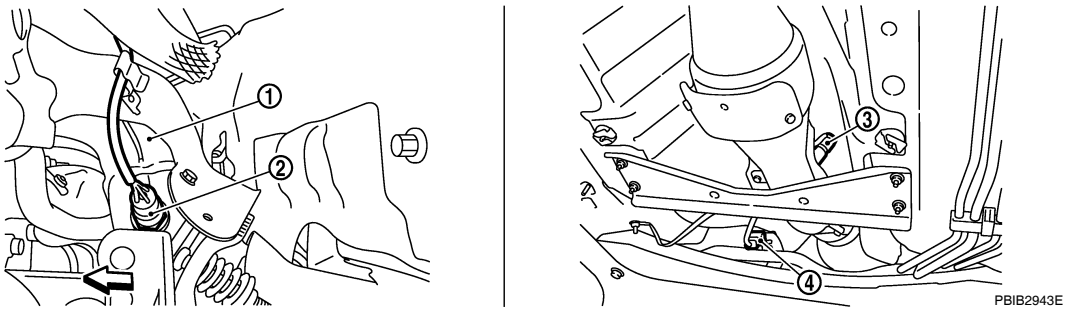
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

Vehicle front



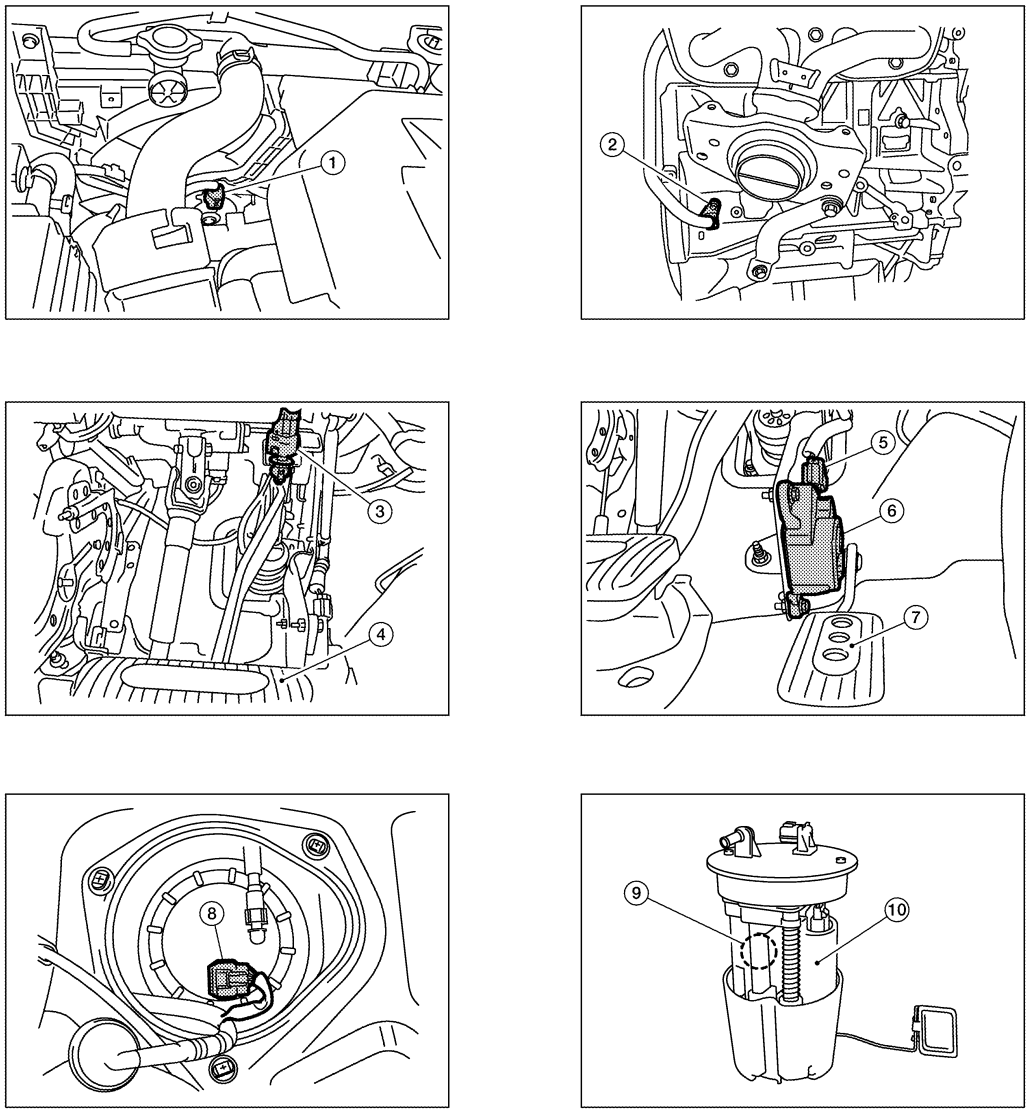
1. Air fuel ratio (A/F) sensor 1
2. Three way catalyst (Manifold)
3. Heated oxygen sensor 2
4. Three way catalyst (Under flloor)
5. Muffler

Vehicle front



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

Vehicle front



AWBIA0044ZZ

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

Component Description

INFOID:0000000004780021

Component	Reference
Accelerator pedal position sensor	EC-399, "Description"
Camshaft position sensor (PHASE)	EC-268, "Description"
Crankshaft position sensor (POS)	EC-263, "Description"

Component	Reference
Engine coolant temperature sensor	EC-167, "Description"
Refrigerant pressure sensor	EC-457, "Description"

CAN COMMUNICATION

System Description

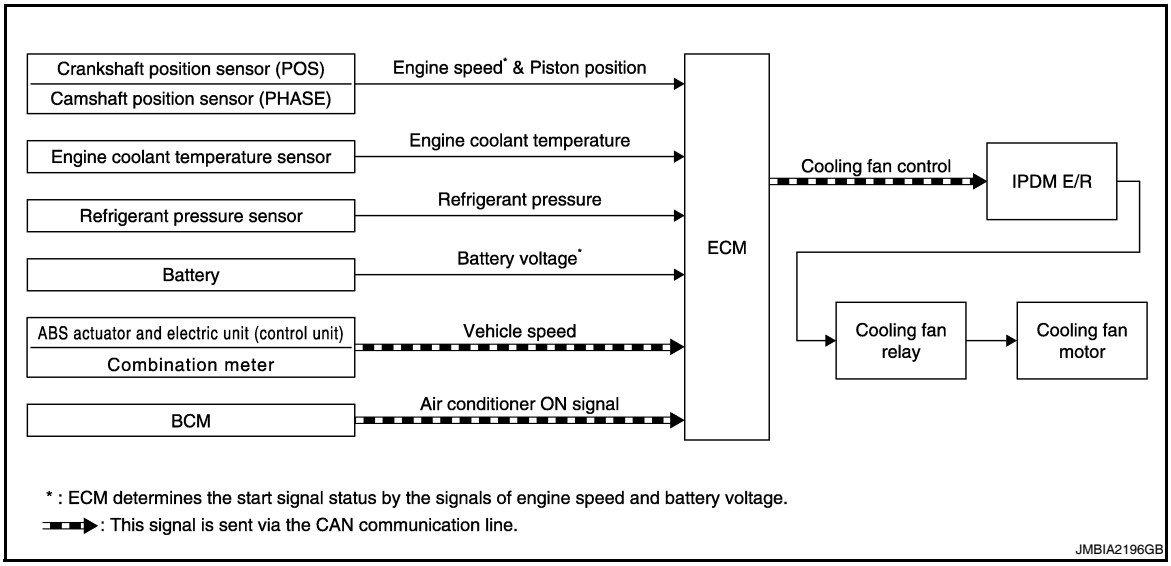
INFOID:0000000004780026

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-26, "CAN Communication Signal Chart", about CAN communication for detail..

COOLING FAN CONTROL

System Diagram

INFOID:0000000004780027



System Description

INFOID:0000000004780028

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	Cooling fan control	IPDM E/R ↓ Cooling fan relay ↓ Cooling fan motor
Battery	Battery voltage*1		
ABS actuator and electric unit (control unit)	Vehicle speed*2		
Combination meter			
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.

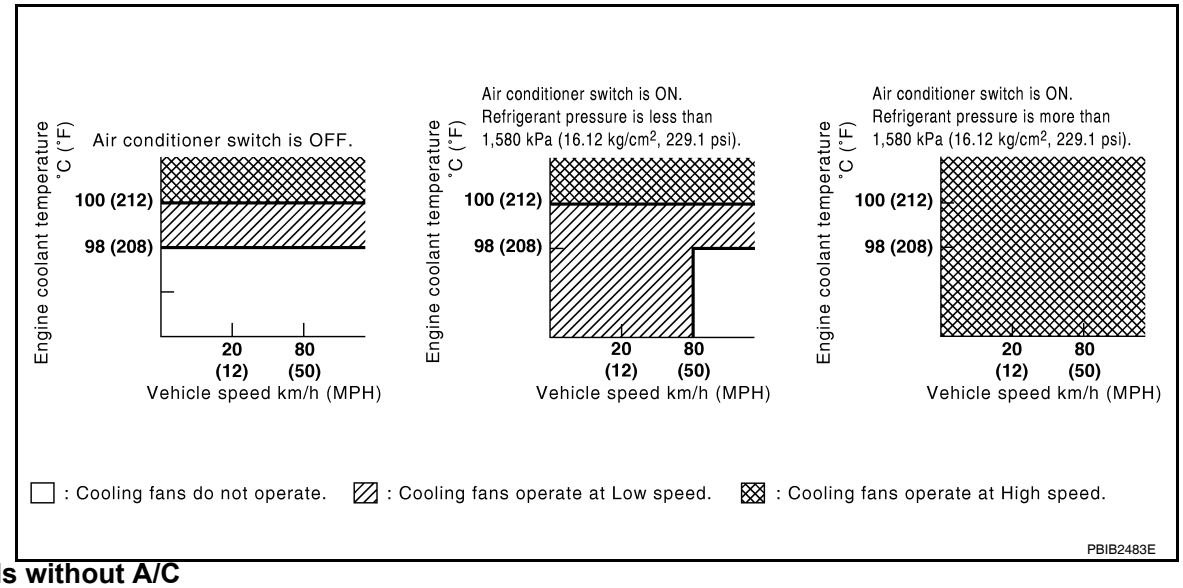
*2: This signal is sent to ECM via the CAN communication line.

SYSTEM DESCRIPTION

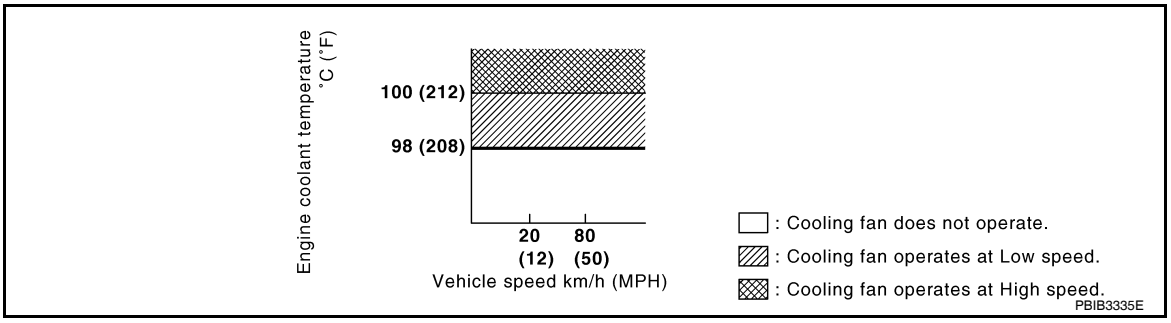
ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, refrigerant pressure, air conditioner ON signal. Then control system has 3-step control [HIGH/LOW/OFF].

Cooling Fan Operation

Models with A/C



Models without A/C



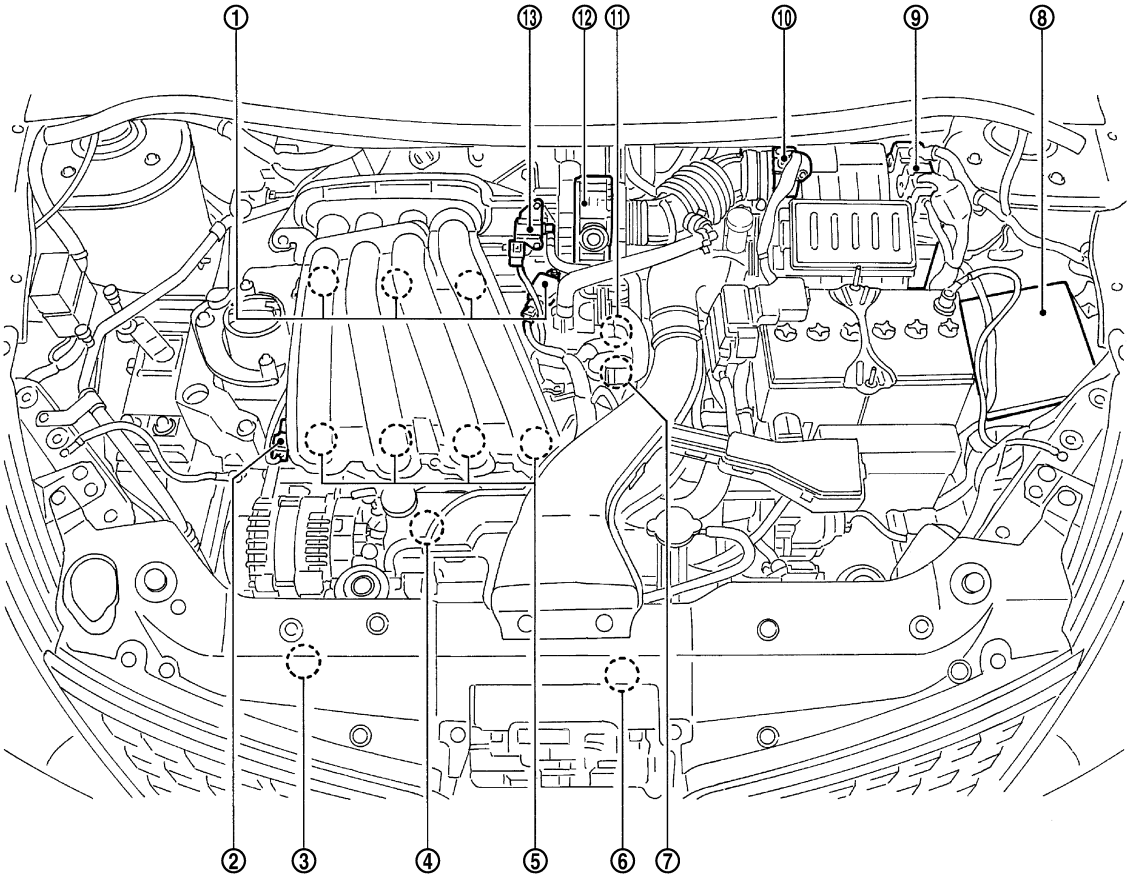
Cooling Fan Relay Operation

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

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

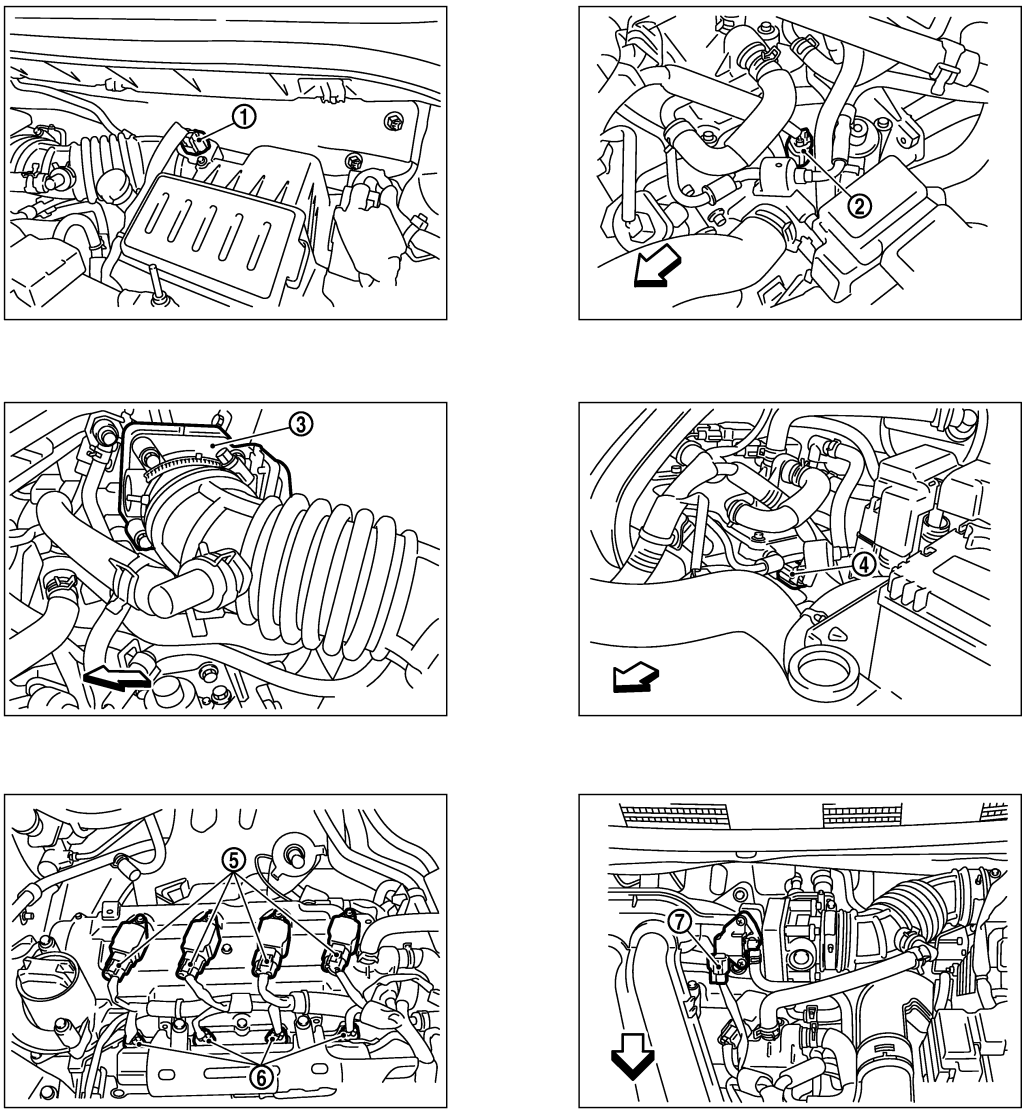
Component Parts Location

INFOID:0000000004780029



PBIB2939E

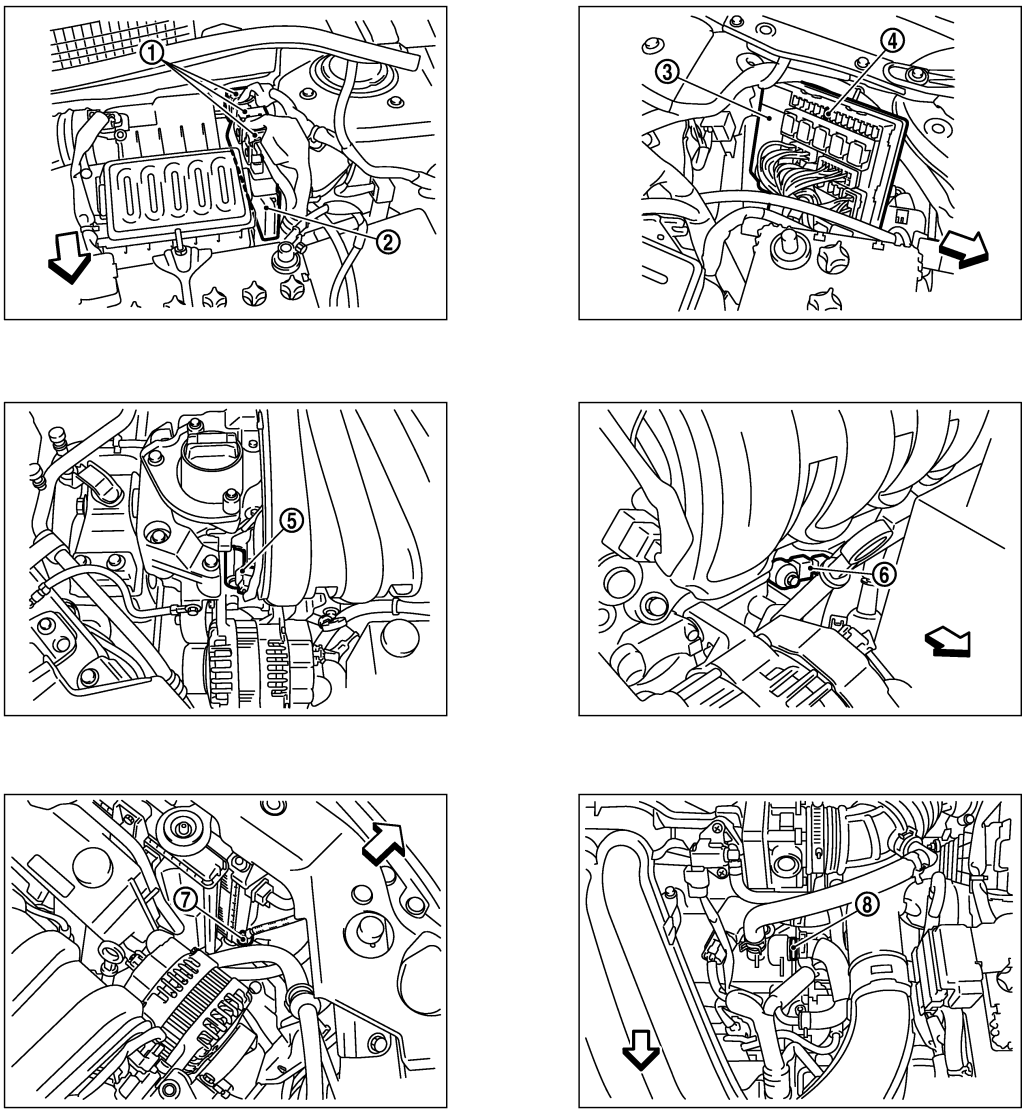
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

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

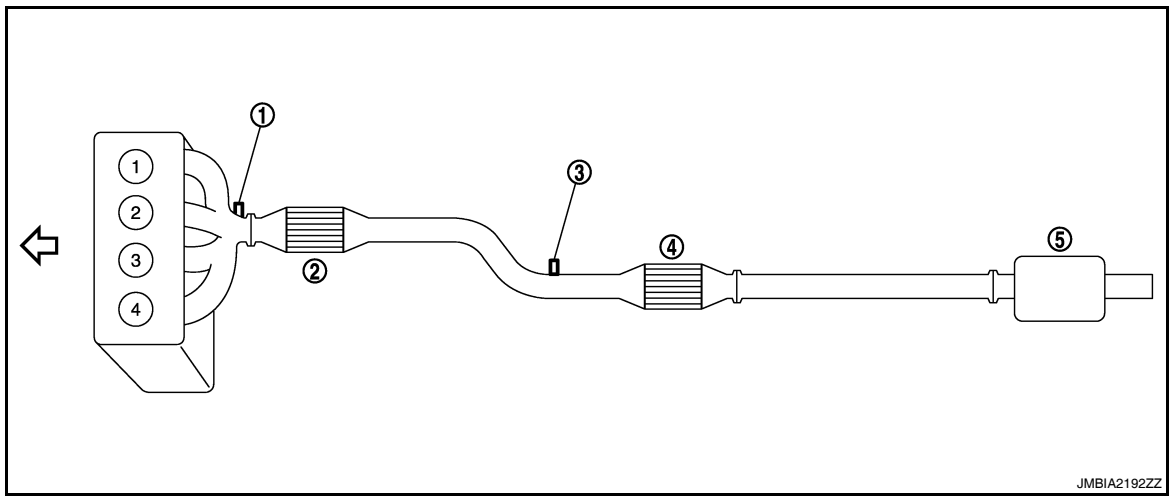
Vehicle front



PBIB2941E

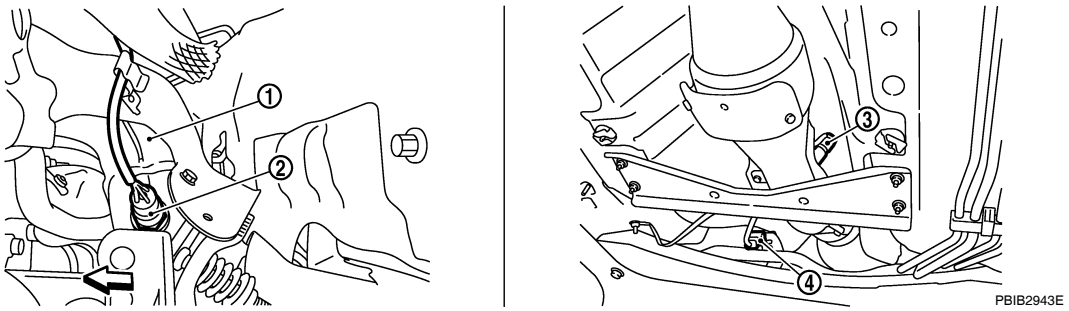
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

Vehicle front



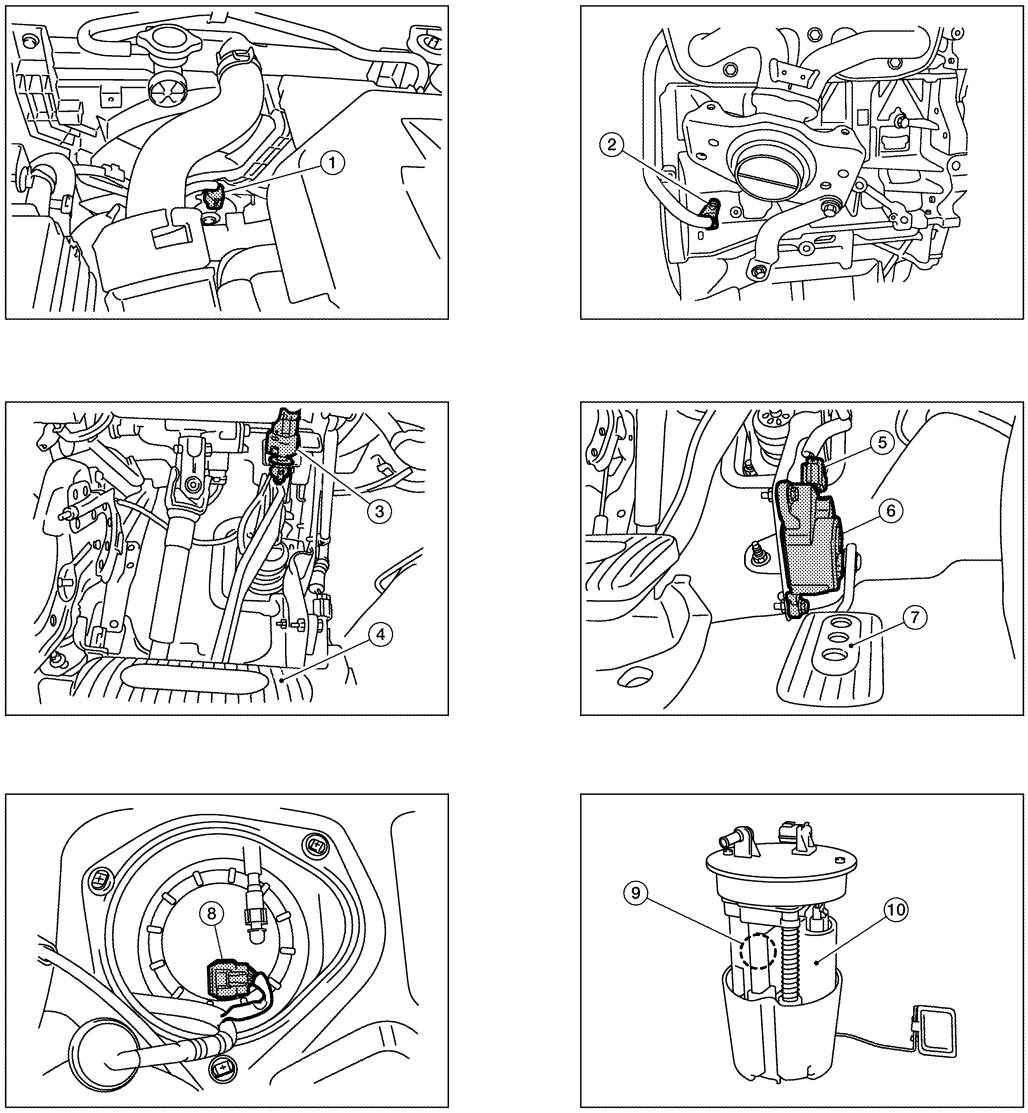
1. Air fuel ratio (A/F) sensor 1
2. Three way catalyst (Manifold)
3. Heated oxygen sensor 2
4. Three way catalyst (Under flloor)
5. Muffler

Vehicle front



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

Vehicle front



AWBIA0044ZZ

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

Component Description

INFOID:0000000004780030

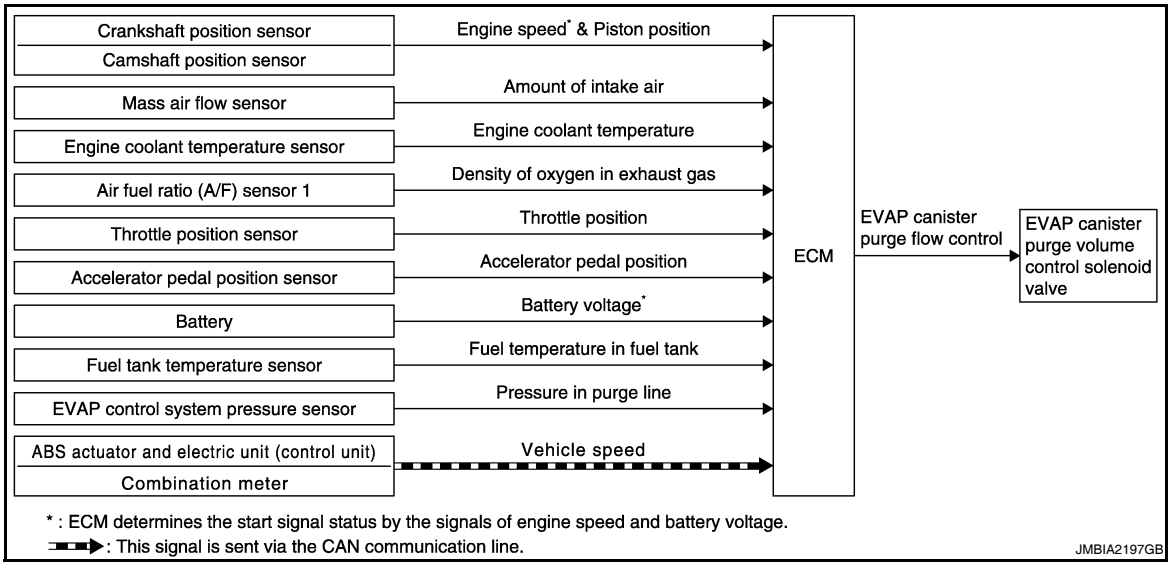
Component	Reference
Camshaft position sensor (PHASE)	EC-268, "Description"
Crankshaft position sensor (POS)	EC-263, "Description"
Cooling fan motor	EC-66, "System Description"

Component	Reference
Engine coolant temperature sensor	EC-167, "Description"
Refrigerant pressure sensor	EC-457, "Description"

EVAPORATIVE EMISSION SYSTEM

System Diagram

INFOID:0000000004780031



System Description

INFOID:0000000004780032

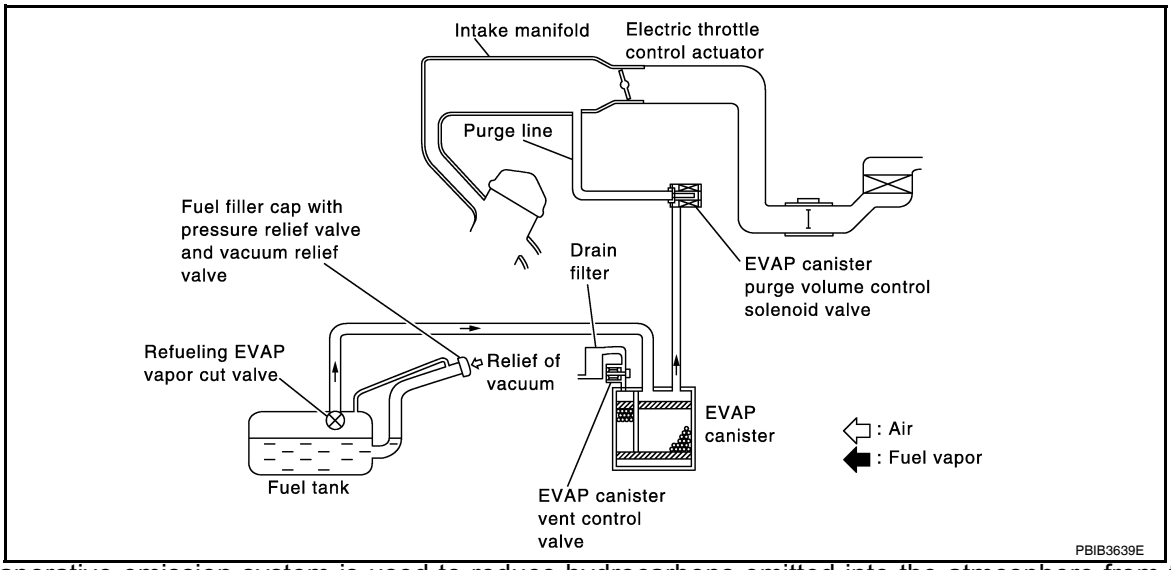
INPUT/OUTPUT SIGNAL CHART

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)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
EVAP control system pressure sensor	Pressure in purge line		
ABS actuator and electric unit (control unit)	Vehicle speed*2		
Combination meter			

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

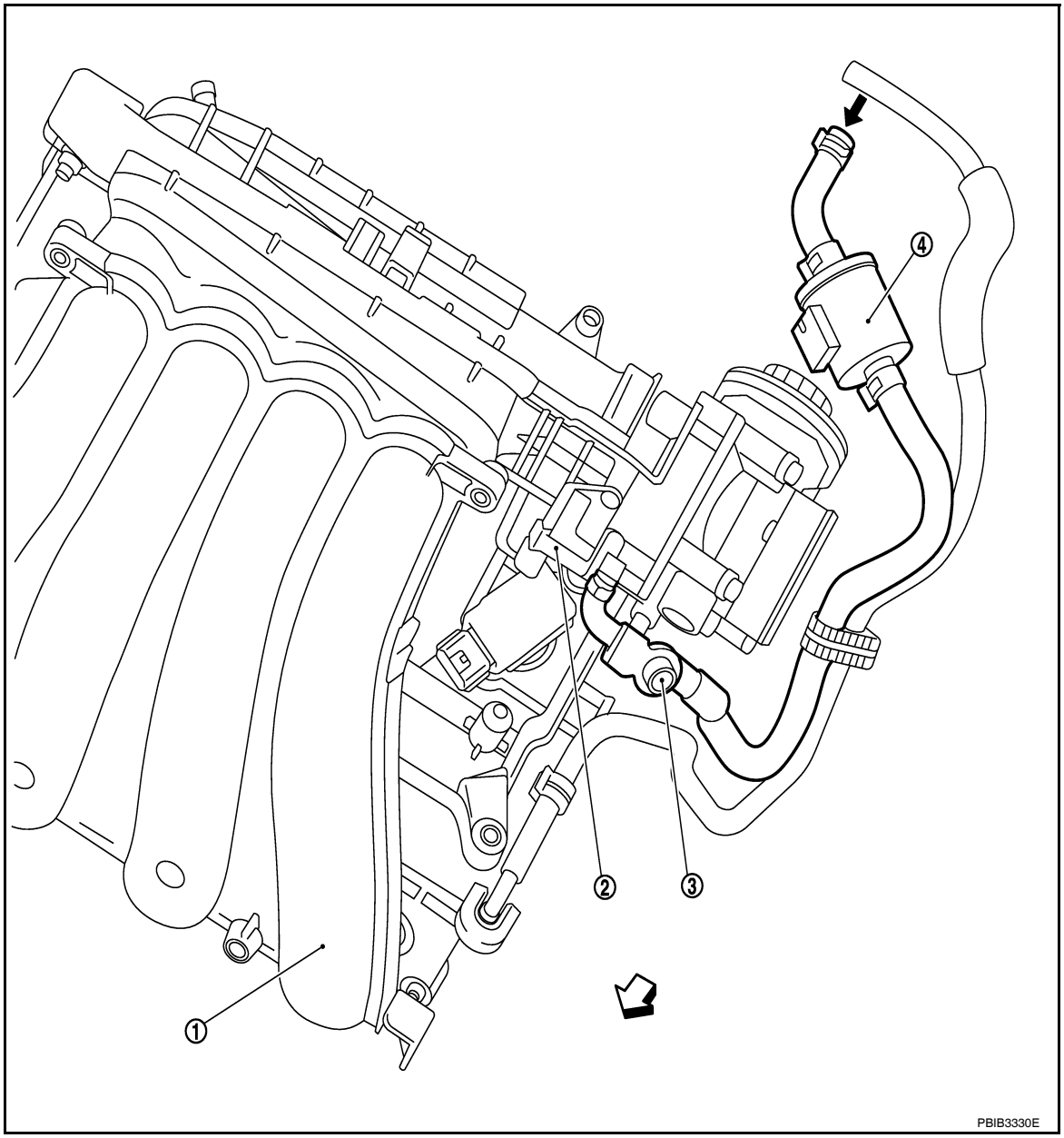
*2: This signal is sent to the ECM via the CAN communication line.

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.

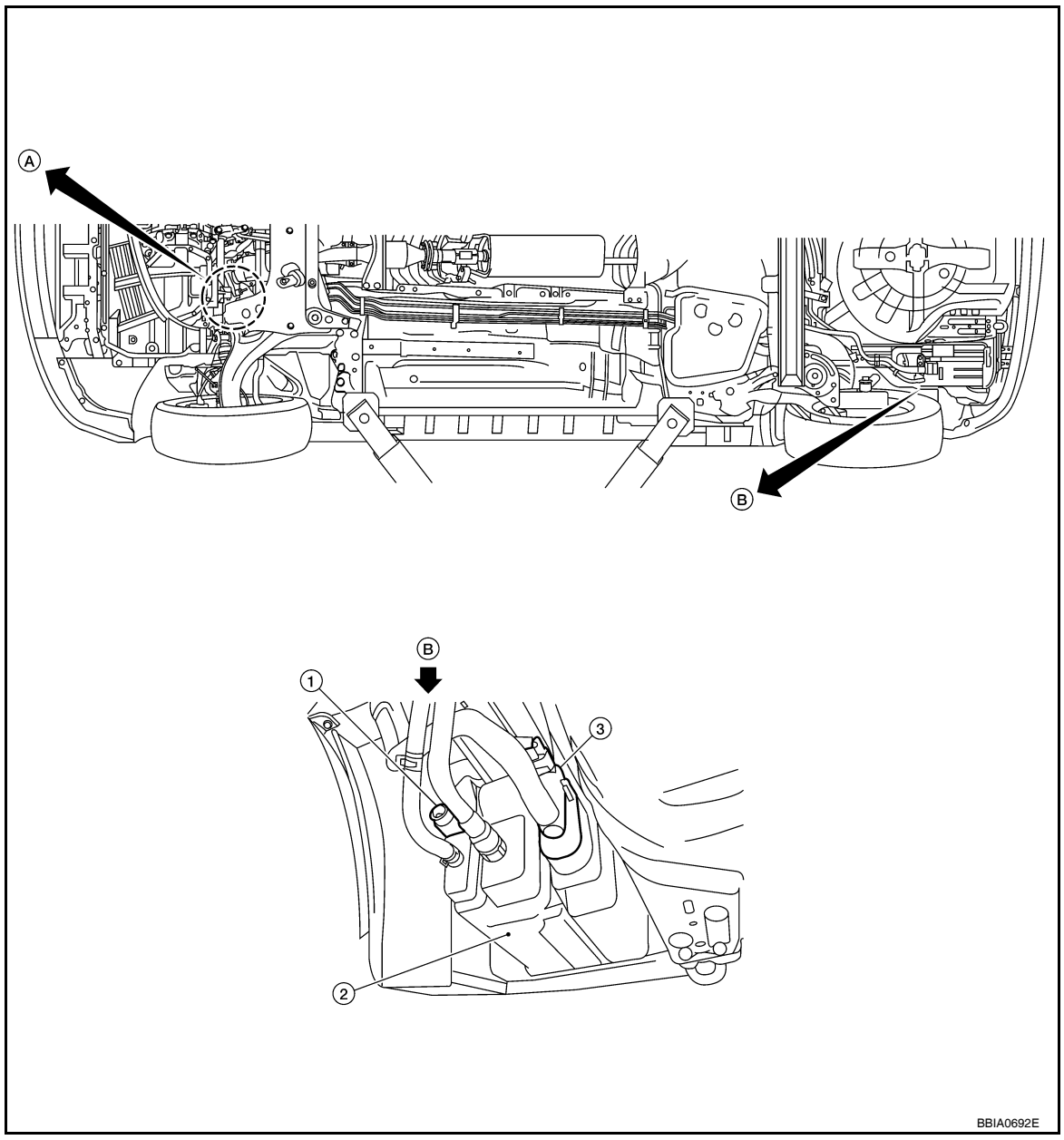
EVAPORATIVE EMISSION LINE DRAWING



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

Vehicle front

From next figure

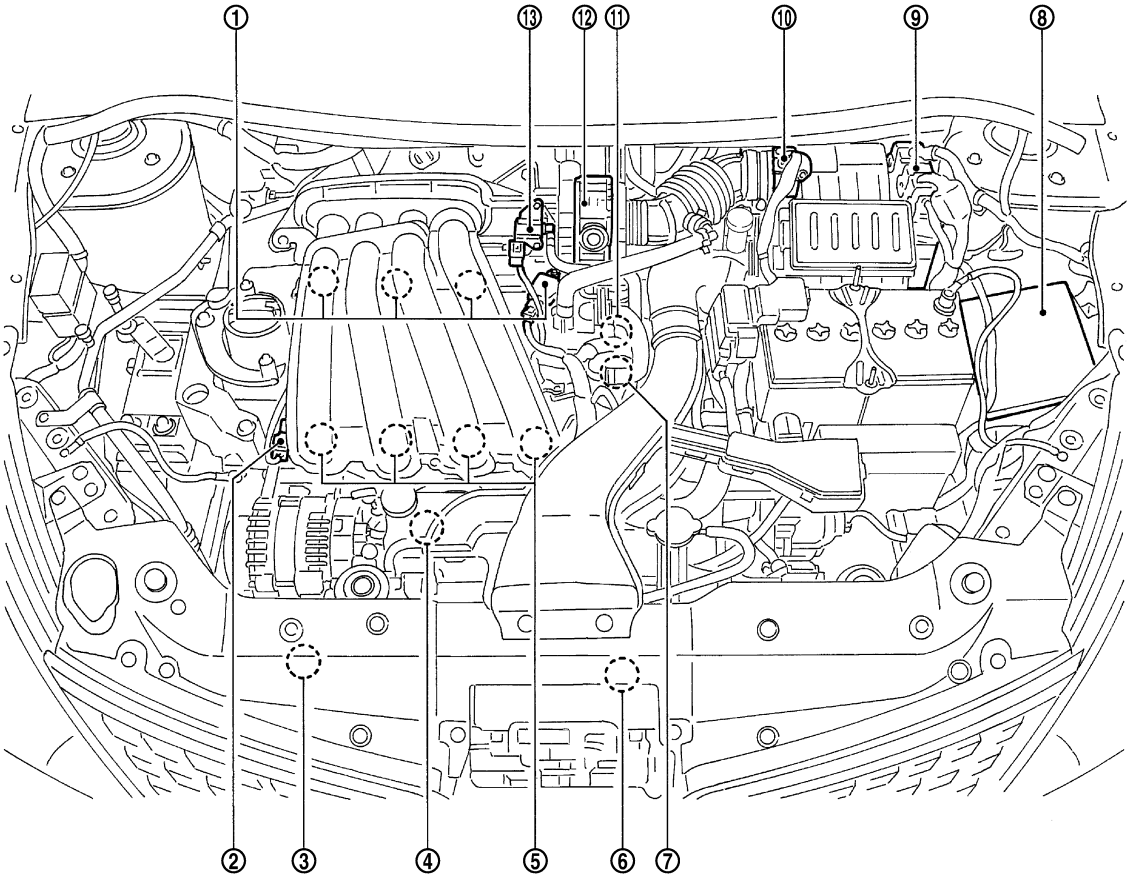


1. EVAP control system pressure sensor 2. EVAP canister 3. EVAP canister vent control valve
A. To previous figure

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

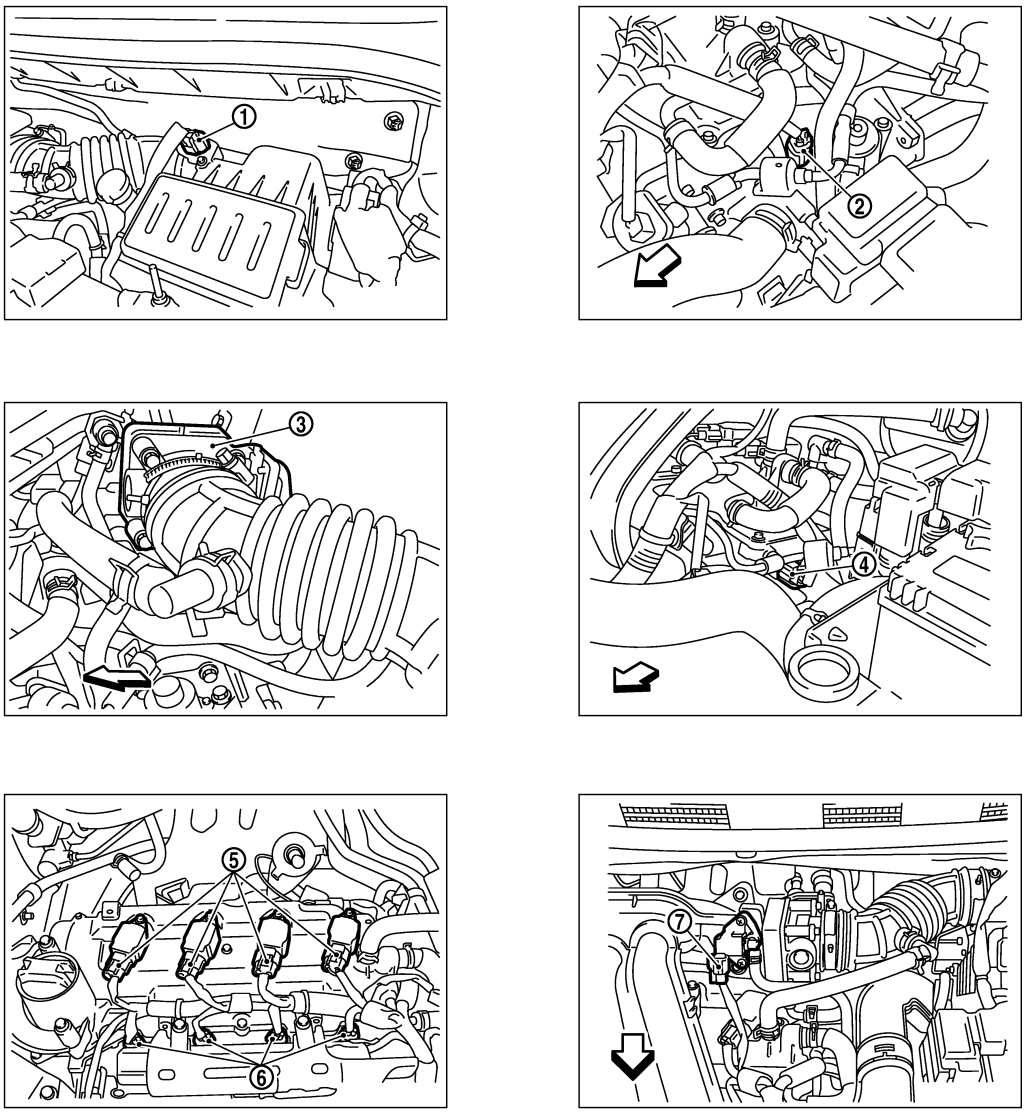
Component Parts Location

INFOID:0000000004780033



PBIB2939E

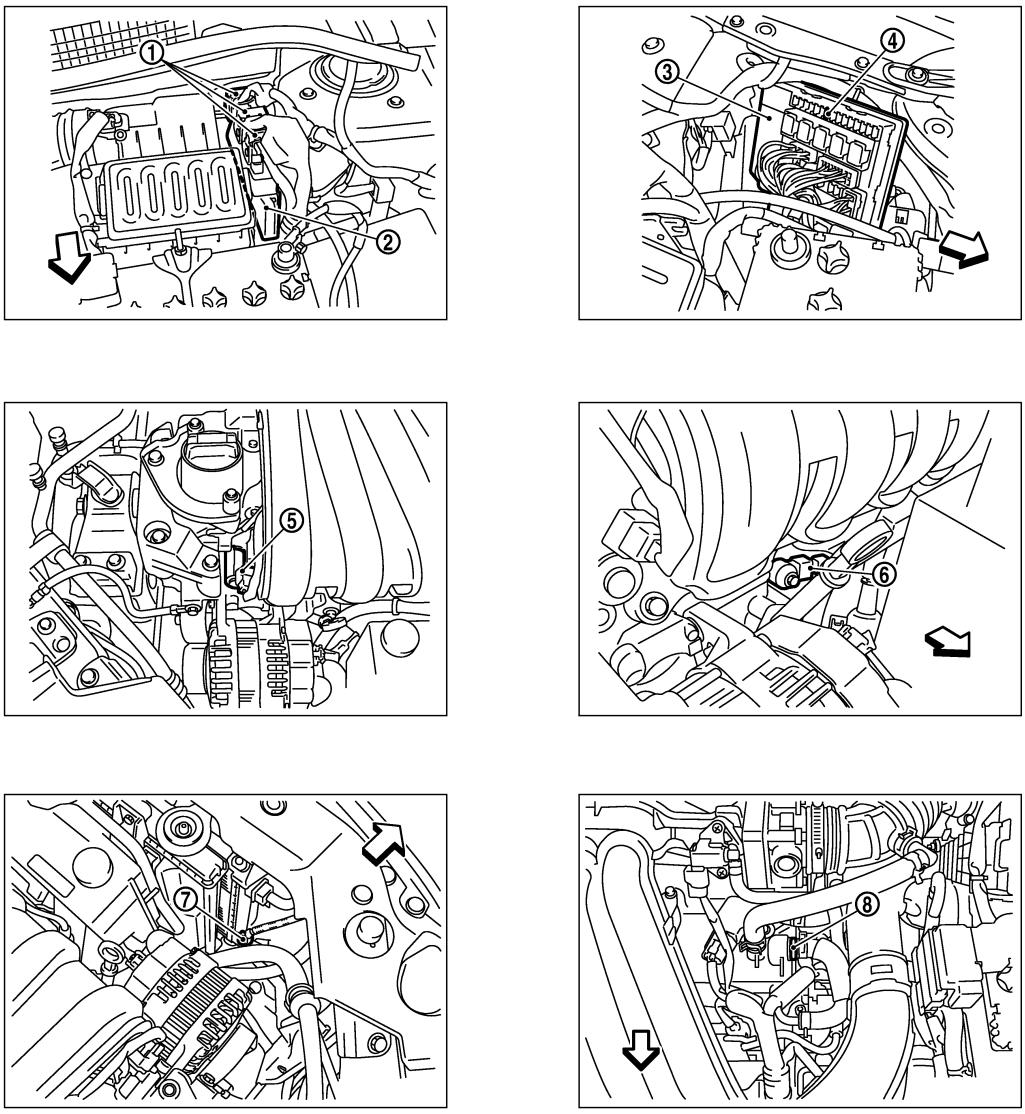
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

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

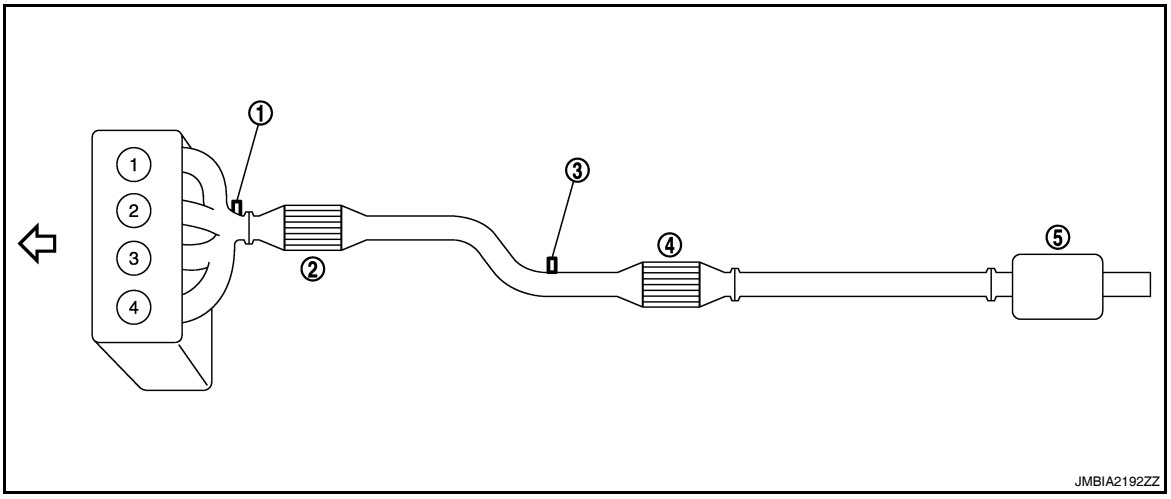
Vehicle front



PBIB2941E

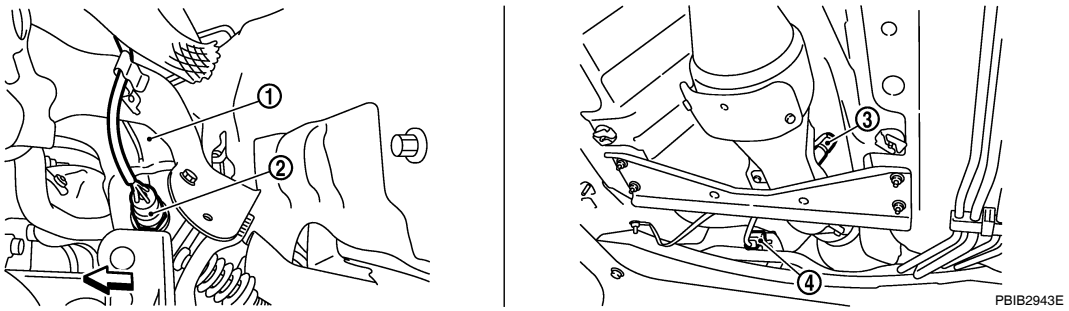
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

Vehicle front



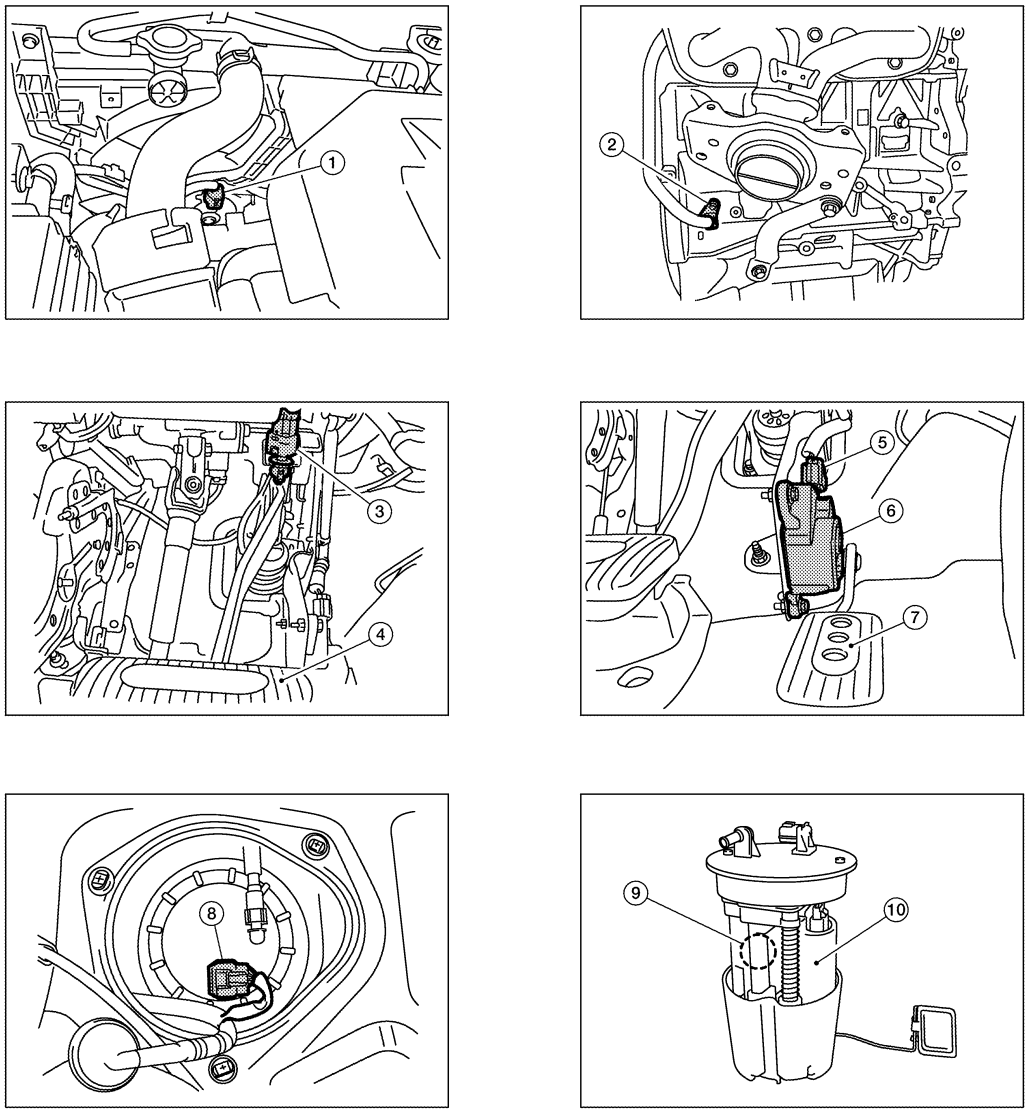
1. Air fuel ratio (A/F) sensor 1
2. Three way catalyst (Manifold)
3. Heated oxygen sensor 2
4. Three way catalyst (Under flloor)
5. Muffler

Vehicle front



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

Vehicle front



AWBIA0044ZZ

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

Component Description

INFOID:0000000004780034

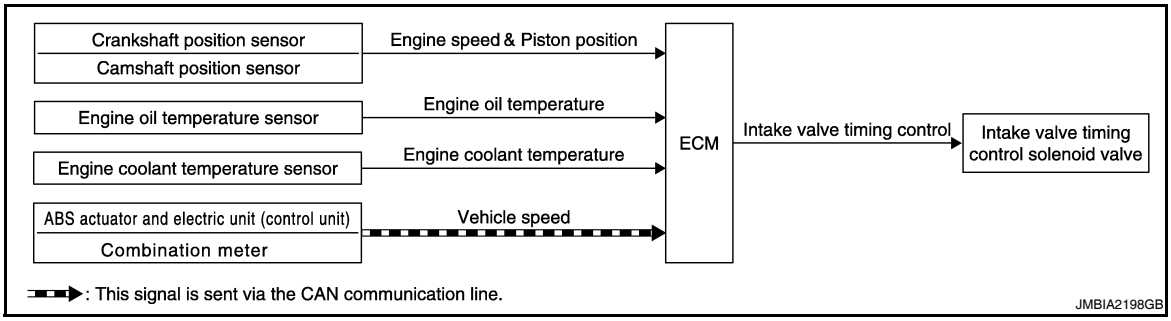
Component	Reference
A/F sensor 1	EC-182, "Description"
Accelerator pedal position sensor	EC-399, "Description"
Camshaft position sensor (PHASE)	EC-268, "Description"
Crankshaft position sensor (POS)	EC-263, "Description"

Component	Reference
Engine coolant temperature sensor	EC-167, "Description"
EVAP canister purge volume control solenoid valve	EC-291, "Description"
EVAP control system pressure sensor	EC-312, "Description"
Fuel tank temperature sensor	EC-240, "Description"
Mass air flow sensor	EC-148, "Description"
Throttle position sensor	EC-171, "Description"

INTAKE VALVE TIMING CONTROL

System Diagram

INFOID:0000000004780035



System Description

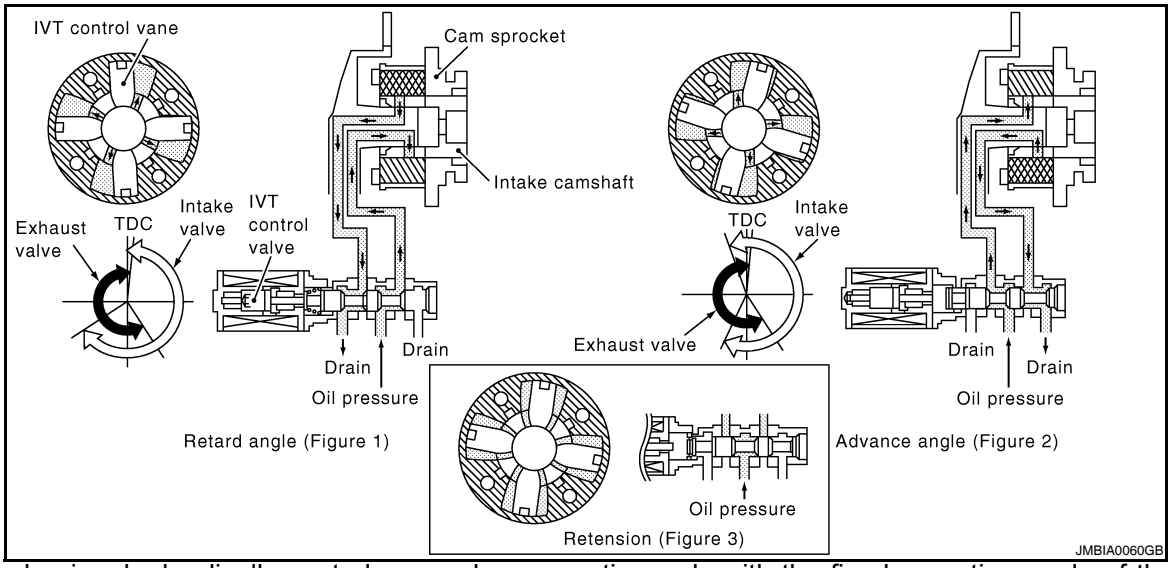
INFOID:0000000004780036

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		
ABS actuator and electric unit (control unit)	Vehicle speed*		
Combination meter			

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

SYSTEM DESCRIPTION

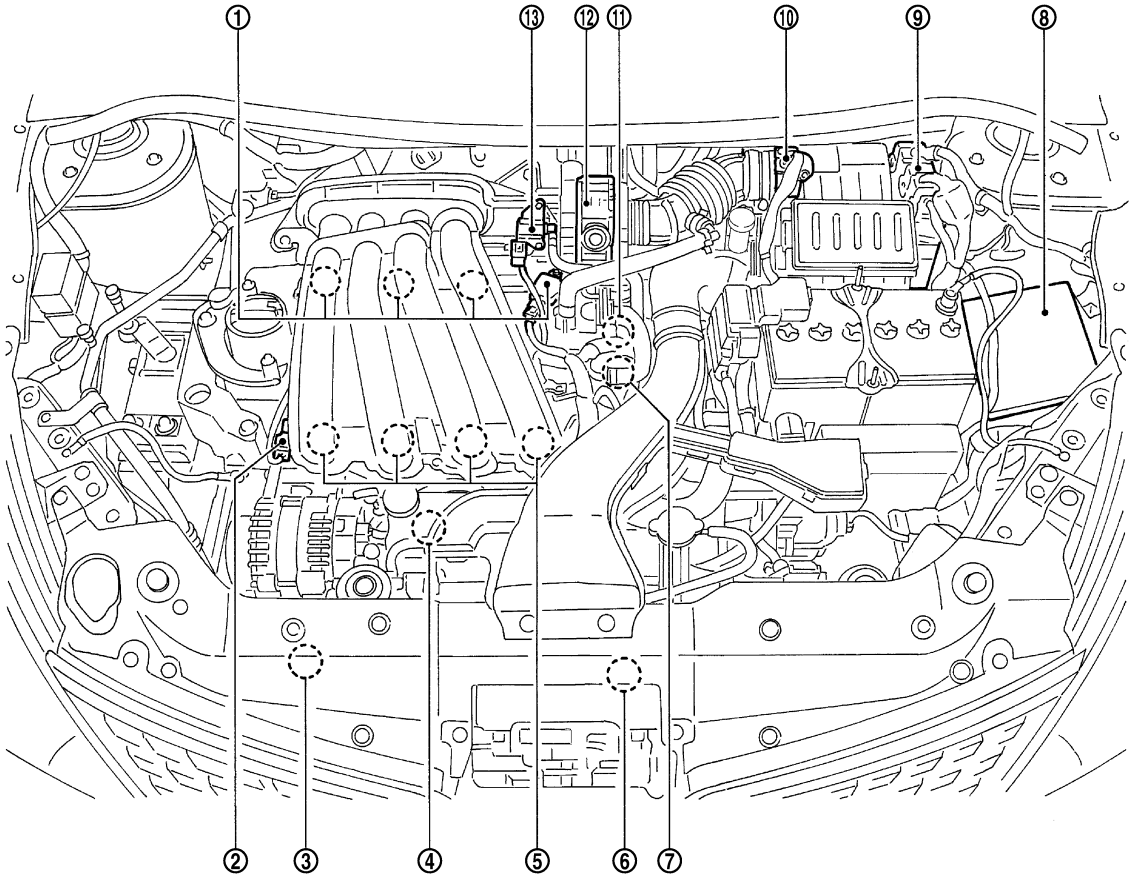


This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

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.

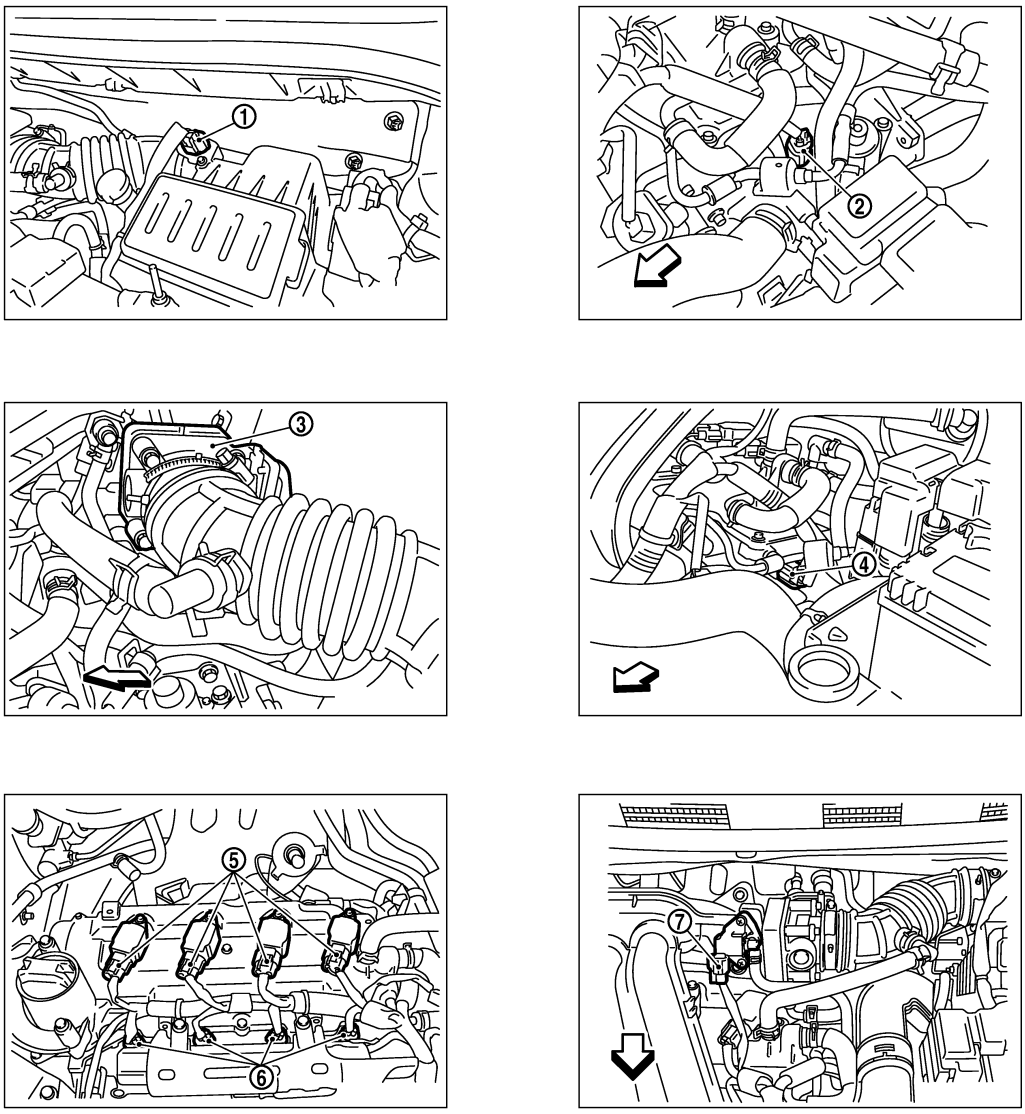
Component Parts Location

INFOID:0000000004780037



PBIB2939E

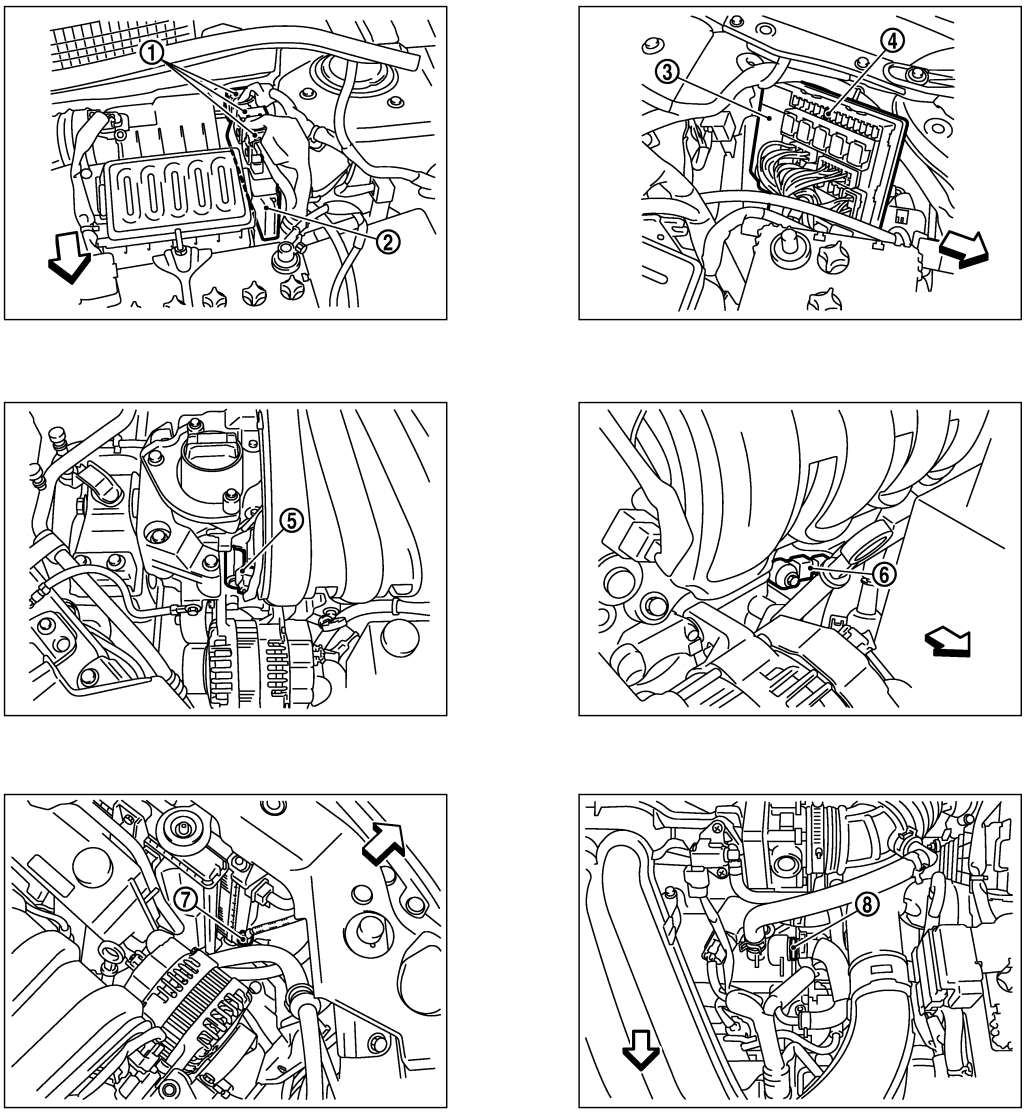
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)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



PBIB2940E

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

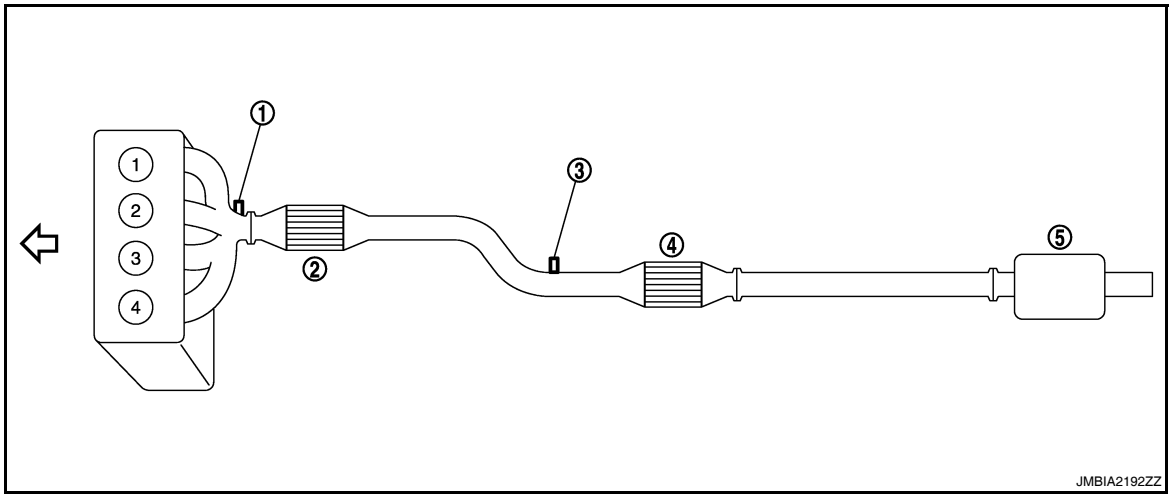
Vehicle front



PBIB2941E

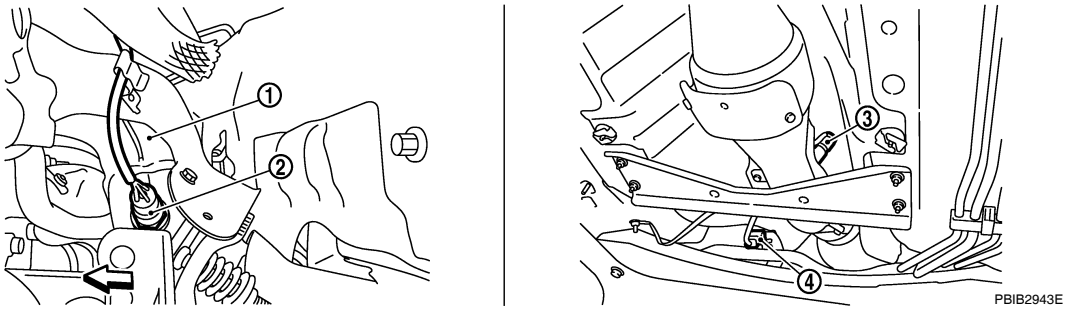
1. ECM harness connectors
2. ECM
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Intake valve timing control solenoid valve
6. Knock sensor
7. Refrigerant pressure sensor
8. PCV valve

Vehicle front



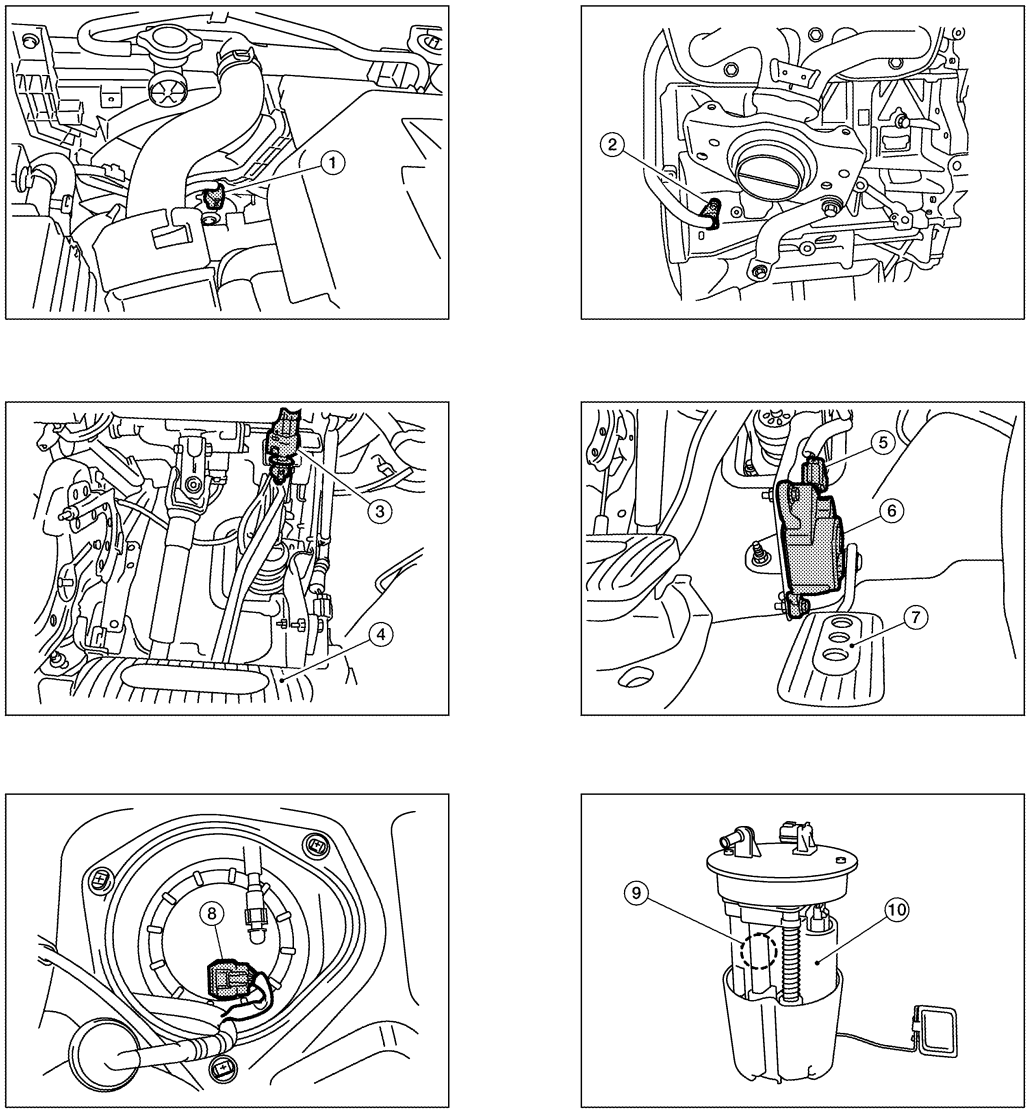
1. Air fuel ratio (A/F) sensor 1
2. Three way catalyst (Manifold)
3. Heated oxygen sensor 2
4. Three way catalyst (Under flloor)
5. Muffler

Vehicle front



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

Vehicle front



AWBIA0044ZZ

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

Component Description

INFOID:0000000004780038

Component	Reference
Camshaft position sensor (PHASE)	EC-268, "Description"
Crankshaft position sensor (POS)	EC-263, "Description"
Engine coolant temperature sensor	EC-167, "Description"
Intake valve timing control solenoid valve	EC-84, "System Description"

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000004780039

INTRODUCTION

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

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

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

×: Applicable —: Not applicable

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

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

The malfunction indicator lamp (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-472, "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. Specific on board diagnostic items will cause the ECM to light up 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	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to EC-475, "DTC Index".)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

DTC AND FREEZE FRAME DATA

DTC and 1st Trip DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not recur, 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 blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.
Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in “How to Erase DTC and 1st Trip DTC”.
For malfunctions in which 1st trip DTCs are displayed, refer to EC-475, "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. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a malfunction. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to EC-22, "Work Flow". Then perform DTC CONFIRMATION PROCEDURE or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

Freeze Frame Data and 1st Trip Freeze Frame Data

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short-term fuel trim, long-term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-III or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-III screen, not on the GST.
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

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

How to Read DTC and 1st Trip DTC

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

With CONSULT-III

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

These DTCs are prescribed by SAE J2012.
(CONSULT-III also displays the malfunctioning component or system.)
Time data indicates how many times the vehicle was driven after the last detection of a DTC.
If the DTC is being detected currently, the time data will be [0].
If a 1st trip DTC is stored in the ECM, the time data will be [1t].

With GST

GST (Generic Scan Tool) displays the DTC in Diagnostic Service $03.
Examples: P0340, P0850, P1148, etc.
These DTCs are prescribed by SAE J2012.

No Tools

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

NOTE:

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

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.**
- **If the DTC is not for A/T related items (EC-475, "DTC Index"), skip step 1.**

1. Erase DTC in TCM. Refer to AT-39, "OBD-II Diagnostic Trouble Code (DTC)".
2. Select “ENGINE” with CONSULT-III.
3. Select “SELF DIAGNOSTIC RESULT”.
4. Touch “ERASE”. (DTC in ECM will be erased.)

With GST

NOTE:

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

1. Select Service $04 with GST (Generic Scan Tool).

No Tools

NOTE:

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

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 cleared within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**

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

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

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Service $01 of SAE J1979.
As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.
If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating “INCMP”, use the information in this Service Manual to set the SRT to “CMPLT”.

In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate “CMPLT” for each application system. Once set as “CMPLT”, the SRT status remains “CMPLT” until the self-diagnosis memory is erased.
Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate “INCMP” for these items.

NOTE:
The SRT will also indicate “INCMP” if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.
If, during the state emissions inspection, the SRT indicates “CMPLT” for all test items, the inspector will continue with the emissions test. However, if the SRT indicates “INCMP” for one or more of the SRT items the vehicle is returned to the customer untested.

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

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

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

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

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

Self-diagnosis result		Example				
		Diagnosis	Ignition cycle ← ON → OFF ← ON → OFF ← ON → OFF ← ON →			
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)
		P0402	OK (1)	— (1)	— (1)	OK (2)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“CMPLT”	“CMPLT”	“CMPLT”	“CMPLT”
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)
		P0402	— (0)	— (0)	OK (1)	— (1)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“INCMP”	“INCMP”	“CMPLT”	“CMPLT”

NG exists	Case 3	P0400	OK	OK	—	—
		P0402	—	—	—	—
		P1402	NG	—	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MIL ON)
		SRT of EGR	“INCMP”	“INCMP”	“INCMP”	“CMPLT”

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

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

—: Self-diagnosis is not carried out.

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

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

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

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

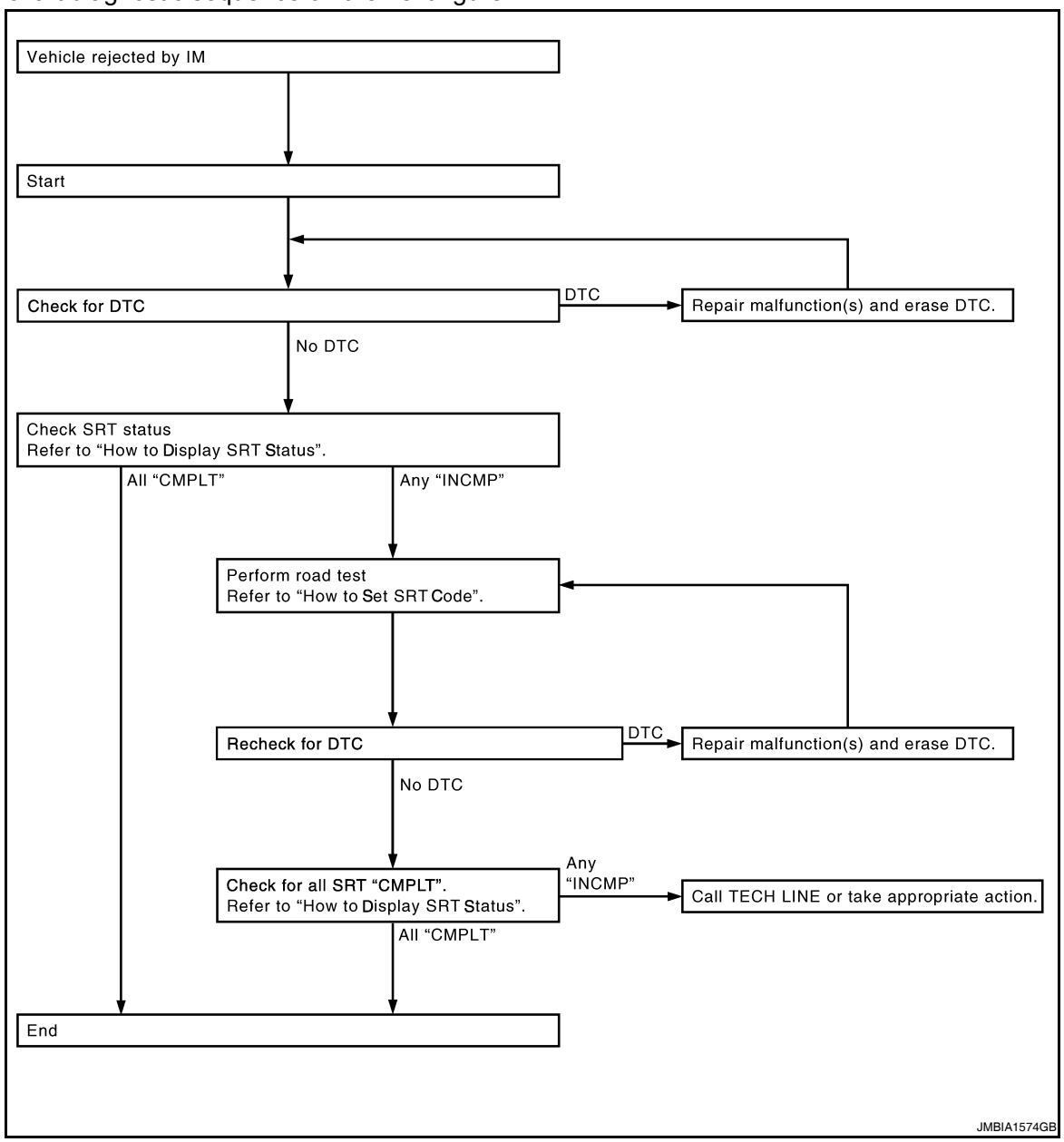
- The SRT will indicate “CMPLT” at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires “CMPLT” of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to “CMPLT” of SRT, the self-diagnosis memory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

NOTE:

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

SRT Service Procedure

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



How to Display SRT Status

WITH CONSULT-III

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

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

NOTE:

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

WITH GST

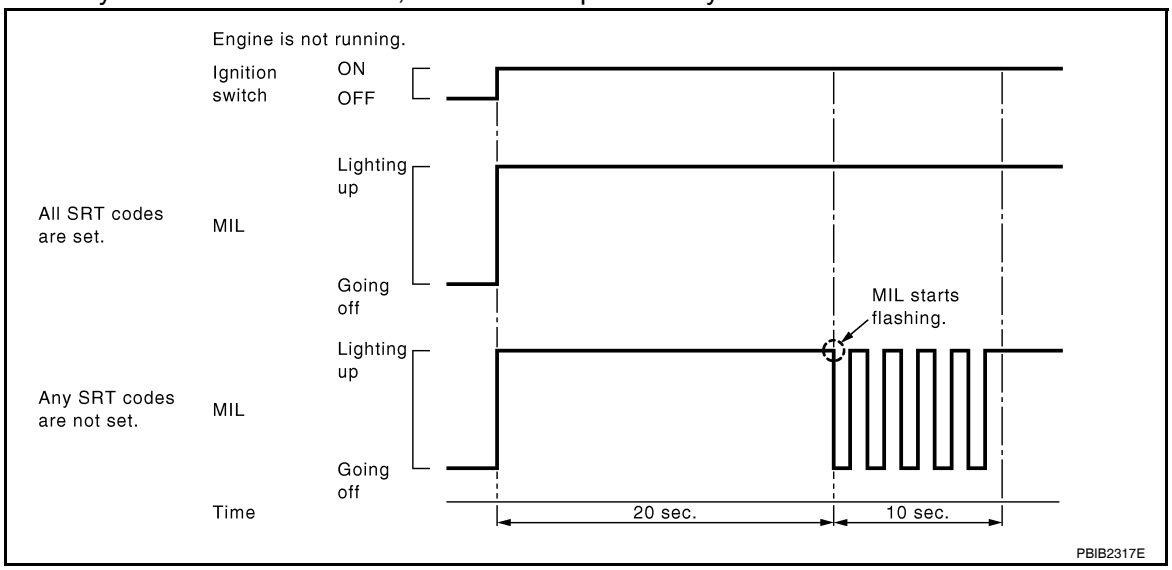
Selecting Service $01 with GST (Generic Scan Tool)

NO TOOLS

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

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

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

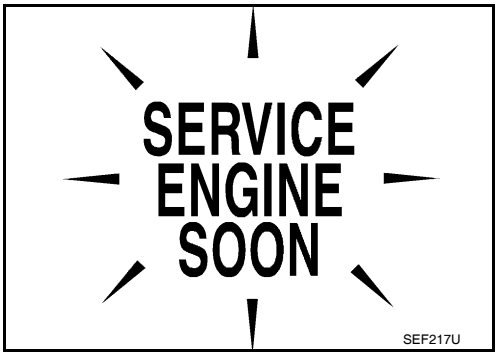


MALFUNCTION INDICATOR LAMP (MIL)

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-446, "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	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 or blink the MIL in the 1st trip. • Misfire (Possible three way catalyst damage) • One trip detection diagnoses
Mode II	Ignition switch in ON position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.

Diagnostic Test Mode I — Bulb Check

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to EC-446, "Description".

Diagnostic Test Mode I — Malfunction Warning

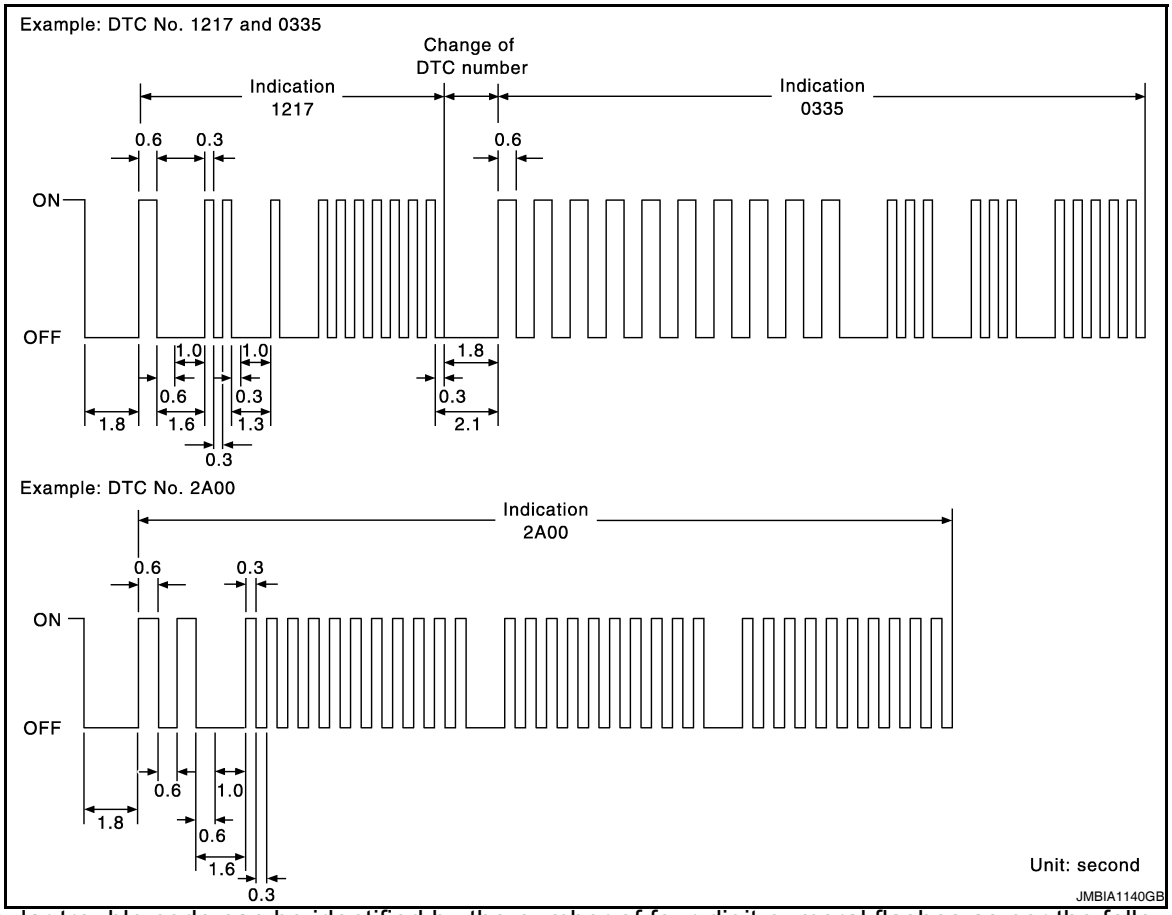
MIL	Condition
ON	When the malfunction is detected.
OFF	No malfunction.

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 or GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes as 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. (See EC-475, "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.

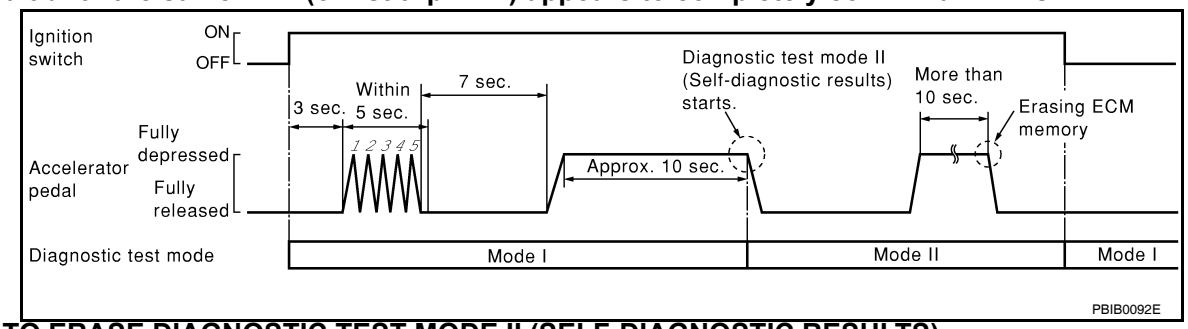
- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MIL starts blinking.

   NOTE:

   Do not release the accelerator pedal for 10 seconds if MIL start 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 Diagnostic Test Mode II (Self-diagnostic results).
   NOTE:
   Wait until the same DTC (or 1st trip DTC) appears to completely confirm all DTCs.



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

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

OBD System Operation Chart

Relationship Between MIL, 1st Trip DTC, DTC and Detectable Items

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

Summary Chart

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

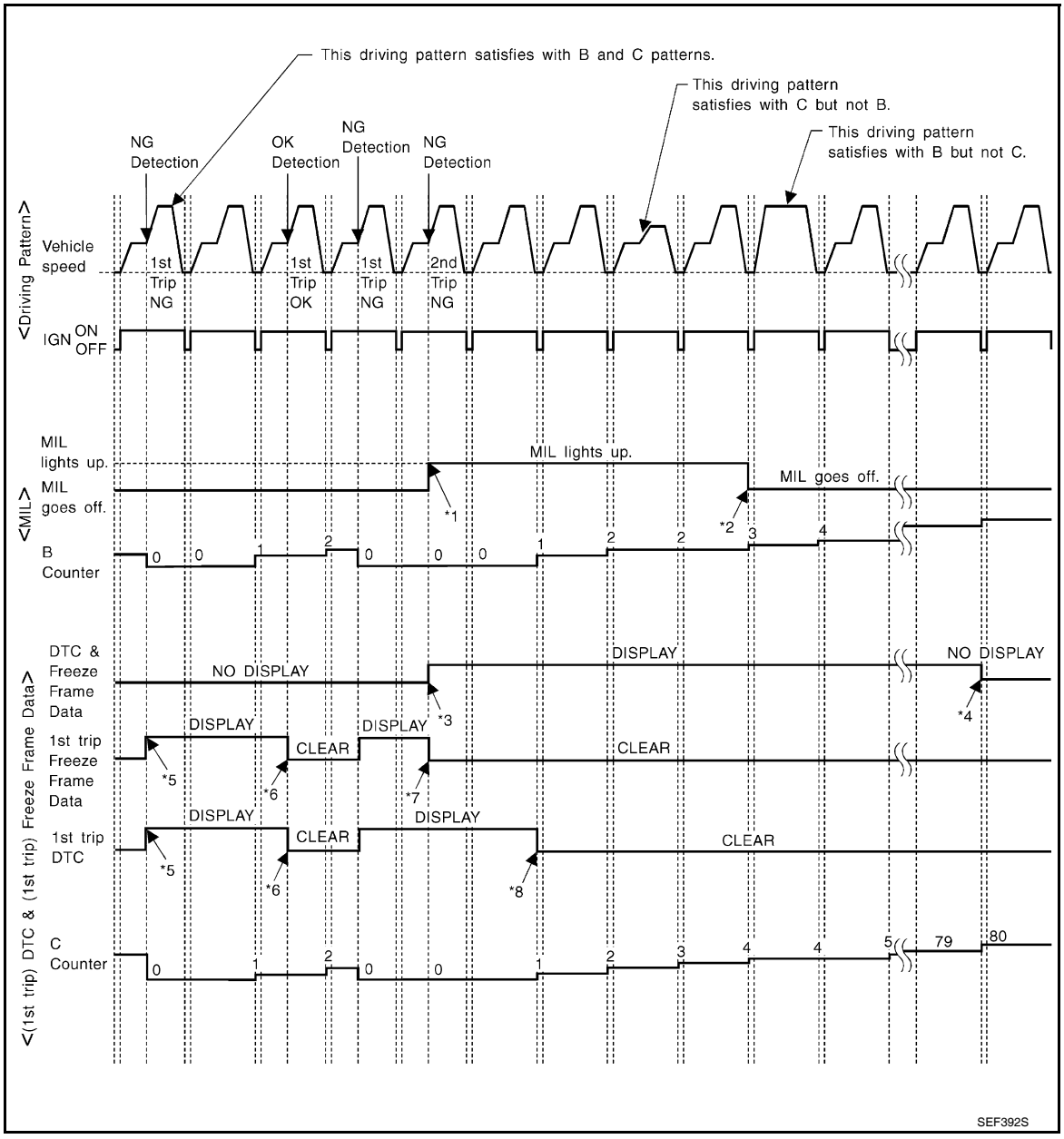
For details about patterns B and C under “Fuel Injection System” and “Misfire”, see “EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”.

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

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

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

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



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

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

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

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

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

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

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

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

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

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

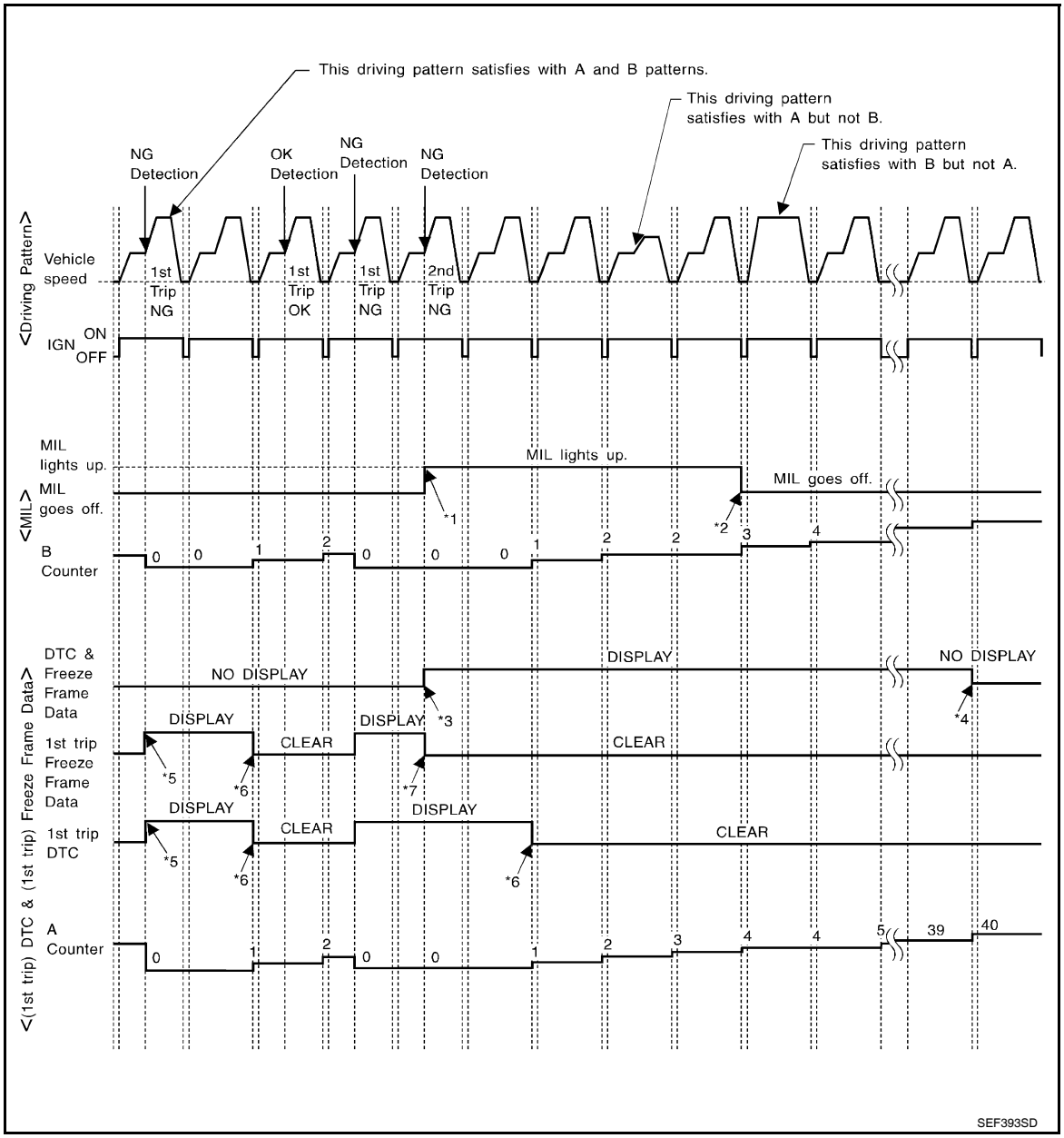
<Driving Pattern C>
Driving pattern C means the vehicle operation as per the following:
The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ± 375 rpm
Calculated load value: (Calculated load value in the freeze frame data) x (1 ± 0.1) [%]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

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

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

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

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



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

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

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

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

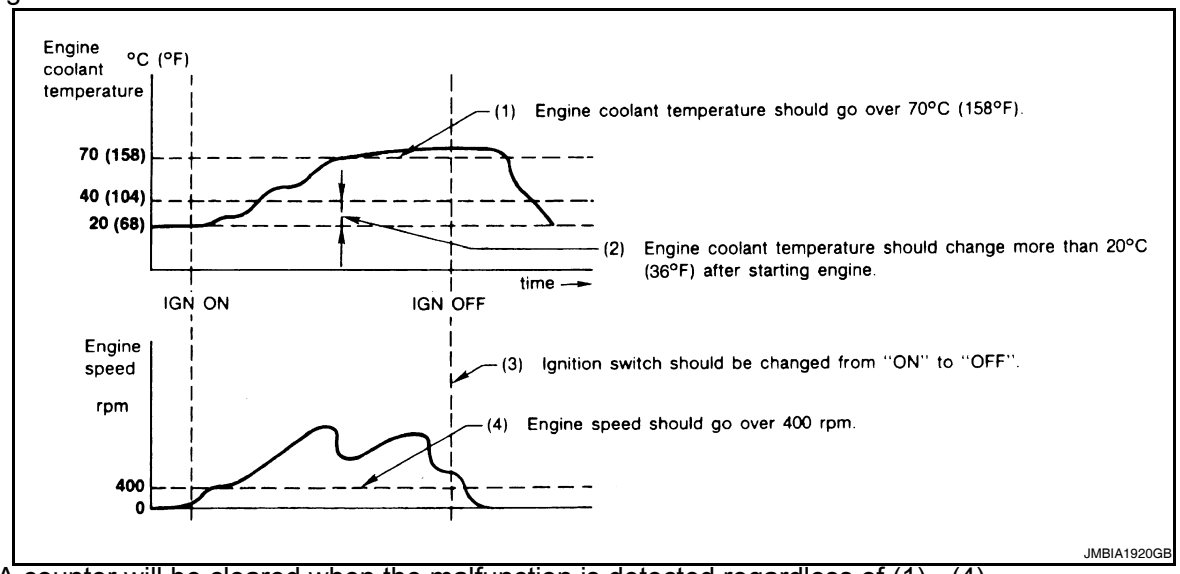
*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

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

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

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

<Driving Pattern A>



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

<Driving Pattern B>

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

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

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

CONSULT-III Function

INFOID:0000000004780040

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

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

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

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

Item			DIAGNOSTIC TEST MODE						
			Work Support	Self Diagnostic Result		Data Monitor	Active Test	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2			SRT STATUS	DTC WORK SUPPORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		×	×	×			
		Camshaft position sensor (PHASE)		×	×	×			
		Mass air flow sensor		×		×			
		Engine coolant temperature sensor		×	×	×	×		
		Air fuel ratio (A/F) sensor 1		×		×		×	×
		Heated oxygen sensor 2		×		×		×	×
		Vehicle speed signal		×	×	×			
		Accelerator pedal position sensor		×		×			
		Throttle position sensor		×	×	×			
		Fuel tank temperature sensor		×		×	×		
		EVAP control system pressure sensor		×		×			
		Intake air temperature sensor		×	×	×			
		Knock sensor		×					
		Refrigerant pressure sensor				×			
		Closed throttle position switch (accelerator pedal position sensor signal)				×			
		Air conditioner ON signal				×			
		Park/neutral position (PNP) switch		×		×			
		Stop lamp switch		×		×			
		Power steering operation signal				×			
		Battery voltage				×			
		Load signal				×			
		Primary speed sensor		×		×			
		Fuel level sensor signal		×		×			
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Fuel injector				×	×		
		Power transistor (Ignition timing)				×	×		
		Throttle control motor relay		×		×			
		Throttle control motor		×					
		EVAP canister purge volume control solenoid valve		×		×	×		×
		Air conditioner relay				×			
		Fuel pump relay	×			×	×		
		Cooling fan relay		×		×	×		
		Air fuel ratio (A/F) sensor 1 heater		×		×		×*3	
		Heated oxygen sensor 2 heater		×		×		×*3	
		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-90, "Diagnosis Description".

*3: Always “CMPLT” is displayed.

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	• THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	• THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing mixture ratio self-learning value
EVAP SYSTEM CLOSE	CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. • IGN SW ON • ENGINE NOT RUNNING • AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). • NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM • FUEL TANK TEMP. IS MORE THAN 0°C (32°F). • WITHIN 10 MINUTES AFTER STARTING “EVAP SYSTEM CLOSE” • WHEN TRYING TO EXECUTE “EVAP SYSTEM CLOSE” UNDER THE CONDITION EXCEPT ABOVE, CONSULT-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. **NOTE:** **WHEN STARTING ENGINE, CONSULT-III MAY DISPLAY “BATTERY VOLTAGE IS LOW. CHARGE BATTERY”, EVEN IN USING CHARGED BATTERY.**	When detecting EVAP vapor leak point of EVAP system
VIN REGISTRATION	• IN THIS MODE, VIN IS REGISTERED IN ECM.	When registering VIN in ECM
TARGET IDLE RPM ADJ*	• IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	• IDLE CONDITION	When adjusting target ignition timing

*: 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-475, "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-475, "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

Freeze frame data item*	Description
CAL/LD VALUE [%]	• The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	• The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	• “Long-term fuel trim” at the moment a malfunction is detected is displayed. • The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
S-FUEL TRM-B1 [%]	• “Short-term fuel trim” at the moment a malfunction is detected is displayed. • The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	• The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	• The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH·P/S [%]	• The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	• The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	• The intake air temperature at the moment a malfunction is detected is displayed.
FUEL SYS-B2	• 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

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”.
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.	

Monitored item	Unit	Description	Remarks
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			
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.	
FUEL LEVEL SE	V	• The signal voltage of the fuel level sensor is displayed.	
START SIGNAL	ON/OFF	• Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	• After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS	ON/OFF	• Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG	ON/OFF	• Indicates [ON/OFF] condition of the air conditioner switch determined by the air conditioner ON signal.	
P/N POSI SW	ON/OFF	• Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL	ON/OFF	• [ON/OFF] condition of the power steering system (determined by the signal sent from EPS control unit) is indicated.	
LOAD SIGNAL	ON/OFF	• Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW	ON/OFF	• Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW	ON/OFF	• Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW	ON/OFF	• Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1	msec	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
IGN TIMING	BTDC	• Indicates the ignition timing computed by ECM according to the input signals.	• When the engine is stopped, a certain value is indicated.
CAL/LD VALUE	%	• “Calculated load value” indicates the value of the current air flow divided by peak air flow.	

Monitored item	Unit	Description	Remarks
MASS AIRFLOW	g·m/s	• Indicates the mass air flow computed by ECM according to the signal voltage of the mass air flow sensor.	
PURG VOL C/V	%	• Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
INT/V TIM(B1)	°CA	• Indicates [°CA] of intake camshaft advance angle.	
INT/V SOL(B1)	%	• The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. • The advance angle becomes larger as the value increases.	
AIR COND RLY	ON/OFF	• The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY	ON/OFF	• Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
VENT CONT/V	ON/OFF	• The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. ON: Closed OFF: Open	
THRTL RELAY	ON/OFF	• Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
COOLING FAN	HI/LOW/OFF	• Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI: High speed operation LOW: Low speed operation OFF: Stop	
HO2S2 HTR (B1)	ON/OFF	• Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
I/P PULLY SPD	rpm	• Indicates the engine speed computed from the primary sped sensor signal.	
VEHICLE SPEED	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
IDL A/V LEARN	YET/CMPLT	• 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.	
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 • Selector lever: P or N position (A/T), Neutral position (M/T) • Cut off each fuel injector signal one at a time using CONSULT-III.	Engine runs rough or dies.	• Harness and connectors • Compression • Fuel injector • Power transistor • Spark plug • Ignition coil
COOLING FAN*	• Ignition switch: ON • Turn the cooling fan “LOW”, “HI” and “OFF” using CONSULT-III.	Cooling fan moves and stops.	• Harness and connectors • IPDM E/R (Cooling fan relay) • Cooling fan motor
ENG COOLANT TEMP	• Engine: Return to the original trouble condition • Change the engine coolant temperature using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Engine coolant temperature sensor • Fuel injector
FUEL PUMP RELAY	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay “ON” and “OFF” using CONSULT-III and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connectors • Fuel pump relay
PURG VOL CONT/V	• Engine: After warming up, run engine at 1,500 rpm. • Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-III.	Engine speed changes according to the opening percent.	• Harness and connectors • Solenoid valve
FUEL/T TEMP SEN	• Change the fuel tank temperature using CONSULT-III.		
VENT CONTROL/V	• Ignition switch: ON (Engine stopped) • Turn solenoid valve “ON” and “OFF” using 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 & SRT CONFIRMATION MODE

SRT STATUS Mode
For details, refer to EC-90, "Diagnosis Description".

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

DTC WORK SUPPORT Mode

Test mode	Test item	Corresponding DTC No.	Reference page
EVAPORATIVE SYSTEM	EVP SML LEAK P0442/P1442*	P0442	EC-284
		P0455	EC-329
	EVP V/S LEAK P0456/P1456*	P0456	EC-335
A/F SEN1	A/F SEN1 (B1) P1278/P1279	P0133	EC-198
	A/F SEN1 (B1) P1276	P0130	EC-182
HO2S2	HO2S2 (B1) P1146	P0138	EC-212
	HO2S2 (B1) P1147	P0137	EC-204
	HO2S2 (B1) P139	P0139	EC-221

*: DTC P1442 and P1456 does not apply to C11 models but appears in DTC Work Support Mode screens.

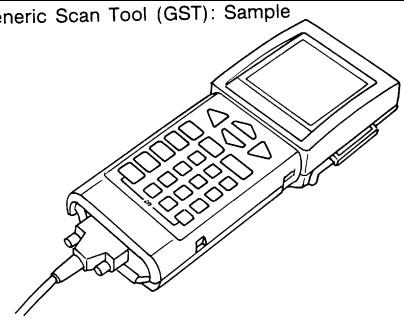
Diagnosis Tool Function

INFOID:0000000004780041

DESCRIPTION

Generic Scan Tool (OBD II scan tool) complying with SAE J1978 has several functions explained below.
ISO15765-4 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.

Generic Scan Tool (GST): Sample



SEF139P

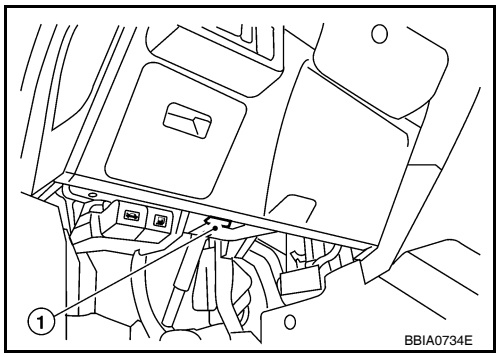
FUNCTION

Diagnostic Service		Function
Service $01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
Service $02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-475, "DTC Index".
Service $03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.
Service $04	CLEAR DIAG INFO	This diagnostic service can clear all emission-related diagnostic information. This includes: • Clear number of diagnostic trouble codes (Service $01) • Clear diagnostic trouble codes (Service $03) • Clear trouble code for freeze frame data (Service $01) • Clear freeze frame data (Service $02) • Reset status of system monitoring test (Service $01) • Clear on board monitoring test results (Service $06 and $07)
Service $06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
Service $07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.

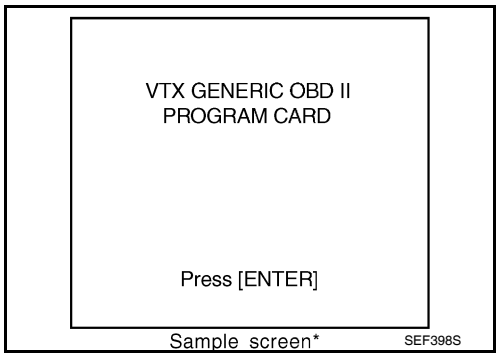
Diagnostic Service		Function
Service $08	—	This diagnostic service can close EVAP system in ignition switch ON position (Engine stopped). When this diagnostic service is performed, EVAP canister vent control valve can be closed. In the following conditions, this diagnostic service cannot function. • Low ambient temperature • Low battery voltage • Engine running • Ignition switch OFF • Low fuel temperature • Too much pressure is applied to EVAP system
Service $09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

INSPECTION PROCEDURE

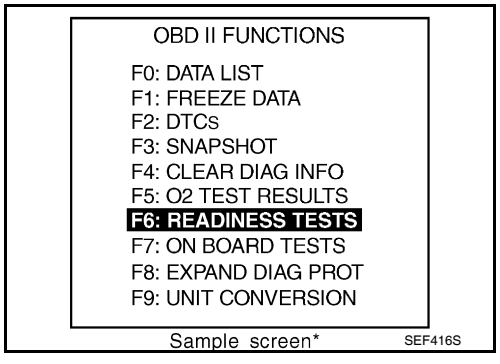
1. Turn ignition switch OFF.
2. Connect “GST” to data link connector (1), which is located under LH dash panel.
3. Turn ignition switch ON.



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



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



COMPONENT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:0000000004780042

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:0000000004780043

1.START

Make sure that all of the following conditions are satisfied.
- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm^2, 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up
  - A/T models: After the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
  - M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied
  - Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.
- Engine speed: Idle

>> GO TO 2.

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

With CONSULT-III
NOTE:
Perform “SPEC” in “DATA MONITOR” mode in maximum scale display.
1. Perform EC-26, "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.

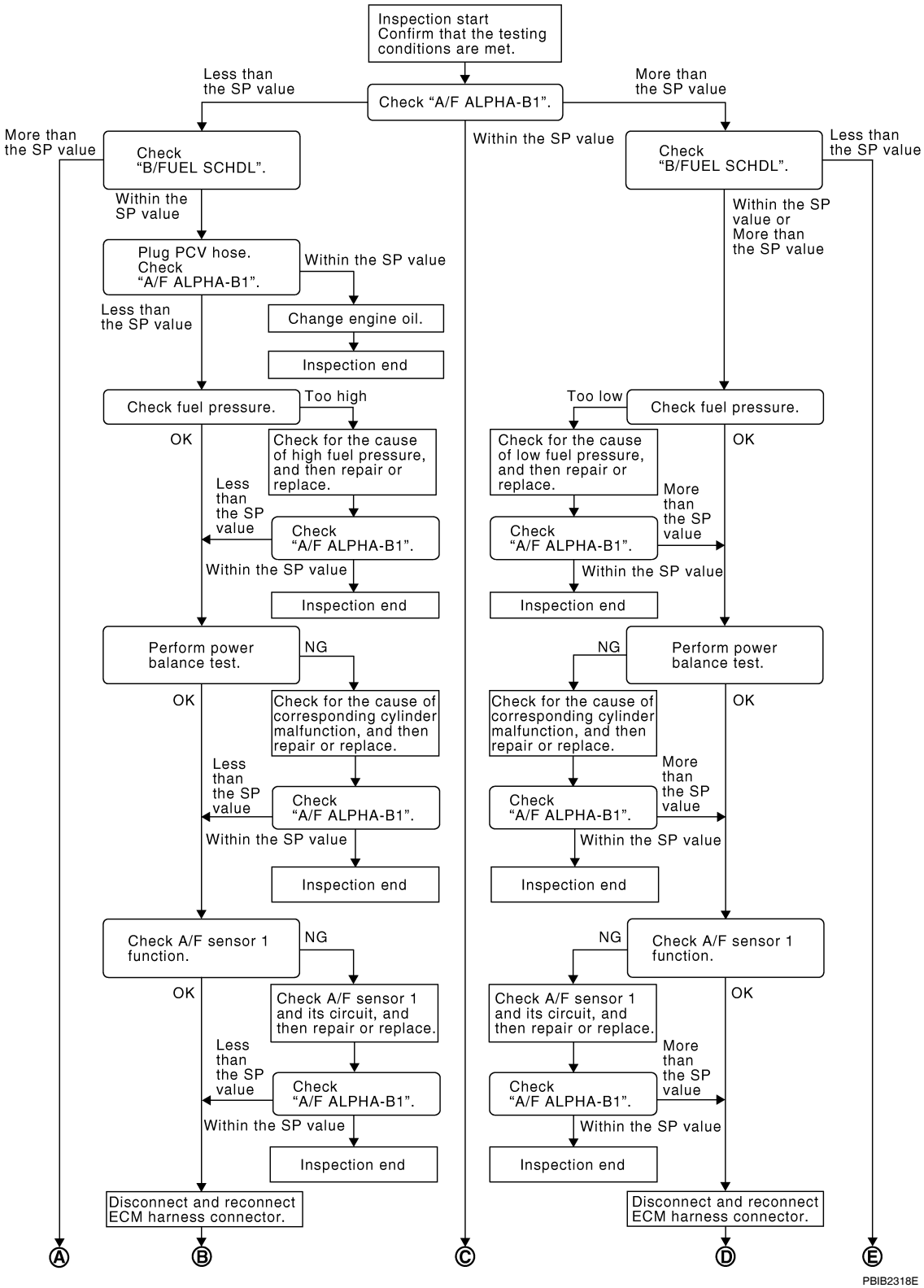
Is the inspection result normal?

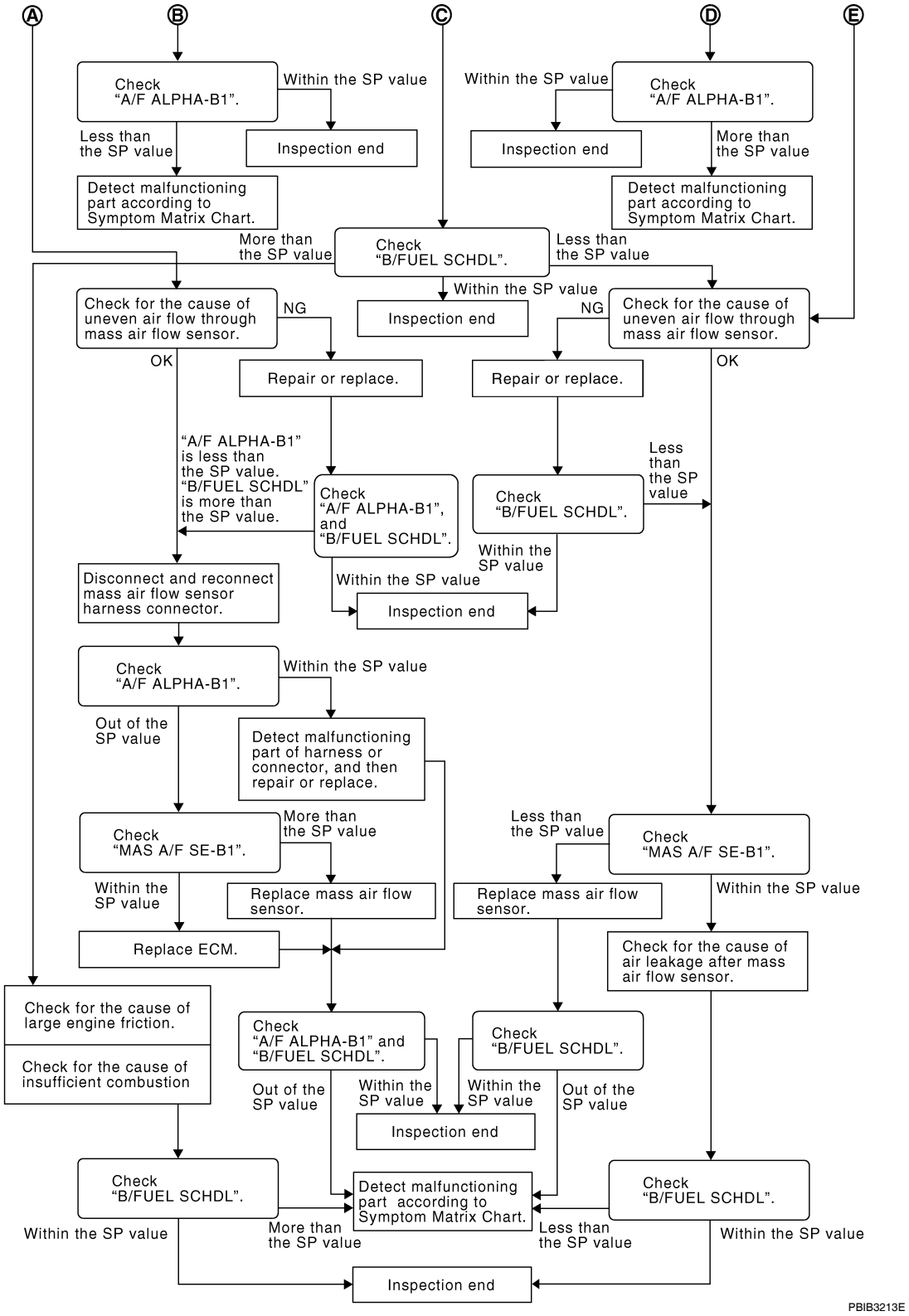
YES >> END
NO >> Go to EC-113, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004780044

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-112, "Component Function Check".
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

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

Is the measurement value within the SP value?

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

2. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

YES >> GO TO 4.
NO >> More than the SP value: GO TO 19.

3. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

YES >> GO TO 6.
NO-1 >> More than the SP value: GO TO 6.
NO-2 >> Less than the SP value: GO TO 25.

4. CHECK “A/F ALPHA-B1”

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-498, "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-439, "Component Function Check".)
2. Fuel injector and its circuit (Refer to EC-430, "Component Function Check".)
3. Intake air leakage
4. Low compression pressure (Refer to EM-23, "Inspection".)

Is the inspection result normal?

YES >> Replace fuel injector and then GO TO 11.
NO >> Repair or replace malfunctioning part and then GO TO 11.

11.CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 12.

12.CHECK A/F SENSOR 1 FUNCTION

Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1.
- For DTC P0130, refer to EC-182, "DTC Logic".
- For DTC P0131, refer to EC-188, "DTC Logic".
- For DTC P0132, refer to EC-193, "DTC Logic".
- For DTC P0133, refer to EC-198, "DTC Logic".
- For DTC P2A00, refer to EC-417, "DTC Logic".

Is any DTC detected?

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

13.CHECK A/F SENSOR 1 CIRCUIT

Perform DIAGNOSTIC PROCEDURE according to corresponding DTC.

>> GO TO 14.

14.CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the 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.
3. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 16.

16. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-487, "Symptom Table".

17. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO-1 >> More than the SP value: GO TO 18.
NO-2 >> Less than the SP value: GO TO 25.

18. DETECT MALFUNCTIONING PART

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

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

19. CHECK INTAKE SYSTEM

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

Is the inspection result normal?

YES >> GO TO 21.
NO >> Repair or replace malfunctioning part, and then GO TO 20.

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

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

Is the measurement value within the SP value?

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

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

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

>> GO TO 22.

22. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-148, "DTC Logic". Then GO TO 29.
NO >> GO TO 23.

23. CHECK “MAS A/F SE-B1”

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

Is the measurement value within the SP value?

YES >> GO TO 24.
NO >> More than the SP value: Replace mass air flow sensor, and then GO TO 29.

24. REPLACE ECM

1. Replace ECM.
2. Perform EC-29, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 29.

25. CHECK INTAKE SYSTEM

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

Is the inspection result normal?

YES >> GO TO 27.
NO >> Repair or replace malfunctioning part, and then GO TO 26.

26. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

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

27. CHECK “MAS A/F SE-B1”

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

Is the measurement value within the SP value?

YES >> GO TO 28.
NO >> Less than the SP value: Replace mass air flow sensor, and then GO TO 30.

28. CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.
- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts

• Malfunctioning seal of intake air system, etc.

>> GO TO 30.

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

Select “A/F ALPHA-B1” and “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that 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-487, "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-487, "Symptom Table".

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

Description

INFOID:0000000004784170

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

Common Intermittent Incidents Report Situations

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

Diagnosis Procedure

INFOID:0000000004784171

1.INSPECTION START

Erase (1st trip) DTCs.
Refer to EC-90, "Diagnosis Description", “DTC AND FREEZE FRAME DATA”, “How to Erase DTC and 1st Trip DTC”.

>> GO TO 2.

2.CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.
Refer to EC-125, "Ground Inspection".

OK or NG

OK >> GO TO 3.
NG >> Repair or replace malfunctioning part.

3.SEARCH FOR ELECTRICAL INCIDENT

Perform GI-25, "How to Perform Efficient Diagnosis for an Electrical Incident", “INCIDENT SIMULATION TESTS”.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace malfunctioning part.

4.CHECK CONNECTOR TERMINALS

Refer to GI-22, "How to Check Terminal", “HOW TO PROBE CONNECTORS”, “How to Check Enlarged Contact Spring of Terminal”.

OK or NG

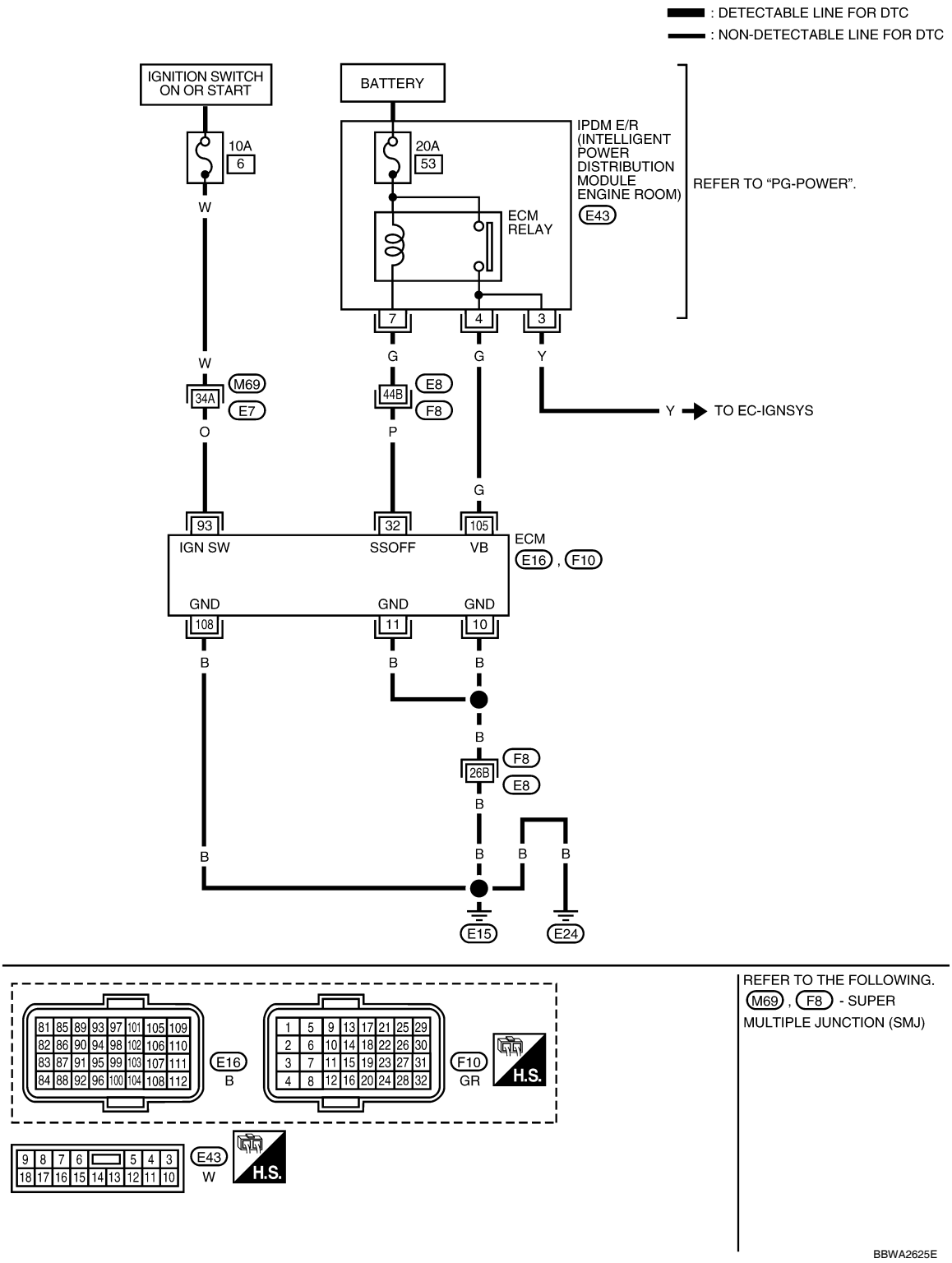
OK >> **INSPECTION END**
NG >> Repair or replace connector.

POWER SUPPLY AND GROUND CIRCUIT

Wiring Diagram

INFOID:0000000004780556

EC-MAIN-01



Diagnosis Procedure

INFOID:0000000004780045

1. INSPECTION START

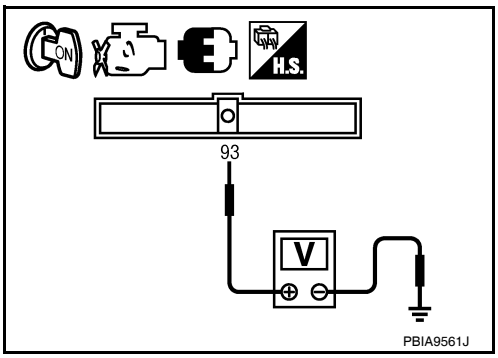
Start engine.

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		
E16	93	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- 10A fuse (No. 6)
- 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 connections E15, E24. Refer to EC-125, "Ground 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		
F10	10	Ground	Existed
	11		
E16	108		

3. Also check harness for short to power.

Is the inspection result normal?

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

6.DETECT MALFUNCTIONING PART

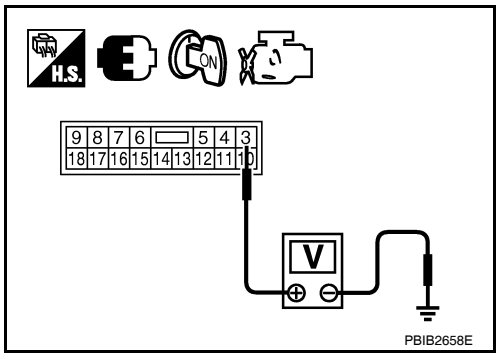
Check the following.
- Harness connectors F8, E8
- Harness for open or short between ECM and ground

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

7.CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connectors.

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



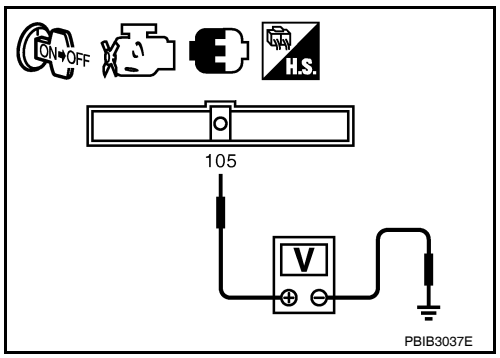
IPDM E/R		Ground	Voltage
Connector	Terminal		
E43	3	Ground	Battery voltage

Is the inspection result normal?

YES >> Go to EC-441, "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.



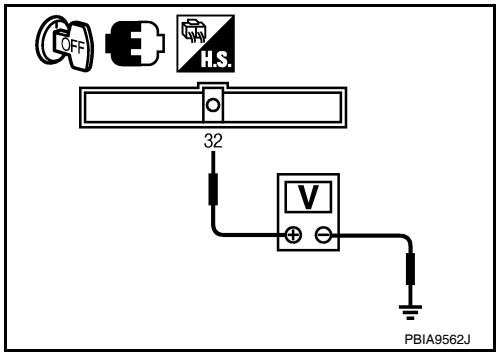
ECM		Ground	Voltage
Connector	Terminal		
E16	105	Ground	After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0 V.

Is the inspection result normal?

YES >> GO TO 14.
NO-1 >> Battery voltage does not exist: GO TO 9.
NO-2 >> Battery voltage exists for more than a few seconds: GO TO 11.

9. CHECK ECM POWER SUPPLY CIRCUIT-IV

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



ECM		Ground	Voltage
Connector	Terminal		
F10	32	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 E43.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E16	105	E43	4	Existed

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

Is the inspection result normal?

YES >> GO TO 17.
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 E43.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

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

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

Is the inspection result normal?

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

12. DETECT MALFUNCTIONING PART

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

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

13. CHECK FUSE

1. Disconnect 20 A fuse (No. 53) from IPDM E/R.
2. Check 20 A fuse.

Is the inspection result normal?

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

14. CHECK GROUND CONNECTION-II

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

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

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

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

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

3. Also check harness for short to power.

Is the inspection result normal?

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

16. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between ECM and ground

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

17. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PG-27, "Removal and Installation of IPDM E/R".
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

Ground Inspection

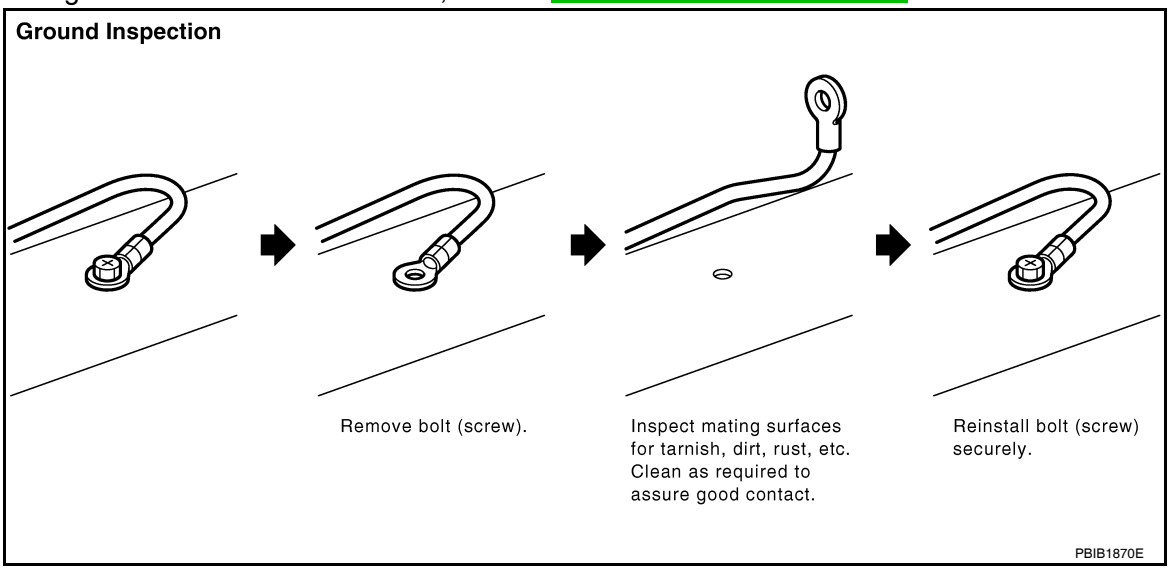
INFOID:0000000004784172

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.
When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for “add-on” accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to PG-29, "Ground Distribution".

Ground Inspection



U0101 CAN COMM CIRCUIT

Description

INFOID:0000000004780046

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:0000000004780047

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

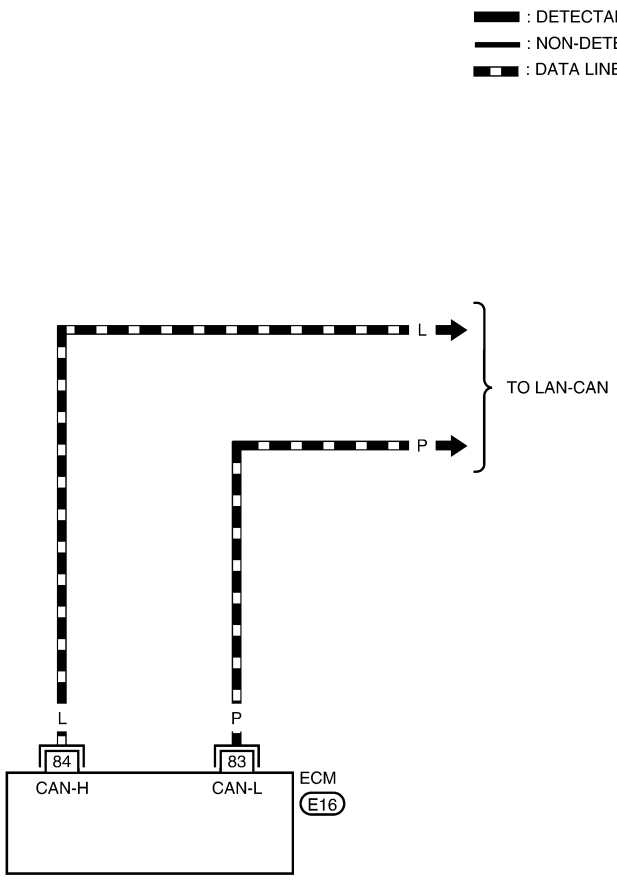
Is DTC detected?

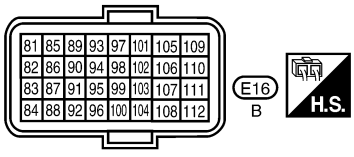
YES >> EC-127, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780557

EC-CAN-01





BBWA2626E

Diagnosis Procedure

INFOID:0000000004780048

Go to LAN-17, "Trouble Diagnosis Flow Chart".

U0140 CAN COMM CIRCUIT

Description

INFOID:0000000004780049

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:0000000004780050

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0140	Lost communication with BCM	When ECM is not transmitting or receiving CAN communication signal of OBD (emission related diagnosis) with BCM for 2 seconds or more.	• CAN communication line between BCM and ECM (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

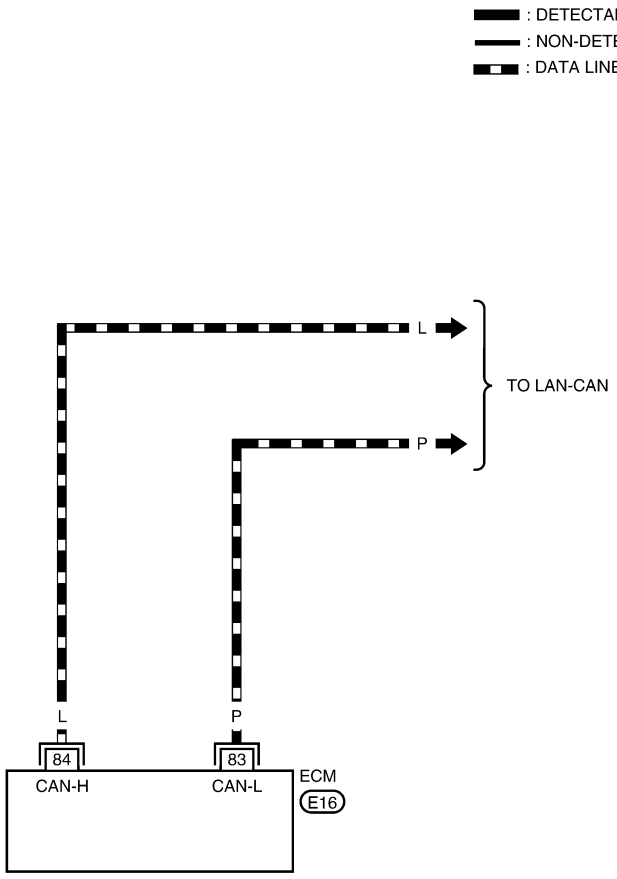
Is DTC detected?

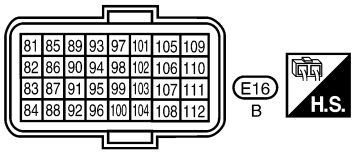
YES >> EC-129, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780678

EC-CAN-01





BBWA2626E

Diagnosis Procedure

INFOID:0000000004780051

Go to LAN-17, "Trouble Diagnosis Flow Chart".

U1001 CAN COMM CIRCUIT

Description

INFOID:0000000004780052

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:0000000004780053

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

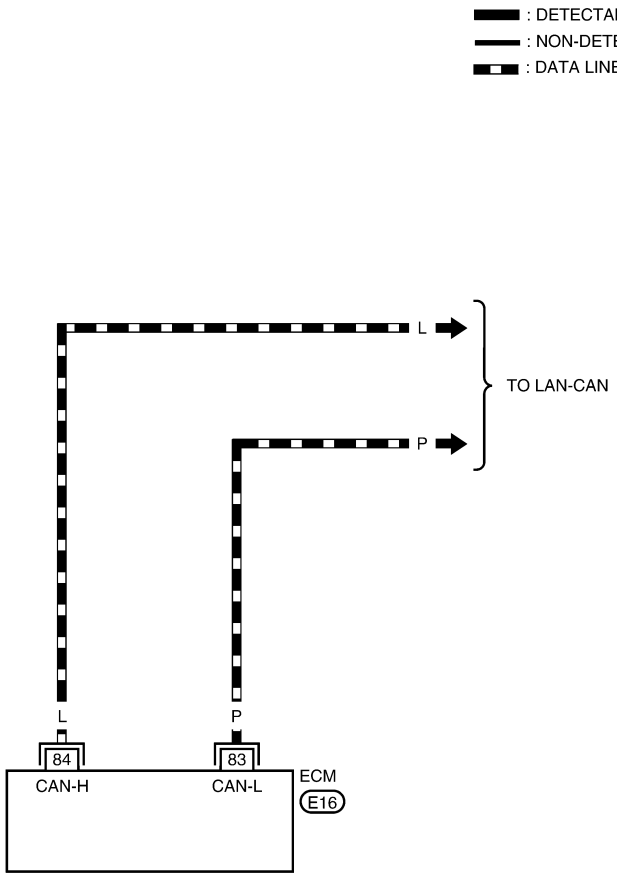
Is 1st trip DTC detected?

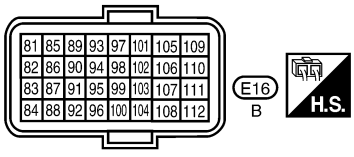
YES >> EC-131, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780679

EC-CAN-01





BBWA2626E

Diagnosis Procedure

INFOID:0000000004780054

Go to LAN-17, "Trouble Diagnosis Flow Chart".

P0011 IVT CONTROL

DTC Logic

INFOID:0000000004780055

DTC DETECTION LOGIC

NOTE:
If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for EC-358, "DTC Logic".

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Turn ignition switch ON and 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 6 consecutive seconds. Hold the accelerator pedal as steady as possible.

ENG SPEED	500 - 2,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 4.2 msec
Selector lever	P or N position (A/T) Neutral position (M/T)

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

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> Go to EC-133, "Diagnosis Procedure"
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT-III

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

ENG SPEED	1,500 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 70°C (221°F)

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

CAUTION:
Always drive at a safe speed.

2. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

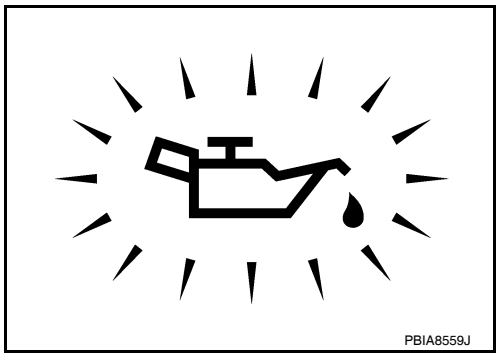
YES >> Go to EC-133, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000004780056

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-7, "Inspection".
NO >> GO TO 2.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-134, "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-267, "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-272, "Component Inspection".

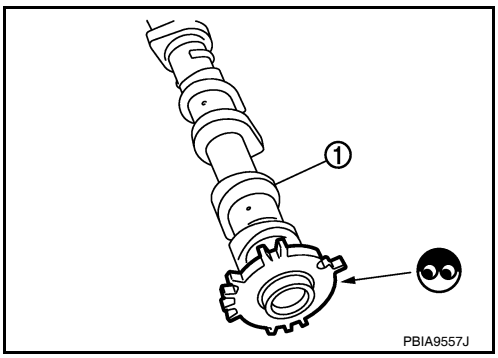
Is the inspection result normal?

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-49, "Removal and Installation".
NO >> GO TO 7.

7.CHECK LUBRICATION CIRCUIT

Refer to EM-70, "Inspection", "INSPECTION AFTER INSTALATION".

Is the inspection result normal?

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

8.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

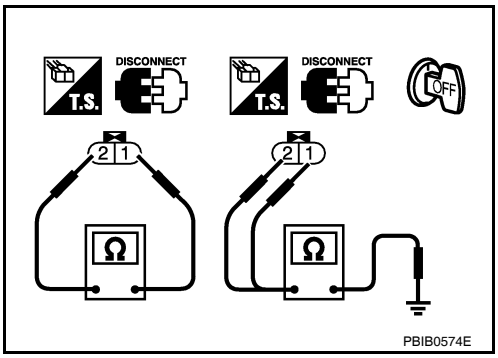
>> INSPECTION END

Component Inspection

INFOID:0000000004780057

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

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



Terminals	Resistance
1 and 2	6.7 - 7.7 Ω [at 20°C (68°F)]
1 or 2 and ground	∞ 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.

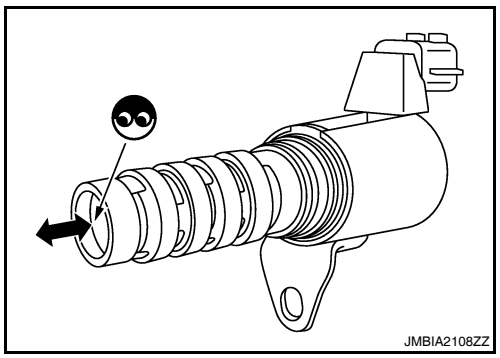
2. Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:

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

NOTE:

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



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake valve timing control solenoid valve.

P0031, P0032 A/F SENSOR 1 HEATER

Description

INFOID:0000000004780058

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:0000000004780059

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031	Air fuel ratio (A/F) sensor 1 heater control circuit low	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)	• Harness or connectors (The A/F sensor 1 heater circuit is open or shorted.) • A/F sensor 1 heater
P0032	Air fuel ratio (A/F) sensor 1 heater control circuit high	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)	• Harness or connectors (The A/F sensor 1 heater circuit is shorted.) • A/F sensor 1 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

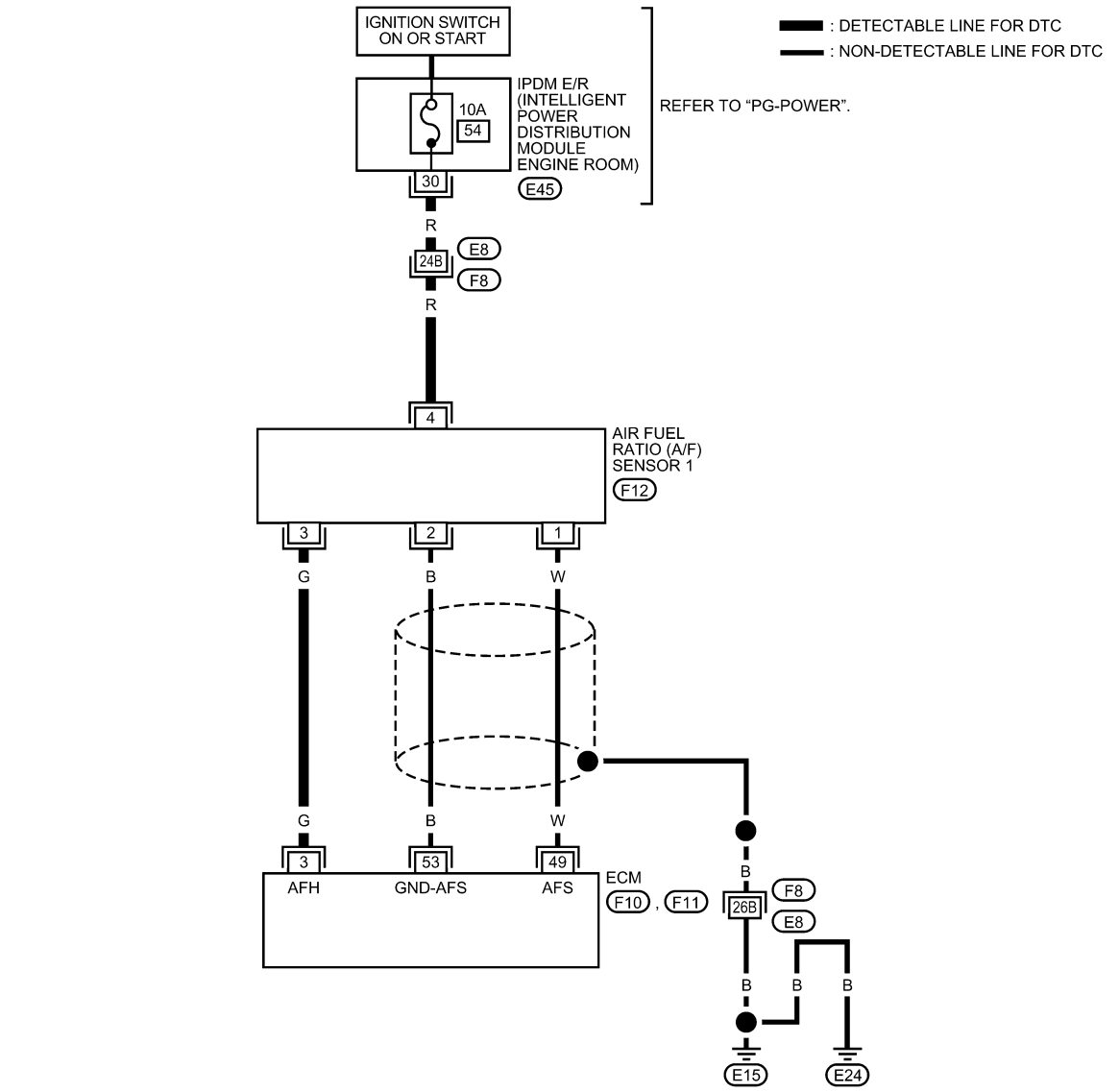
Is 1st trip DTC detected?

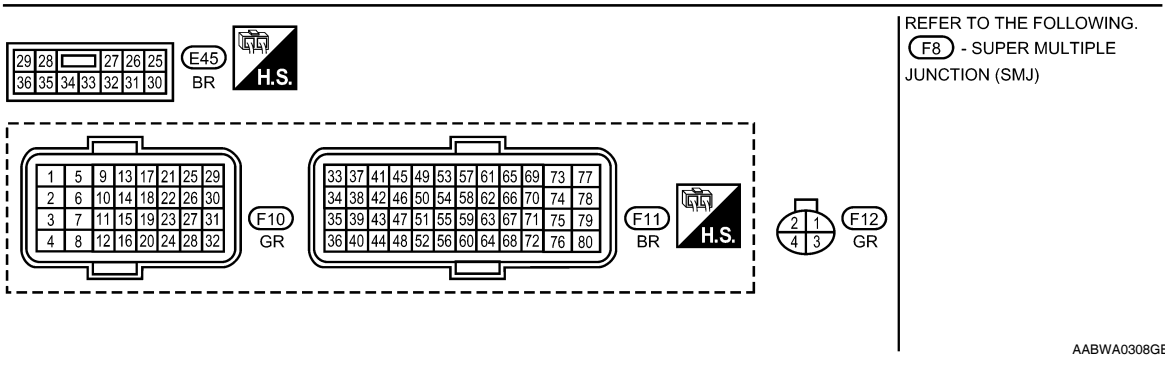
YES >> Go to EC-137, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780559

EC-A/FH-01





Diagnosis Procedure

INFOID:0000000004780060

1. CHECK GROUND CONNECTION

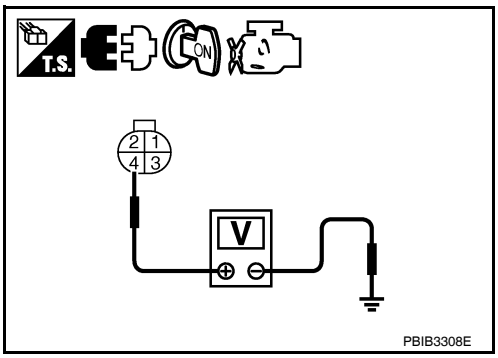
1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

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		
F12	4	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- IPDM E/R harness connector E45
- 10 A fuse (No. 54)
- 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	
F12	3	F10	3	Existed

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

Is the inspection result normal?

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

5.CHECK A/F SENSOR 1 HEATER

Refer to EC-139, "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 sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Perform EC-120, "Diagnosis Procedure".

>> Repair or replace.

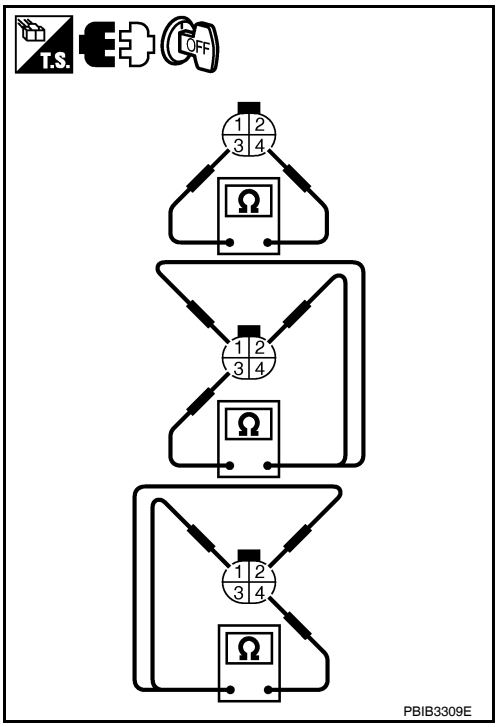
Component Inspection

INFOID:0000000004780061

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

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Check resistance between A/F sensor 1 terminals as per the following.

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



Is the inspection result normal?

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

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

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

CAUTION:

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

>> INSPECTION END

P0037, P0038 HO2S2 HEATER

Description

INFOID:0000000004780062

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:0000000004780063

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	• Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) • Heated oxygen sensor 2 heater
P0038	Heated oxygen sensor 2 heater control circuit high	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	• Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.) • Heated oxygen sensor 2 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

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

With GST

Follow the procedure “With CONSULT-III” above.

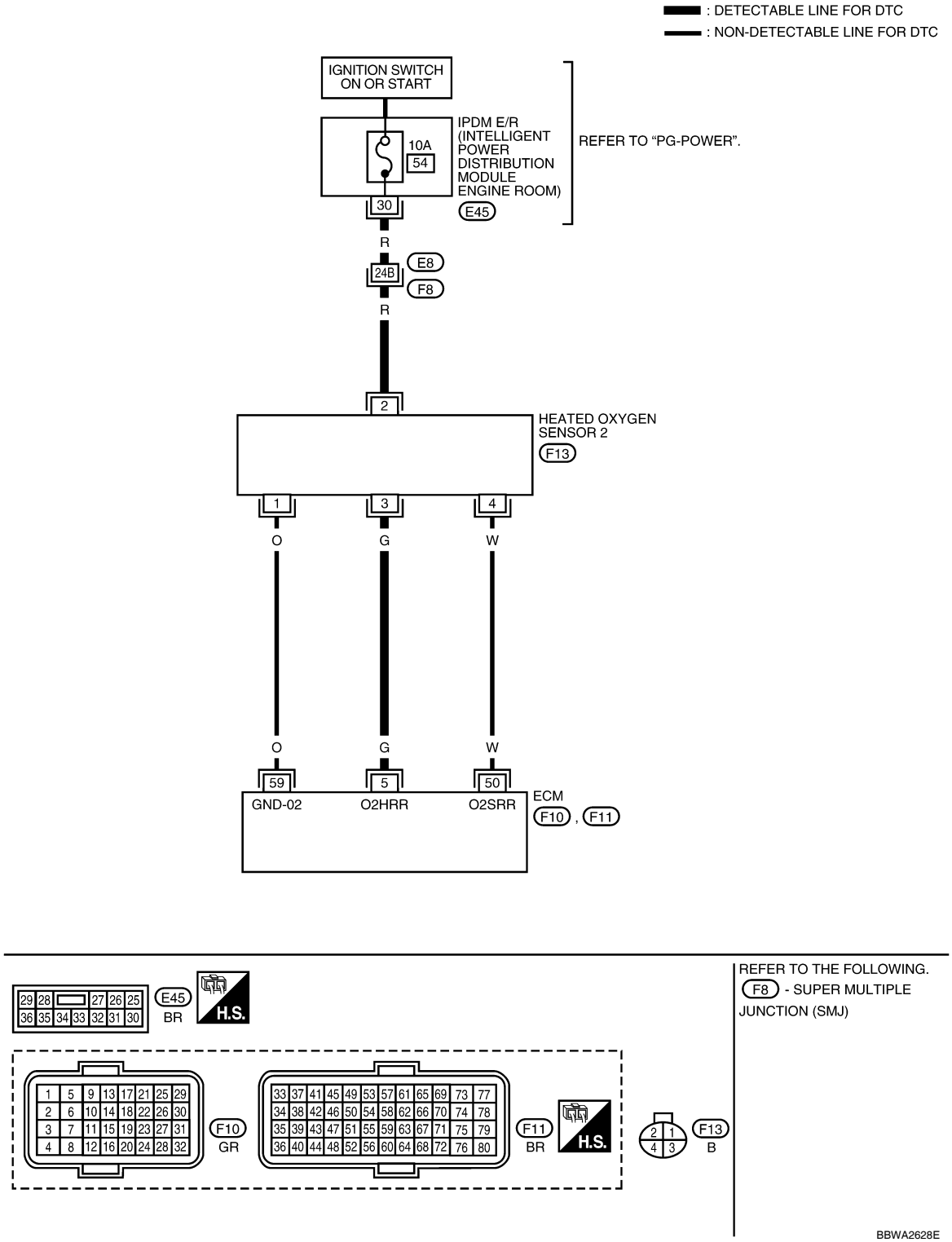
Is 1st trip DTC detected?

YES >> Go to EC-141, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780636

EC-HO2S2H-01



BBWA2628E

Diagnosis Procedure

INFOID:0000000004780064

1. CHECK GROUND CONNECTION

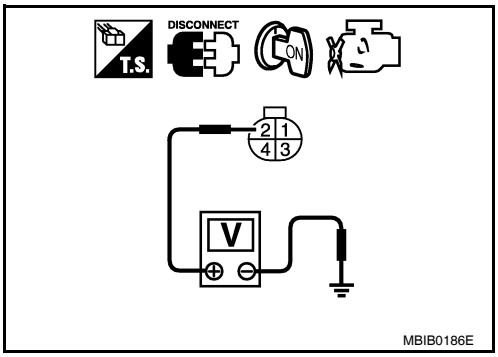
1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

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

2.CHECK HO2S2 POWER SUPPLY CIRCUIT

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



HO2S2		Ground	Voltage
Connector	Terminal		
F13	2	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- IPDM E/R connector E45
- 10 A fuse (No. 54)
- Harness for open or short between heated oxygen sensor 2 and fuse

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

4.CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F13	3	F10	5	Existed

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

Is the inspection result normal?

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

5.CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-143, "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 sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

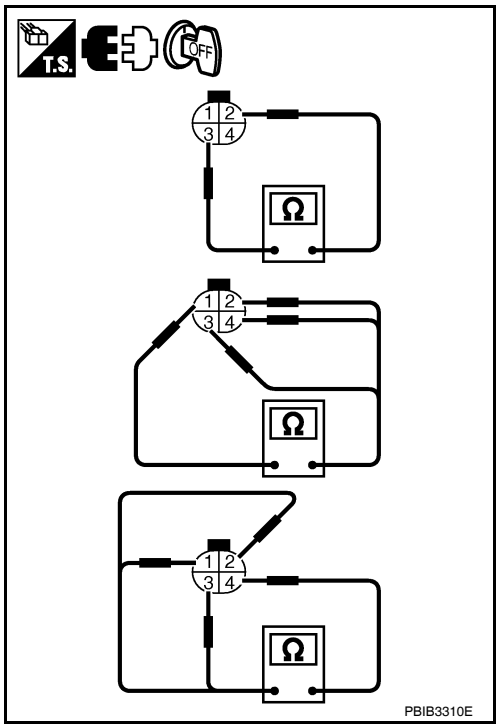
Component Inspection

INFOID:0000000004780065

1.CHECK HEATED OXYGEN SENSOR 2 HEATER

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

Terminals	Resistance
2 and 3	3.4 - 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 heated oxygen sensor 2.

CAUTION:

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

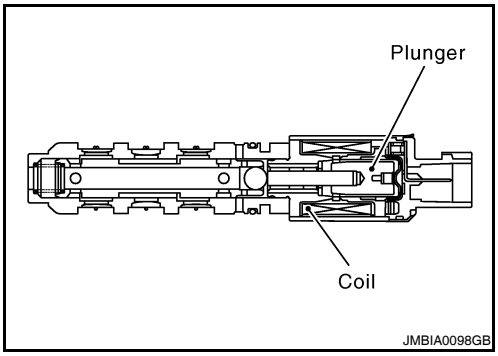
>> INSPECTION END

P0075 IVT CONTROL SOLENOID VALVE

Description

INFOID:0000000004780066

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:0000000004780067

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

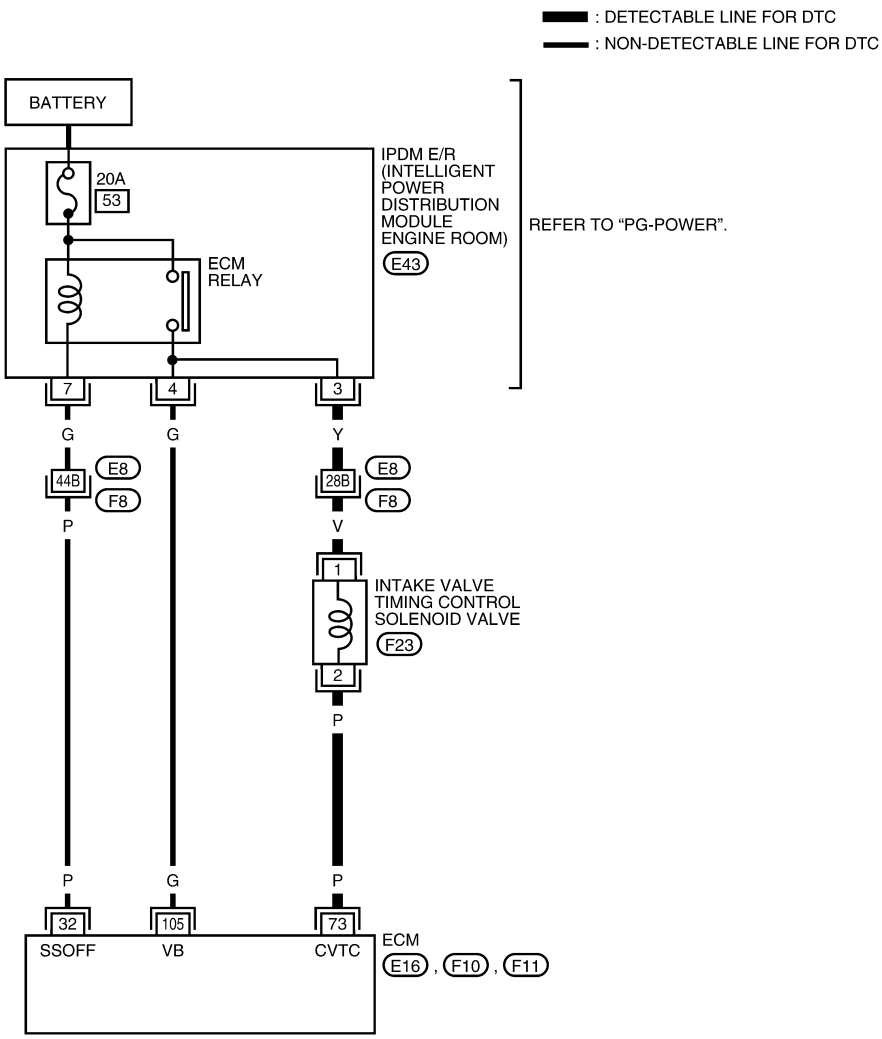
Is 1st trip DTC detected?

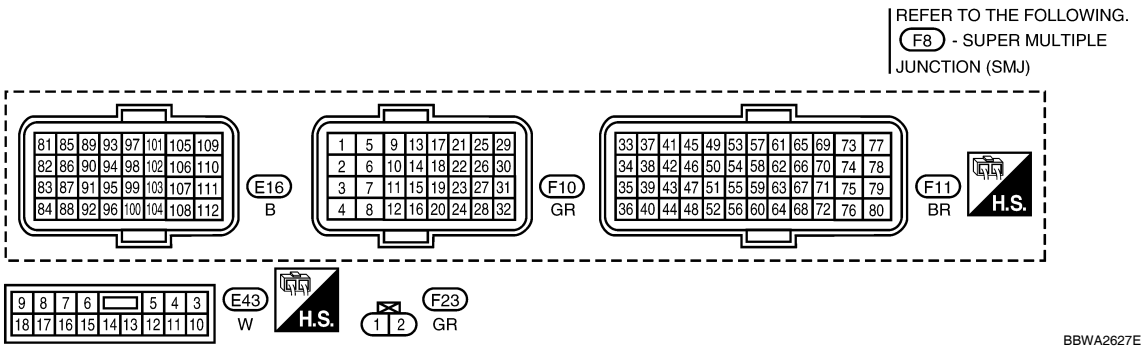
YES >> Go to EC-145, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780637

EC-IVC-01





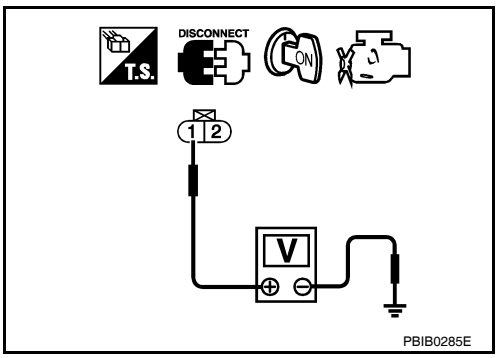
Diagnosis Procedure

INFOID:0000000004780068

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect intake valve timing (IVT) control solenoid valve harness connector.
3. Turn ignition switch ON.

4. Check the voltage between intake valve timing control solenoid valve harness connector and ground.



IVT control solenoid valve		Ground	Voltage
Connector	Terminal		
F23	1	Ground	Battery voltage

Is the inspection result normal?

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

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- IPDM E/R connector E43
- Harness for open or short between IVT control solenoid valve and IPDM E/R

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

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

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

IVT control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F23	2	F11	73	Existed

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

Is the inspection result normal?

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

4.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-146, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace intake valve timing control solenoid valve.

5.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

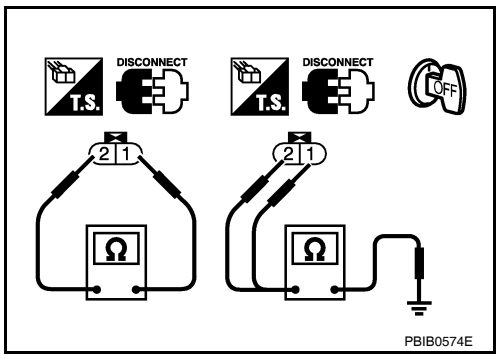
Component Inspection

INFOID:0000000004780069

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.

3. Check resistance between intake valve timing control solenoid valve terminals as per the following.



Terminals	Resistance
1 and 2	6.7 - 7.7 Ω [at 20°C (68°F)]
1 or 2 and ground	∞ Ω (Continuity should not exist)

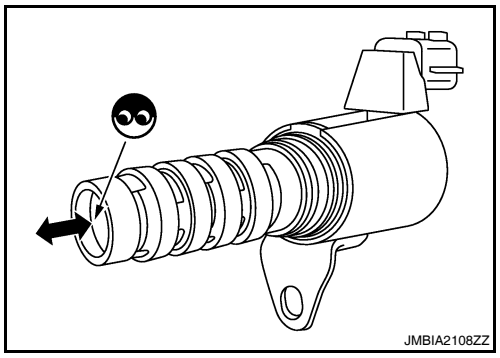
Is the inspection result normal?

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

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



Is the inspection result normal?

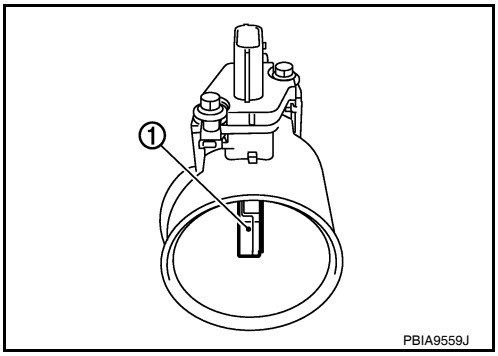
YES >> INSPECTION END
NO >> Replace intake valve timing control solenoid valve.

P0101 MAF SENSOR

Description

INFOID:0000000004780070

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:0000000004780071

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0101	Mass air flow sensor circuit range/performance	A)	A high voltage from the sensor is sent to ECM under light load driving condition.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor • EVAP control system pressure sensor
		B)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor • EVAP control system pressure sensor • Intake air temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch ON) instead of running engine at idle speed.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

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

Is 1st trip DTC detected?

YES >> Go to EC-151, "Diagnosis Procedure".
NO-1 >> With CONSULT-III: GO TO 3.
NO-2 >> Without CONSULT-III: GO TO 5.

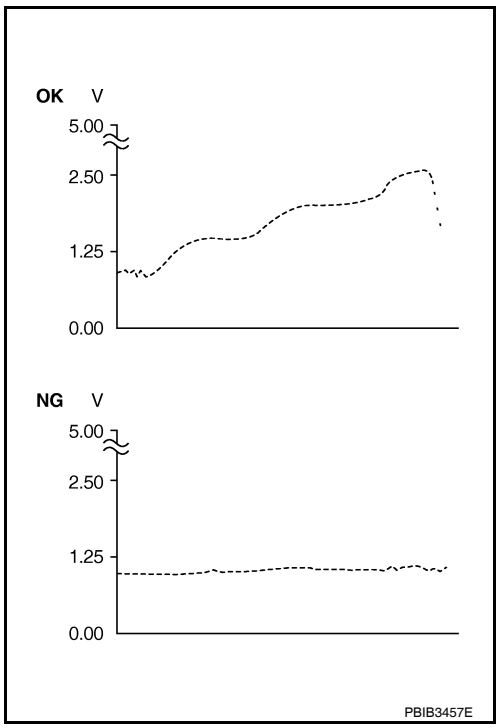
3.CHECK MASS AIR FLOW SENSOR FUNCTION

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
   If engine cannot be started, go to EC-151, "Diagnosis Procedure".

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

Is the inspection result normal?

YES >> GO TO 4.
NO >> Go to EC-151, "Diagnosis Procedure".



4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
TP SEN 1-B1	More than 1.5 V
TP SEN 2-B1	More than 1.5 V
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

CAUTION:
Always drive vehicle at a safe speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-151, "Diagnosis Procedure".
NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to EC-149, "Component Function Check".

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-151, "Diagnosis Procedure".

Component Function Check

INFOID:0000000004780072

1. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

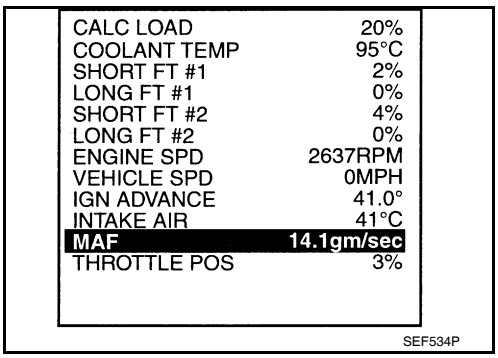
With GST

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

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

Is the inspection result normal?

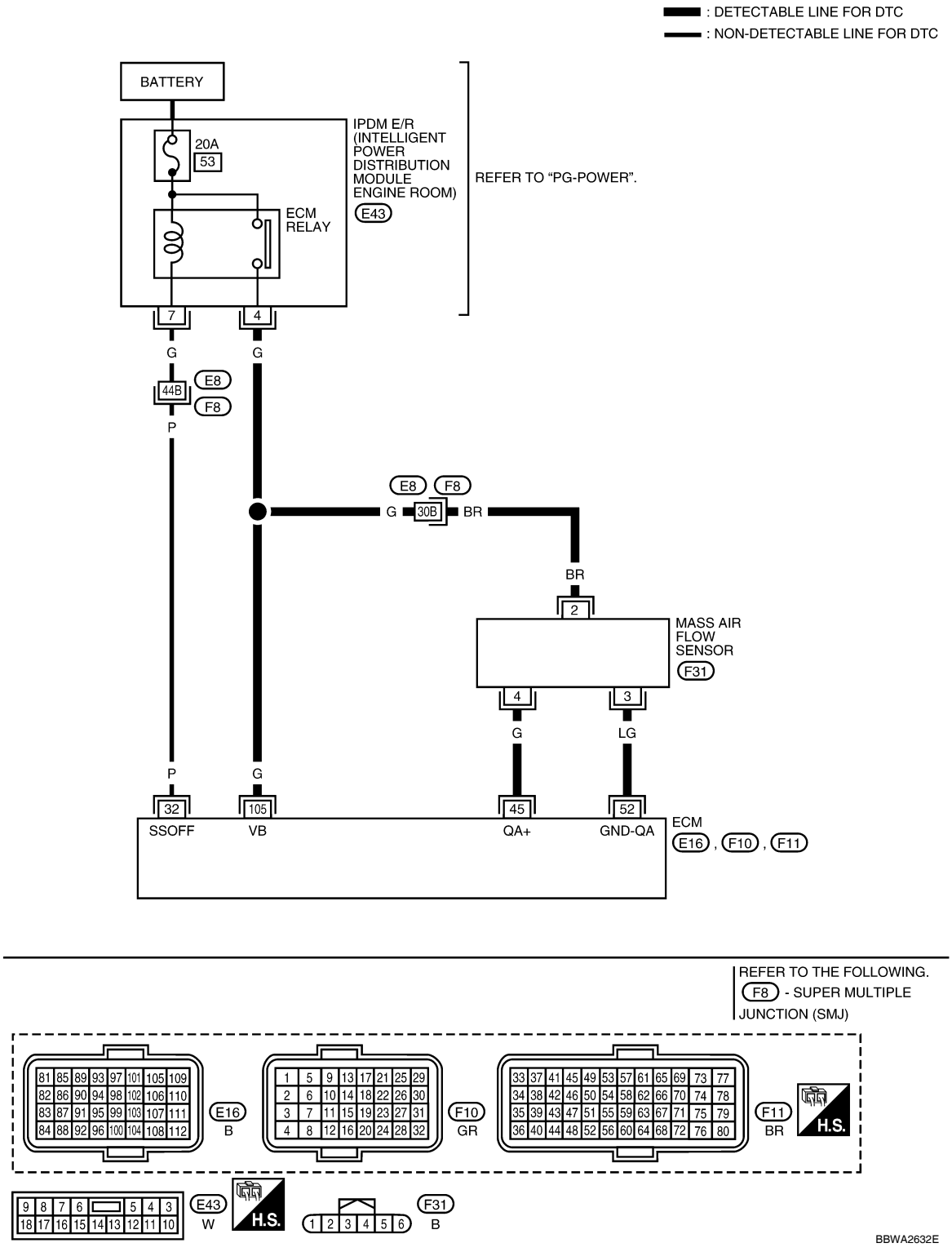
YES >> INSPECTION END
NO >> Go to EC-151, "Diagnosis Procedure".



Wiring Diagram

INFOID:0000000004780649

EC-MAFS-01



Diagnosis Procedure

INFOID:0000000004780073

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-148, "DTC Logic".

Which malfunction is detected?

A >> GO TO 3.
B >> GO TO 2.

2.CHECK INTAKE SYSTEM

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

Is the inspection result normal?

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

3.CHECK GROUND CONNECTION

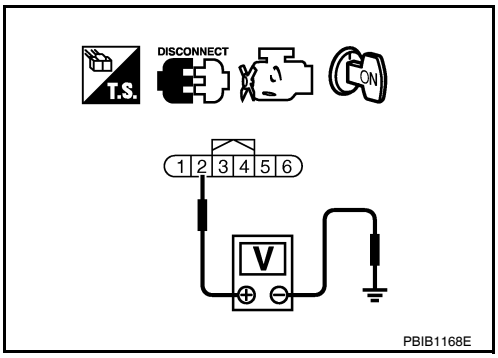
1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

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 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

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

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

6.CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	3	F11	52	Existed

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

Is the inspection result normal?

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

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

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	4	F11	45	Existed

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

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK INTAKE AIR TEMPERATURE SENSOR

Check intake air temperature sensor.
Refer to EC-164, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace mass air flow sensor (with intake air temperature sensor).

9.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-314, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace EVAP control system pressure sensor.

10.CHECK MASS AIR FLOW SENSOR

Refer to EC-153, "Component Inspection".

Is the inspection result normal?

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

11.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

Component Inspection

INFOID:0000000004780074

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.

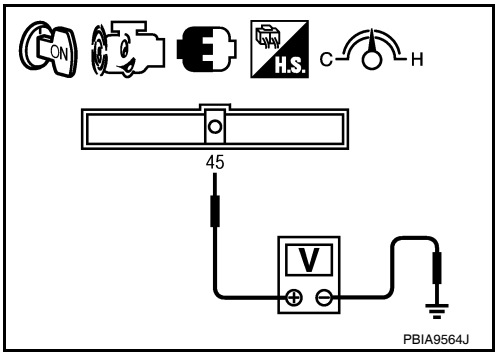
Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
	Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

*: 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			
F11	45 (MAF sensor signal)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
			Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

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

Is the inspection result normal?

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

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

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

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

Is the inspection result normal?

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

3.CHECK MASS AIR FLOW SENSOR-II

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.

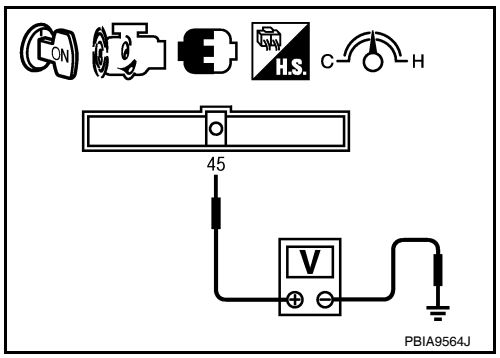
Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
	Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

*: 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			
F11	45 (MAF sensor signal)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
			Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

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

Is the inspection result normal?

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

4. CHECK MASS AIR FLOW SENSOR-III

With CONSULT-III

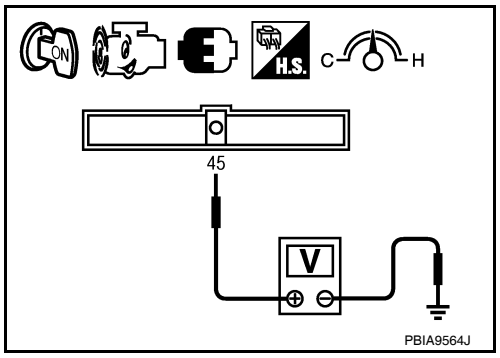
1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT-III and select “DATA MONITOR” mode.
5. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
	Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

*: 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			
F11	45 (MAF sensor signal)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
			Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

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

Is the inspection result normal?

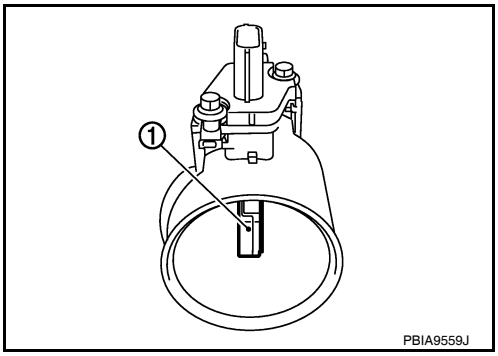
YES >> INSPECTION END
NO >> Clean or replace mass air flow sensor.

P0102, P0103 MAF SENSOR

Description

INFOID:0000000004780075

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:0000000004780076

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-157, "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-157, "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.

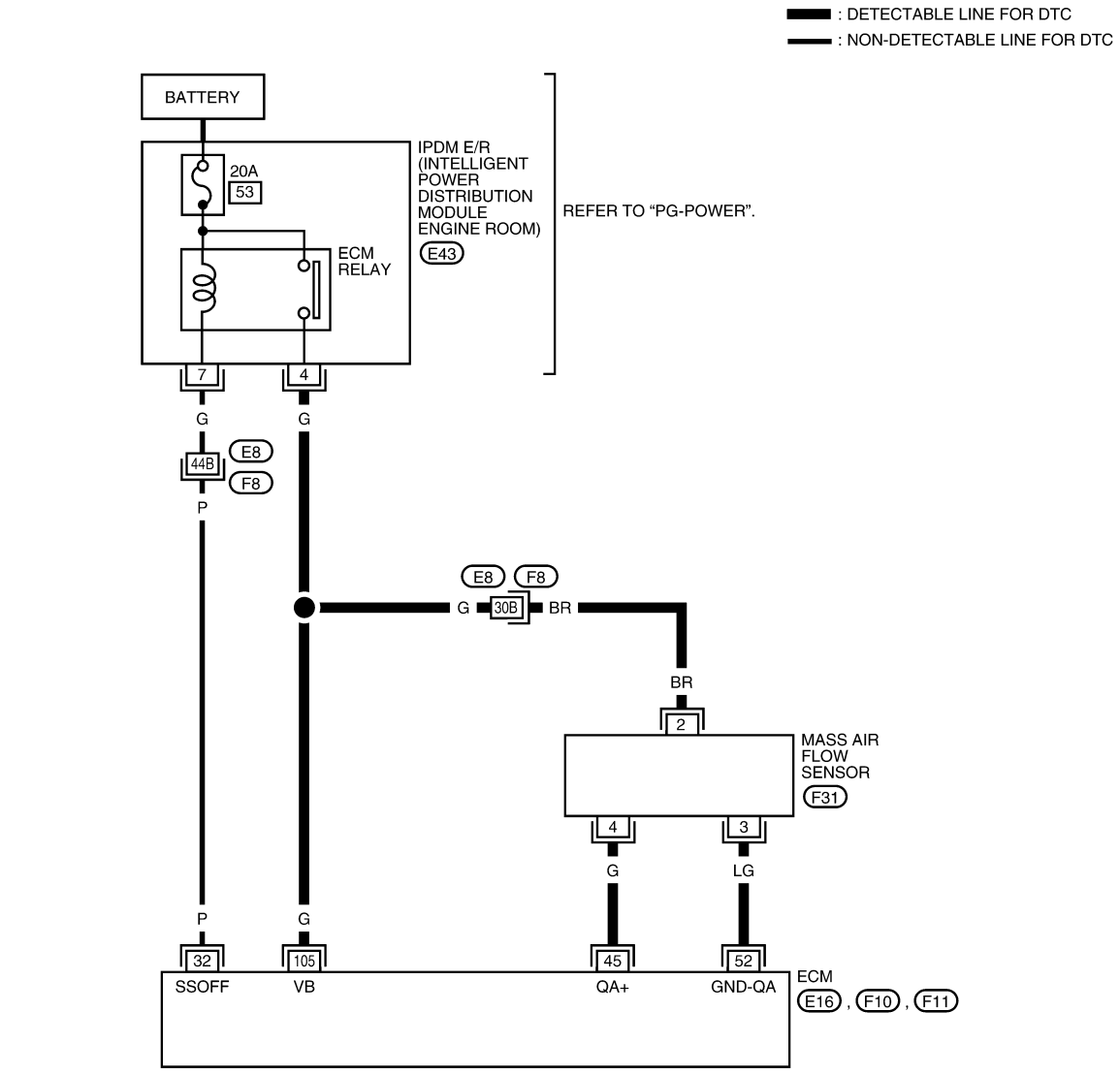
Is DTC detected?

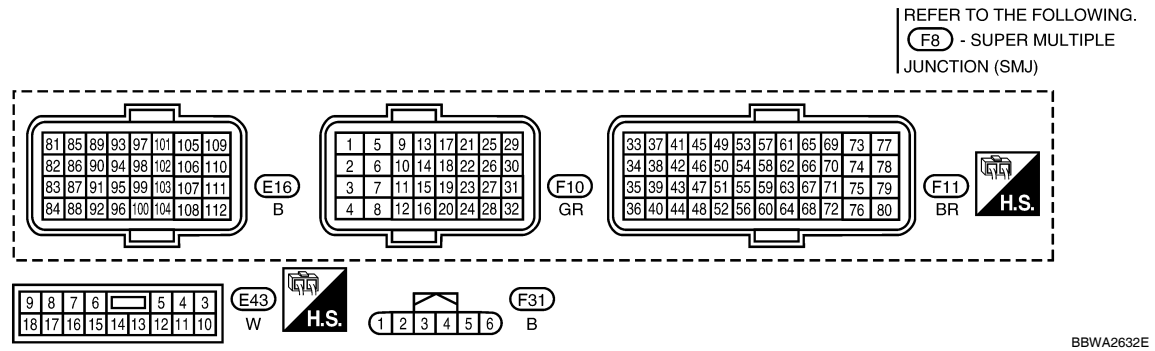
YES >> Go to EC-157, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780680

EC-MAFS-01





BBWA2632E

Diagnosis Procedure

INFOID:0000000004780077

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 connections E15, E24. Refer to EC-125, "Ground Inspection".

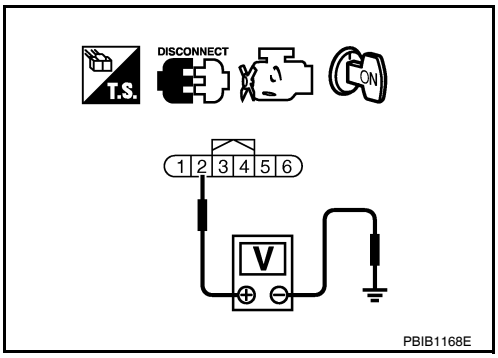
Is the inspection result normal?

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 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

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

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

6.CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	3	F11	52	Existed

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

Is the inspection result normal?

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

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

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	4	F11	45	Existed

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

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK MASS AIR FLOW SENSOR

Refer to EC-159, "Component Inspection".

Is the inspection result normal?

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

9.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

Component Inspection

INFOID:0000000004780078

1.CHECK MASS AIR FLOW SENSOR-I

With CONSULT-III

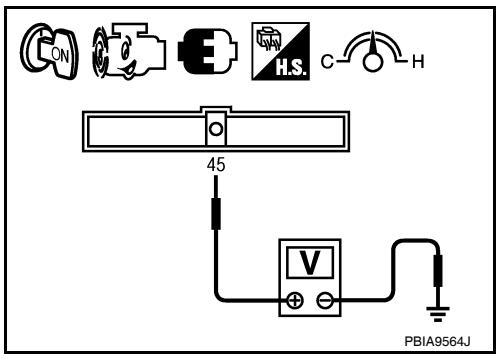
1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT-III and select “DATA MONITOR” mode.
5. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
	Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

*: 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			
F11	45 (MAF sensor signal)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
			Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

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

Is the inspection result normal?

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

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

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

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

Is the inspection result normal?

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

3.CHECK MASS AIR FLOW SENSOR-II

With CONSULT-III

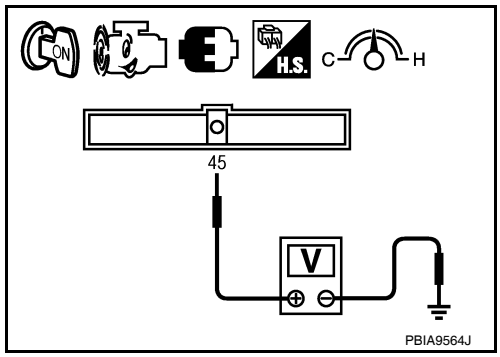
1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-III and select “DATA MONITOR” mode.
4. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
	Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

*: 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			
F11	45 (MAF sensor signal)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
			Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

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

Is the inspection result normal?

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

4.CHECK MASS AIR FLOW SENSOR-III

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.

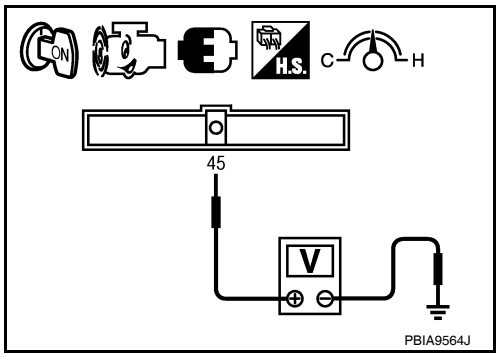
4. Connect CONSULT-III and select “DATA MONITOR” mode.
5. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
	Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

*: 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			
F11	45 (MAF sensor signal)	Ground	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.3 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.9 V
			Idle to about 4,000 rpm	0.9 - 1.3 V to Approx. 2.4 V*

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

Is the inspection result normal?

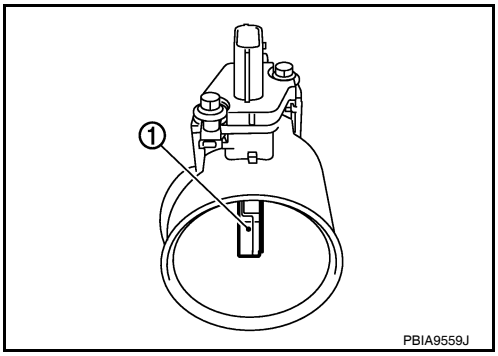
YES >> INSPECTION END
NO >> Clean or replace mass air flow sensor.

P0112, P0113 IAT SENSOR

Description

INFOID:0000000004780079

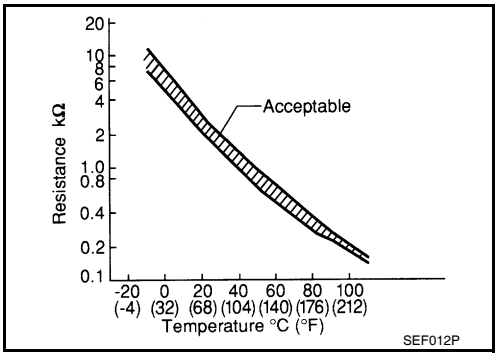
The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response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



<Reference data>

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

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



CAUTION:

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

DTC Logic

INFOID:0000000004780080

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?

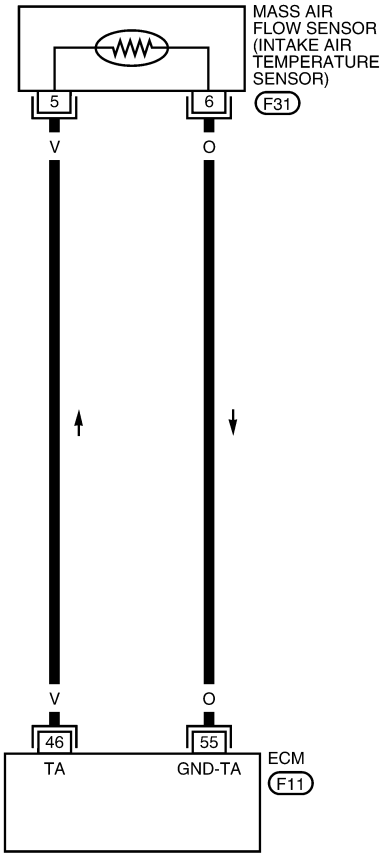
YES >> Go to EC-163, "Diagnosis Procedure".
NO >> INSPECTION END

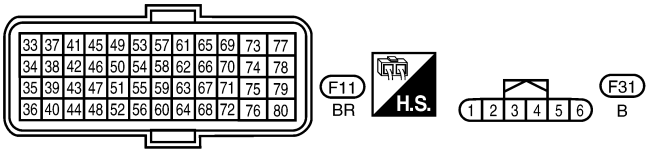
Wiring Diagram

INFOID:0000000004780650

EC-IATS-01

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





BBWA2633E

Diagnosis Procedure

INFOID:0000000004780081

1. CHECK GROUND CONNECTION

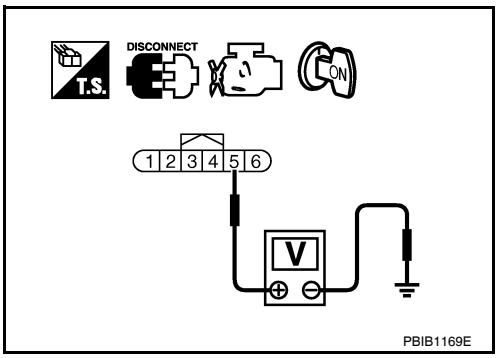
1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

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. 5 V

Is the inspection result normal?

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

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

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F31	6	F11	55	Existed

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

Is the inspection result normal?

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

4.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-164, "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 EC-120, "Diagnosis Procedure".

>> INSPECTION END

Component Inspection

INFOID:0000000004780082

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 per the following.

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

Is the inspection result normal?

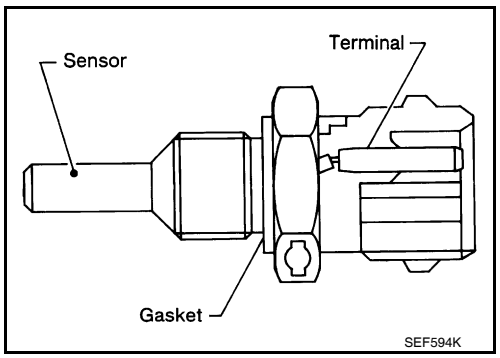
YES >> INSPECTION END
NO >> Replace mass air flow sensor (with intake air temperature sensor).

P0116 ECT SENSOR

Description

INFOID:0000000004780447

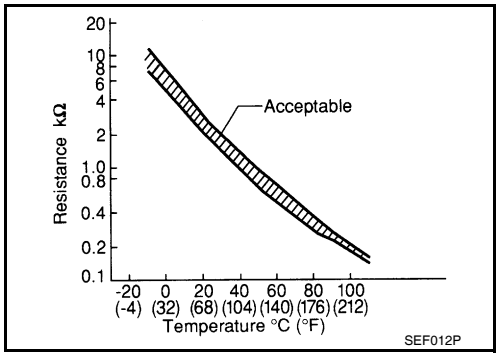
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

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

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



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:0000000004780084

DTC DETECTION LOGIC

NOTE:

If DTC P0116 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117, P0118. Refer to EC-167, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0116	Engine coolant temperature sensor circuit range/performance	Engine coolant temperature signal from engine coolant temperature sensor does not fluctuate, even when some time has passed after starting the engine with pre-warming up condition.	• Harness or connectors (High or low resistance in the circuit) • Engine coolant temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Rev engine up to 2,000 rpm for more than 10 minutes.
3. Move the vehicle to a cool place, then stop engine and turn ignition switch OFF.
4. Check resistance between “fuel level sensor unit and fuel pump” terminals 4 and 5.

5. Soak the vehicle until the resistance between “fuel level sensor unit and fuel pump” terminals 4 and 5 becomes 0.5 kΩ higher than the value measured before soaking.
   CAUTION:
   Never turn ignition switch ON during the soaking time.
   NOTE:
   Soak time changes depending on ambient air temperature. It may take several hours.
6. Start engine and let it idle for 5 minutes.
7. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> EC-166, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000004780085

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, 24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

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

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-166, "Component Inspection".

Is the inspection result normal?

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

3.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

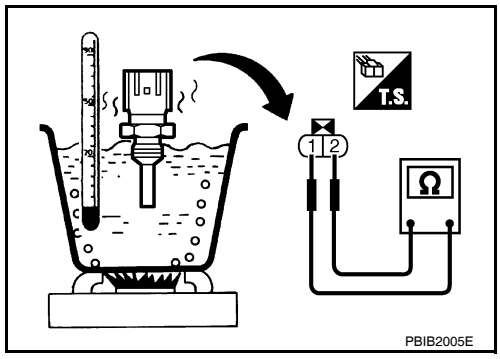
>> INSPECTION END

Component Inspection

INFOID:0000000004780446

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?

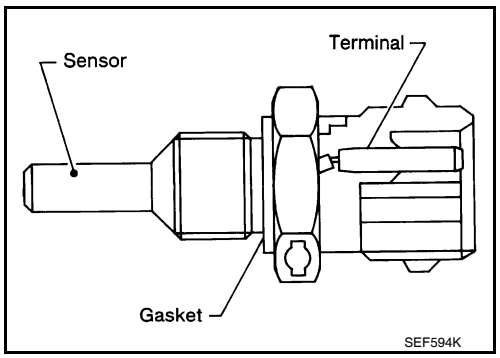
YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor.

P0117, P0118 ECT SENSOR

Description

INFOID:0000000004780087

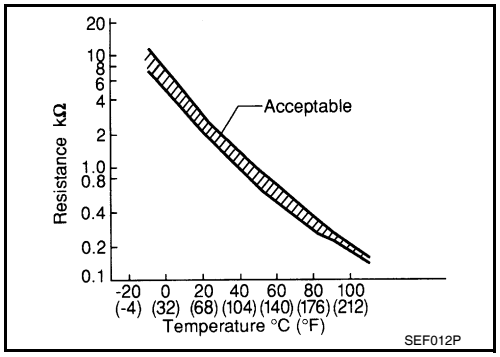
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

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

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



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:0000000004780088

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.

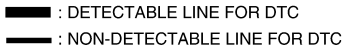
Is DTC detected?

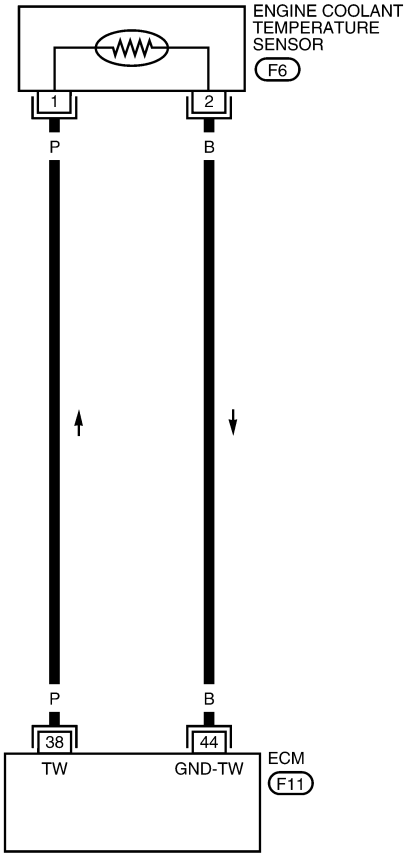
YES >> Go to EC-168, "Diagnosis Procedure".
NO >> INSPECTION END

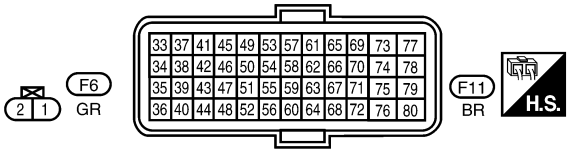
Wiring Diagram

INFOID:0000000004780651

EC-ECTS-01







BBWA2634E

Diagnosis Procedure

INFOID:0000000004780089

1. CHECK GROUND CONNECTION

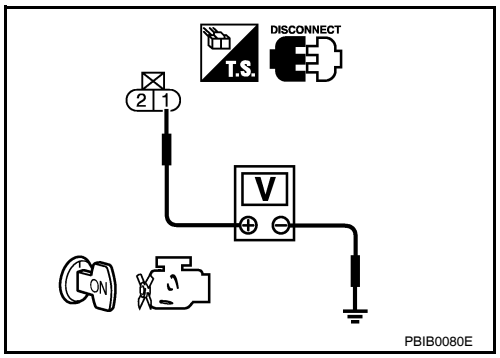
1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

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

2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT

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



ECT sensor		Ground	Voltage
Connector	Terminal		
F6	1	Ground	Approx. 5 V

Is the inspection result normal?

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

3.CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

ECT sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F6	2	F11	44	Existed

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

Is the inspection result normal?

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

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-169, "Component Inspection".

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

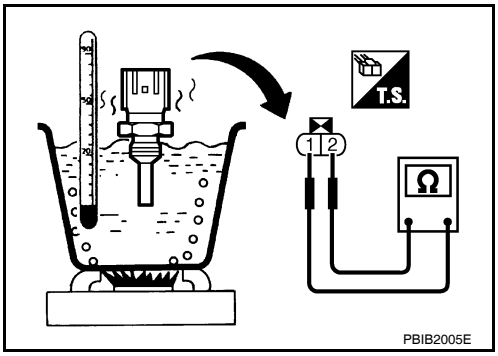
Component Inspection

INFOID:0000000004780090

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?

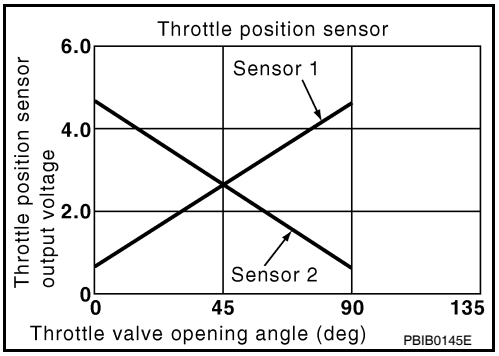
YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor.

P0122, P0123 TP SENSOR

Description

INFOID:0000000004780091

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



DTC Logic

INFOID:0000000004780092

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-358, "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.

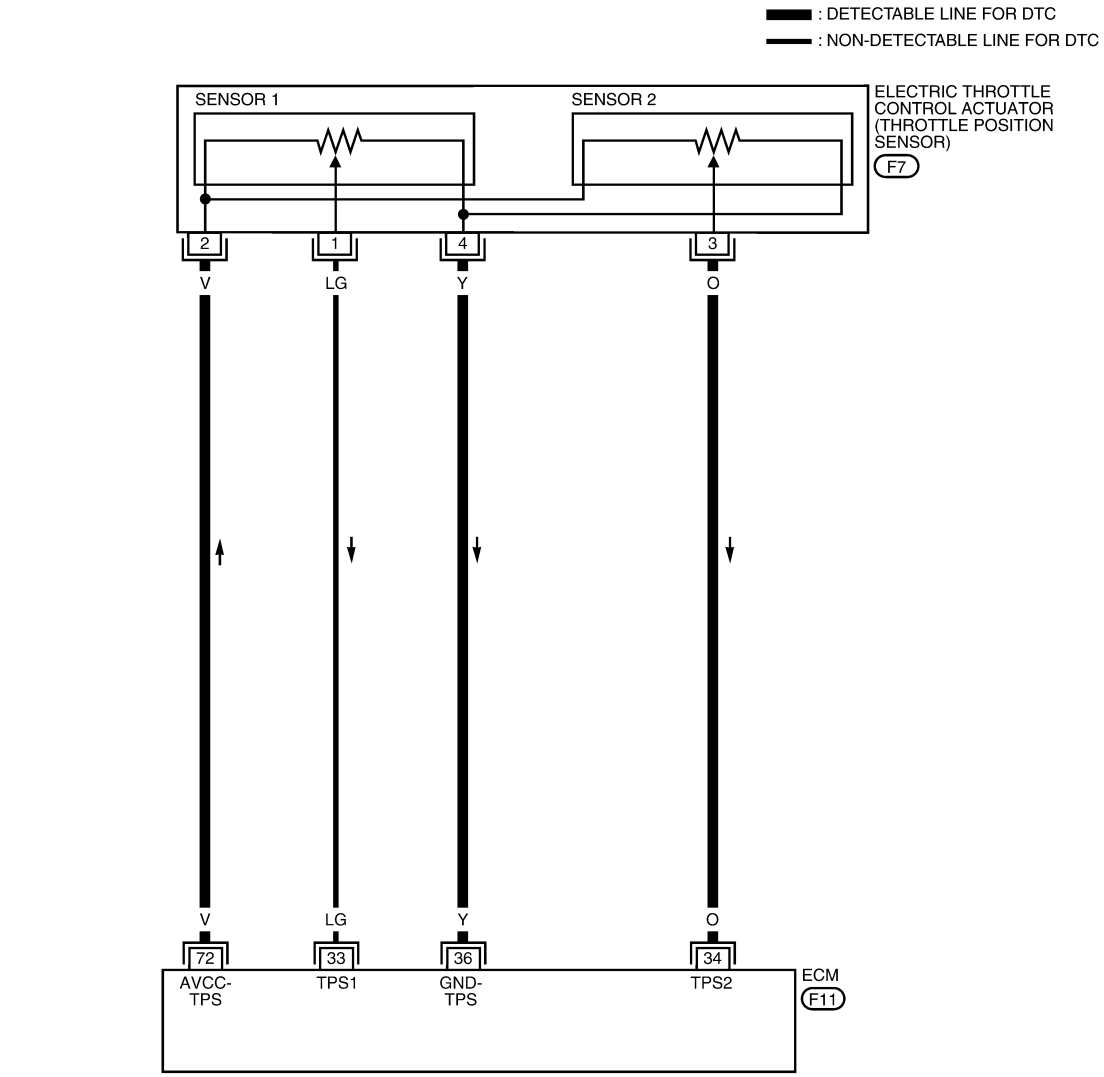
Is DTC detected?

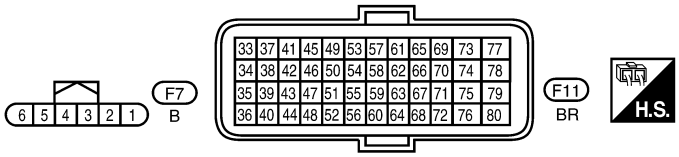
YES >> Go to EC-172, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780677

EC-TPS2-01





BBWA2656E

Diagnosis Procedure

INFOID:0000000004780093

1.CHECK GROUND CONNECTION

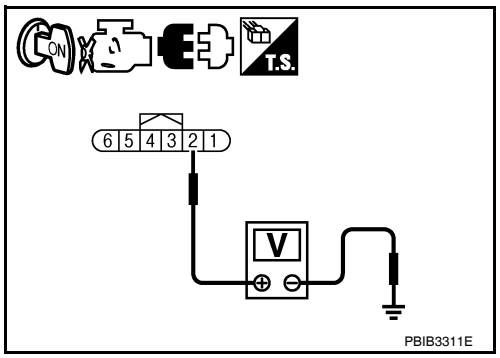
1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

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

2. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

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



Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F7	2	Ground	Approx. 5 V

Is the inspection result normal?

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

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

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	4	F11	36	Existed

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

Is the inspection result normal?

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

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

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

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

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

Is the inspection result normal?

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

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-174, "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. Perform EC-174, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

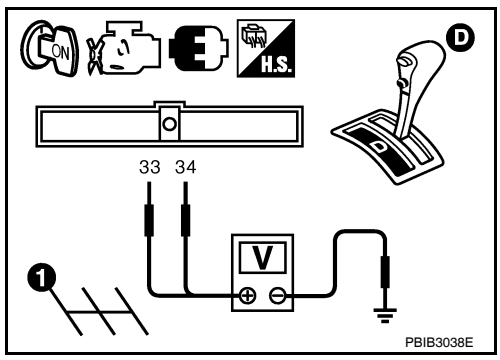
>> INSPECTION END

Component Inspection

INFOID:0000000004780094

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set selector lever to D (A/T) or 1st (M/T) position.
6. Check the voltage between ECM harness connector and ground.



ECM		Ground	Condition		Voltage
Connector	Terminal				
F11	33 (TP sensor 1 signal)	Ground	Accelerator pedal	Fully released	More than 0.36V
				Fully de-pressed	Less than 4.75V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75V
				Fully de-pressed	More than 0.36V

Is the inspection result normal?

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

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-174, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000004780095

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-32, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

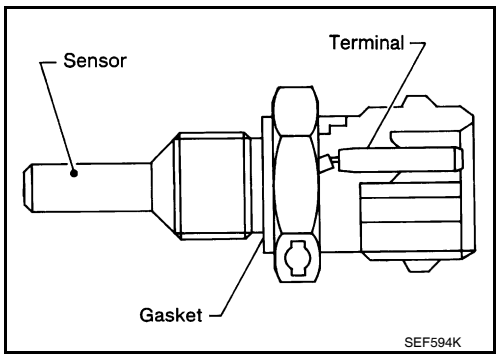
>> END

P0125 ECT SENSOR

Description

INFOID:0000000004780096

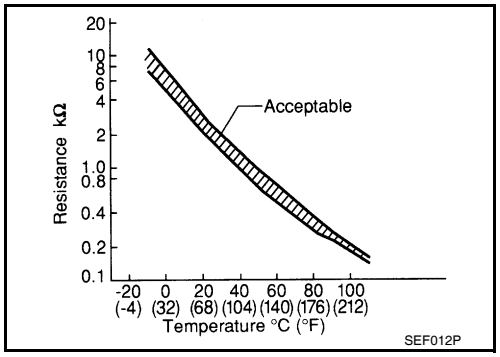
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

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

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



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:0000000004780097

DTC DETECTION LOGIC

NOTE:

- **If DTC P0125 is displayed with P0116, first perform the trouble diagnosis for DTC P0116. Refer to EC-165, "DTC Logic".**
- **If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to EC-167, "DTC Logic".**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0125	Insufficient engine coolant temperature for closed loop fuel control	• Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. • Engine coolant temperature is insufficient for closed loop fuel control.	• Harness or connectors (High resistance in the circuit) • Engine coolant temperature sensor • Thermostat

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR FUNCTION

With CONSULT-III

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-III.
3. Check that “COOLAN TEMP/S” is above 5°C (41°F).

With GST

Follow the procedure “With CONSULT-III” above.

Is it above 5°C (41°F)?

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

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

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

If “COOLAN TEMP/S” indication increases to more than 5°C (41°F) within 65 minutes, stop engine because the test result will be OK.

CAUTION:

Be careful not to overheat engine.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:0000000004780098

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

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

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-176, "Component Inspection".

Is the inspection result normal?

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

3.CHECK THERMOSTAT OPERATION

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

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace thermostat. Refer to CO-22, "Removal and Installation".

4.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

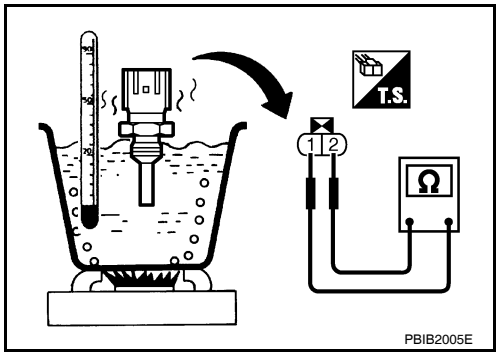
Component Inspection

INFOID:0000000004780099

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?

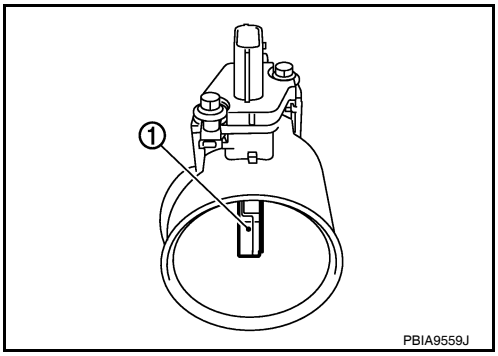
YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor.

P0127 IAT SENSOR

Description

INFOID:0000000004780100

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



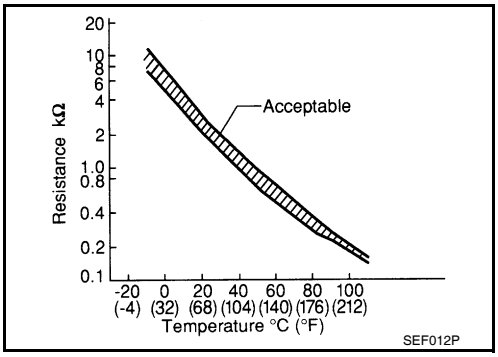
<Reference data>

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

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

CAUTION:

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



DTC Logic

INFOID:0000000004780101

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0127	Intake air temperature too high	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	• Harness or connectors (The sensor circuit is open or shorted) • Intake air temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Wait until engine coolant temperature is less than 96°C (205°F)
- Turn ignition switch ON.
- Select “DATA MONITOR” mode with CONSULT-III.
- Check the engine coolant temperature.
- If the engine coolant temperature is not less than 96°C (205°F), turn ignition switch OFF and cool down engine.

NOTE:
Perform the following steps before engine coolant temperature is above 96°C (205°F).

2. Turn ignition switch ON.
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Start engine.
5. Hold vehicle speed at more than 70 km/h (43 MPH) for 95 consecutive seconds.
   CAUTION:
   Always drive vehicle at a safe speed.
6. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> Go to EC-179, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000004780102

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

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

2.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-179, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace mass air flow sensor (with intake air temperature sensor).

3.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

Component Inspection

INFOID:0000000004780103

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 per the following.

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

Is the inspection result normal?

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

P0128 THERMOSTAT FUNCTION

DTC Logic

INFOID:0000000004780104

DTC DETECTION LOGIC

NOTE:
If DTC P0128 is displayed with DTC P0300, P0301, P0302, P0303 or P0304, first perform the trouble diagnosis for DTC P0300, P0301, P0302, P0303, P0304. Refer to EC-253, "DTC Logic".
Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough.
This is due to a leak in the seal or the thermostat stuck open.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	• Thermostat • Leakage from sealing portion of thermostat • Engine coolant temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
- **For best results, perform at ambient temperature of –10°C (14°F) or higher.**
- **For best results, perform at engine coolant temperature of –10°C (14°F) to 56°C (133°F).**
- **Before performing the following procedure, do not fill with the fuel.**

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III
1. Turn A/C switch OFF.
2. Turn blower fan switch OFF.
3. Turn ignition switch ON.
4. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-III.
5. Check the indication of “COOLAN TEMP/S”
   If it is below 56°C (133°F), go to following step.
   If it is above 56°C (133°F), cool down the engine to less than 56°C (133°F). Then go to next steps.
6. Start engine.
7. Drive vehicle for 10 consecutive minutes under the following conditions.

VHCL SPEED SE	More than 56km/h (35MPH)

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If “COOLAN TEMP/S” indication increases to more than 75°C (167°F) within 10 minutes, turn ignition switch OFF because the test result will be OK.
8. Check 1st trip DTC.

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

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:0000000004780105

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-181, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine coolant temperature sensor.

2.CHECK THERMOSTAT

Refer to CO-23, "Inspection".

Is the inspection result normal?

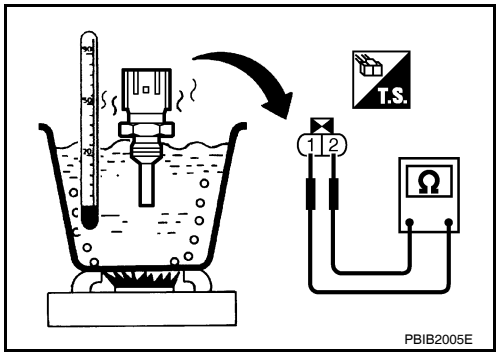
YES >> INSPECTION END
NO >> Replace thermostat.

Component Inspection

INFOID:0000000004780106

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor harness connector.
3. Remove engine coolant temperature sensor.
4. Check resistance between engine coolant temperature sensor terminals by heating with hot water as shown in the figure.



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

Is the inspection result normal?

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

P0130 A/F SENSOR 1

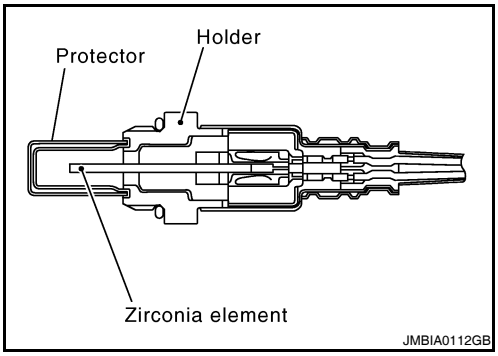
Description

INFOID:0000000004780107

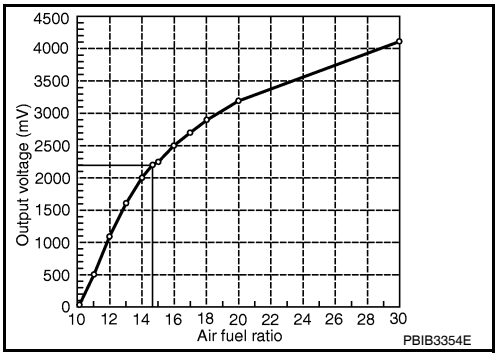
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement = 1, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



DTC Logic

INFOID:0000000004780108

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible Cause
P0130	Air fuel ratio (A/F) sensor 1 circuit	A)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in the range other than approx. 2.2 V.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • A/F sensor 1
		B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Let it idle for 2 minutes.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-185, "Diagnosis Procedure".

NO-1 >> With CONSULT-III: GO TO 3.
NO-2 >> Without CONSULT-III: GO TO 7.

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

1. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode with CONSULT-III.
2. Check “A/F SEN1 (B1)” indication.

Does the indication fluctuates around 2.2 V?

YES >> GO TO 4.
NO >> Go to EC-185, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-I

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

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 64 km/h (40 mph)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	D position (A/T) 5th position (M/T)

If “TESTING” is not displayed after 20 seconds, retry from step 2.
CAUTION:
Always drive vehicle at a safe speed.

Is “TESTING” displayed on CONSULT-III screen?

YES >> GO TO 5.
NO >> Check A/F sensor 1 function again. GO TO 3.

5.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-II

Release accelerator pedal fully.
NOTE:
Never apply brake during releasing the accelerator pedal.

Which does “TESTING” change to?

COMPLETED>>GO TO 6.
OUT OF CONDITION>>Retry DTC CONFIRMATION PROCEDURE. GO TO 4.

6.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-III

Touch “SELF-DIAG RESULT”

Which is displayed on CONSULT-III screen?

YES >> INSPECTION END
NO >> Go to EC-185, "Diagnosis Procedure".

7.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform Component Function Check. Refer to EC-183, "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-185, "Diagnosis Procedure".

Component Function Check

INFOID:0000000004780109

1.PERFORM COMPONENT FUNCTION CHECK

With GST
1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.

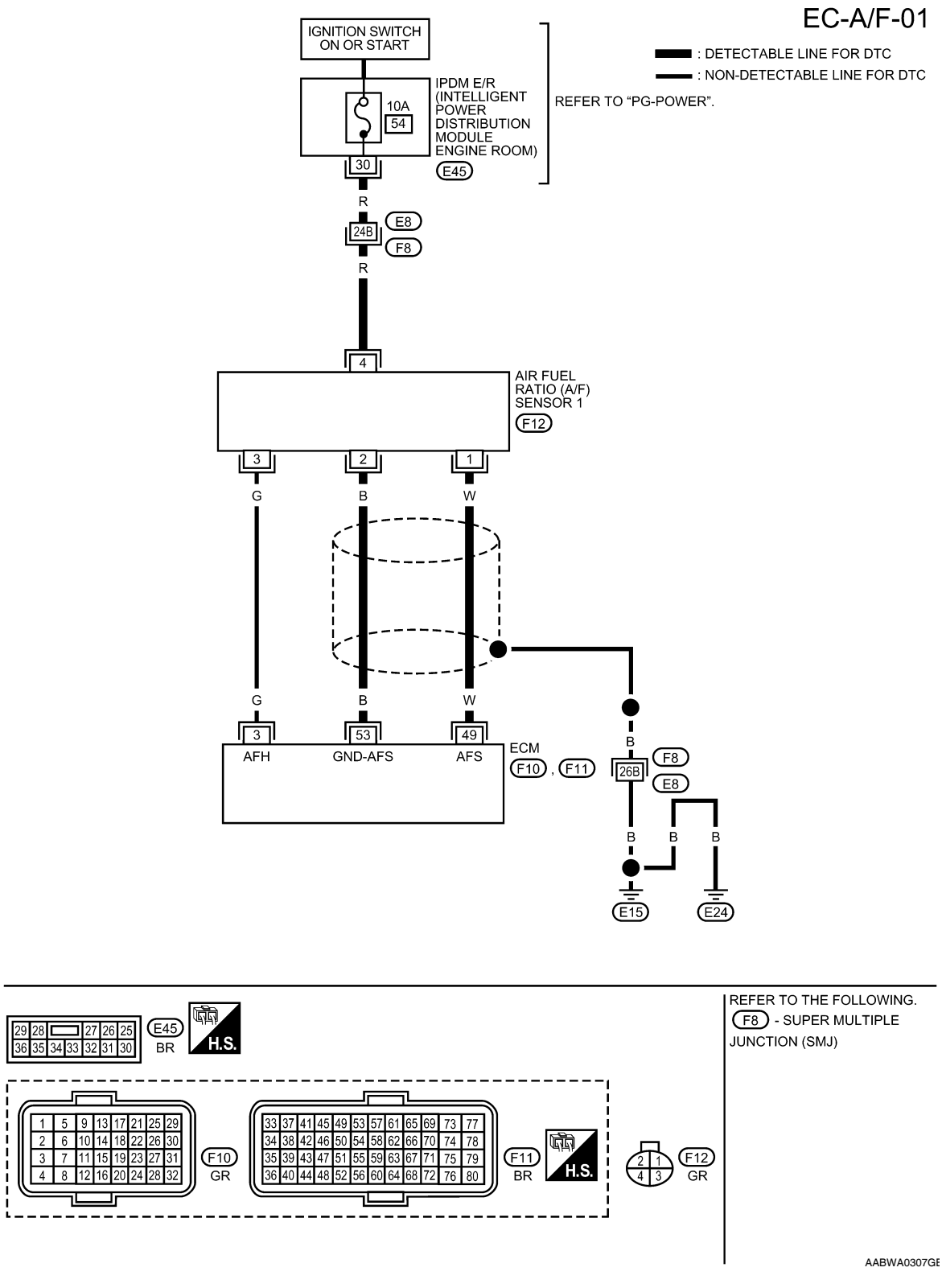
3. Shift the selector lever to the D position (A/T) or 1st position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (31 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
   NOTE:
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 for five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 for five times.
8. Stop the vehicle.
9. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-185, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780681



Diagnosis Procedure

INFOID:0000000004780110

1. CHECK GROUND CONNECTION

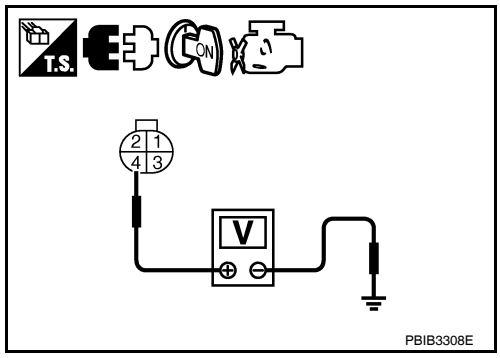
1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

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		
F12	4	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- IPDM E/R harness connector E45
- 10 A fuse (No. 54)
- 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	
F12	1	F11	49	Existed
	2		53	

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

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

5. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Perform EC-120, "Diagnosis Procedure".

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

>> INSPECTION END

P0131 A/F SENSOR 1

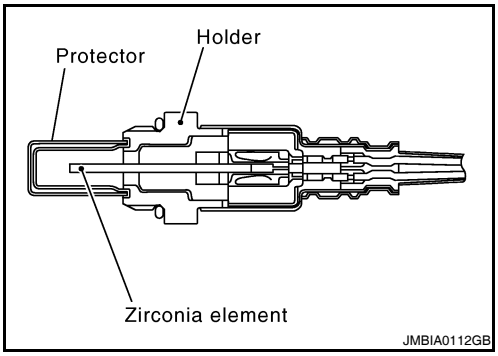
Description

INFOID:0000000004780111

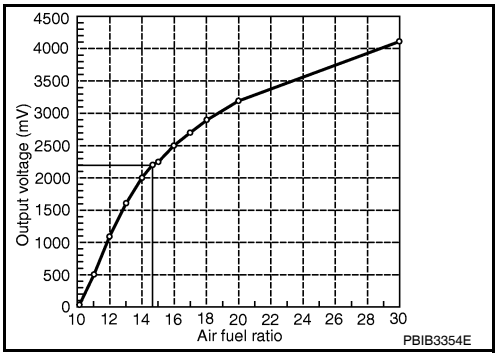
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement = 1, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



DTC Logic

INFOID:0000000004780112

DTC DETECTION LOGIC

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0131	Air fuel ratio (A/F) sensor 1 circuit low voltage	• The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0 V.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • A/F sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

>> GO TO 2.

2.CHECK A/F SENSOR FUNCTION

With CONSULT-III

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

With GST

Follow the procedure “With CONSULT-III” above.

Is the indication constantly approx. 0 V?

YES >> Go to EC-190, "Diagnosis Procedure".
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
   CAUTION:
   Always drive vehicle at a safe speed.
3. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	Suitable position

NOTE:
- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 1, return to step 1.**

4. Check 1st trip DTC.

With GST

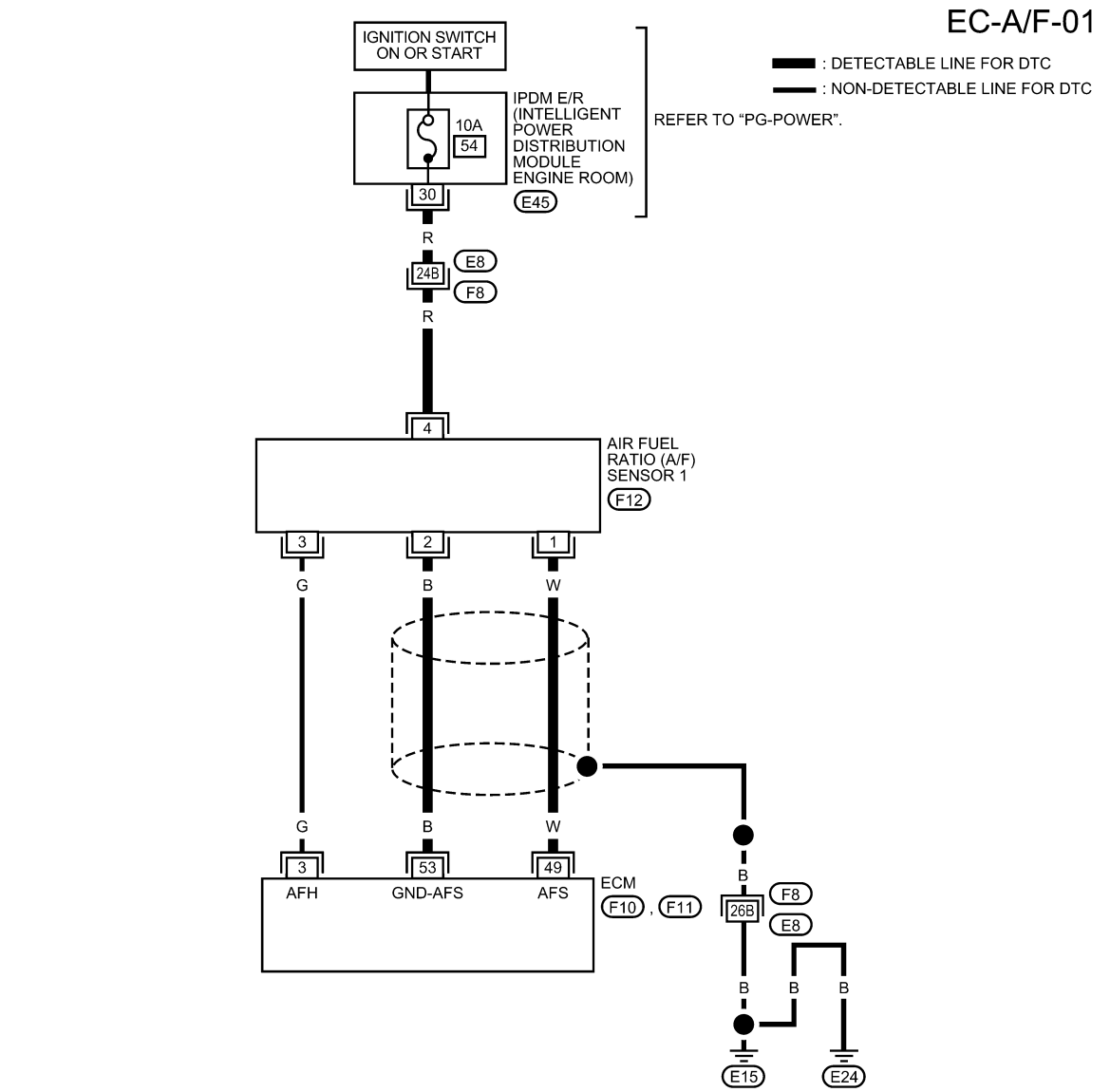
Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

YES >> Go to EC-190, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780710



Diagnosis Procedure

INFOID:0000000004780113

1. CHECK GROUND CONNECTION

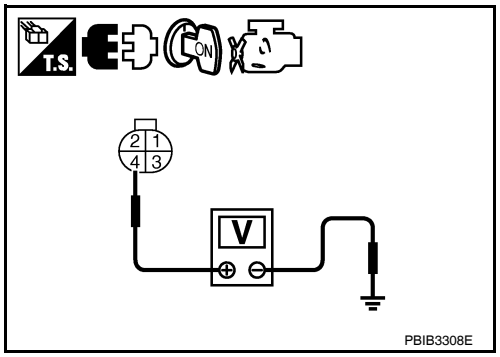
1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

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		
F12	4	Ground	Battery voltage

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- IPDM E/R harness connector E45
- 10 A fuse (No. 54)
- 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	
F12	1	F11	49	Existed
	2		53	

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

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

5. Also check harness for short to power.

Is the inspection result normal?

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

5. CHECK INTERMITTENT INCIDENT

Perform EC-120, "Diagnosis Procedure".

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

>> INSPECTION END

P0132 A/F SENSOR 1

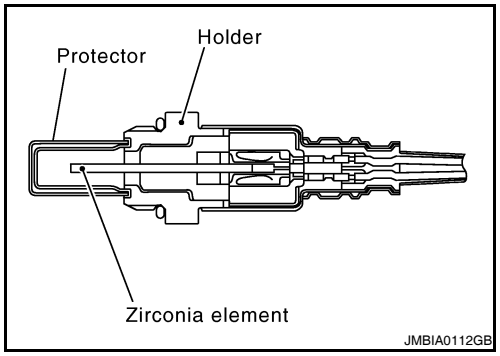
Description

INFOID:0000000004780114

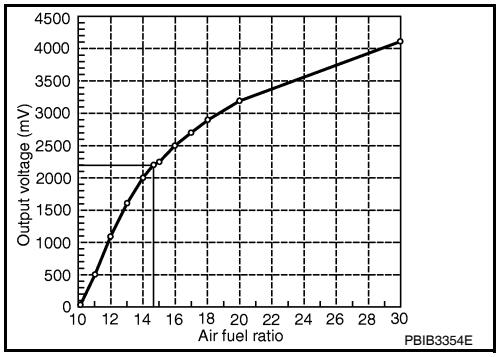
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement = 1, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



DTC Logic

INFOID:0000000004780115

DTC DETECTION LOGIC

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

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

>> GO TO 2.

2.CHECK A/F SENSOR FUNCTION

With CONSULT-III

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

With GST

Follow the procedure “With CONSULT-IIII” above.

Is the indication constantly approx. 5 V?

YES >> Go to EC-195, "Diagnosis Procedure".
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
   CAUTION:
   Always drive vehicle at a safe speed.
3. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	Suitable position

   NOTE:
   - **Keep the accelerator pedal as steady as possible during the cruising.**
   - **If this procedure is not completed within 1 minute after restarting engine at step 1, return to step 1.**
4. Check 1st trip DTC.

With GST

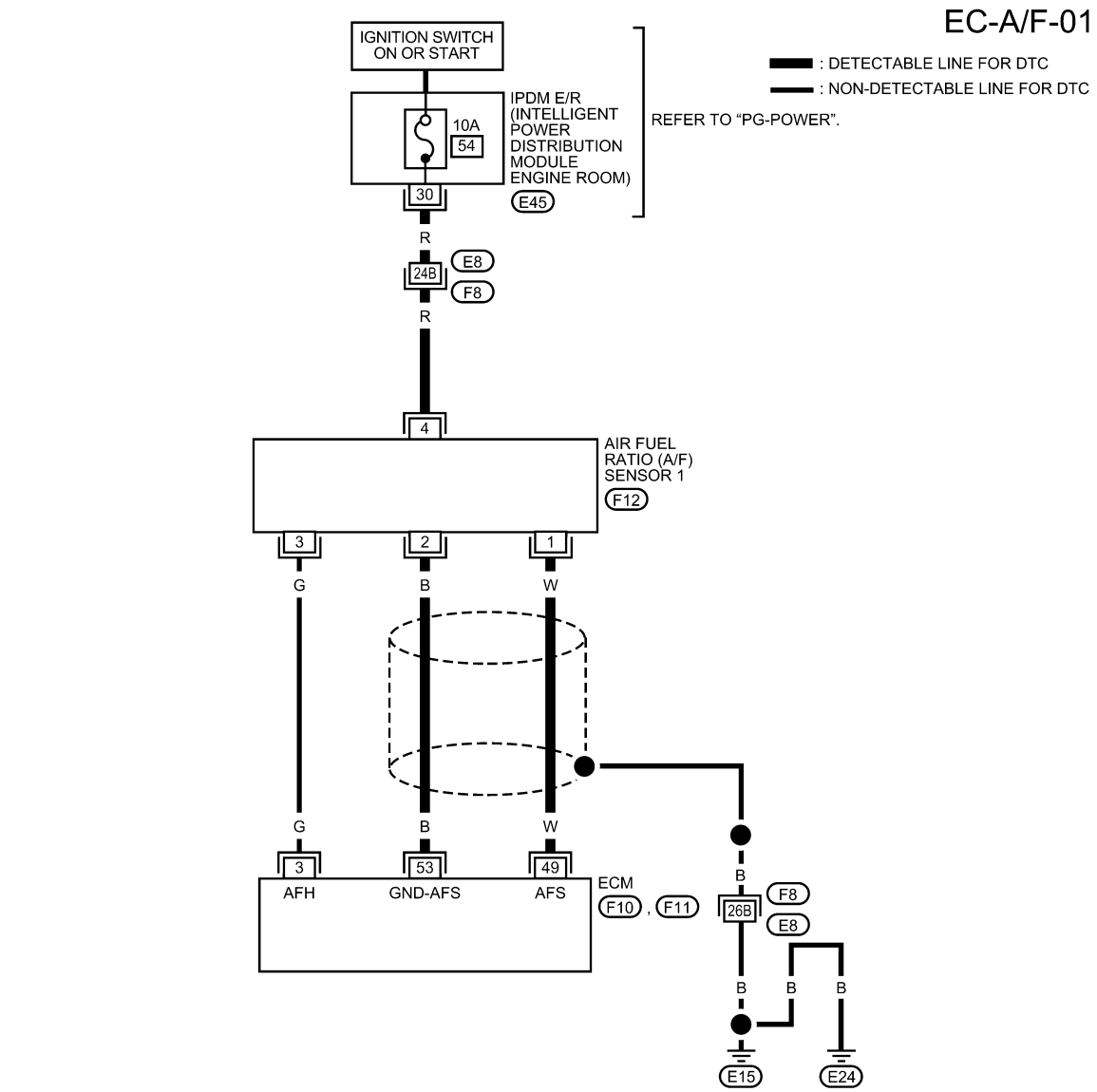
Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC is detected?

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

Wiring Diagram

INFOID:0000000004780711



Diagnosis Procedure

INFOID:0000000004780116

1.CHECK GROUND CONNECTION

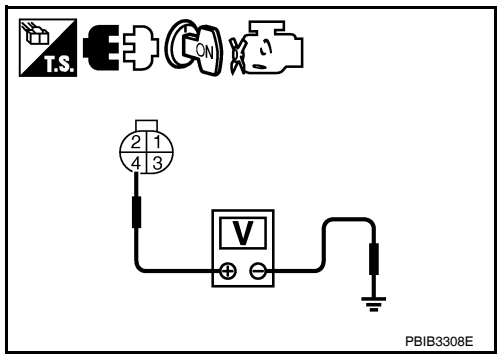
1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

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		
F12	4	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- IPDM E/R harness connector E45
- 10 A fuse (No. 54)
- 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	
F12	1	F11	49	Existed
	2		53	

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

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

5. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Perform EC-120, "Diagnosis Procedure".

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

>> INSPECTION END

P0133 A/F SENSOR 1

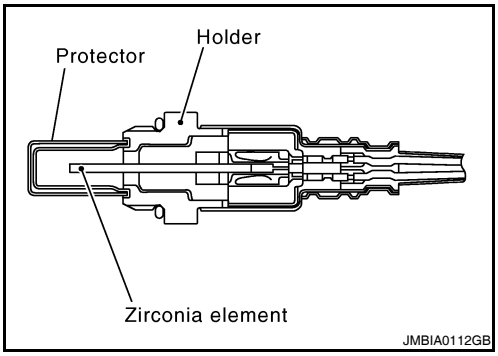
Description

INFOID:0000000004780117

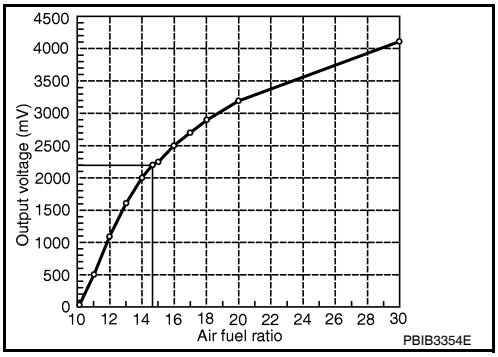
The air fuel ratio (A/F) sensor 1 is a planar one-cell limit current sensor. The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement = 1, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



DTC Logic

INFOID:0000000004780118

DTC DETECTION LOGIC

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

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

Do you have CONSULT-III?

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

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

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

Is “COMPLETED” displayed on COUSULT-III?

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

3.PERFORM DTC CONFIRMATION PROCEDURE-II

Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT-III?

OK >> INSPECTION END
NG >> Go to EC-201, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

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

If “TESTING” is not displayed after 10 seconds, go to EC-112, "Component Function Check".

2. Wait for about 20 seconds at idle under the condition that “TESTING” is displayed on the CONSULT-III screen.
3. Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, go to EC-112, "Component Function Check".
4. Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT-III?

OK >> INSPECTION END
NG >> Go to EC-201, "Diagnosis Procedure".

5.CHECK AIR-FUEL RATIO SELF-LEARNING VALUE

With GST

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

Is the total percentage within ±15%?

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

6.DETECT MALFUNCTIONING PART

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

>> Repair or replace malfunctioning part.

7.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
3. Let engine idle for 1 minute.
4. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.

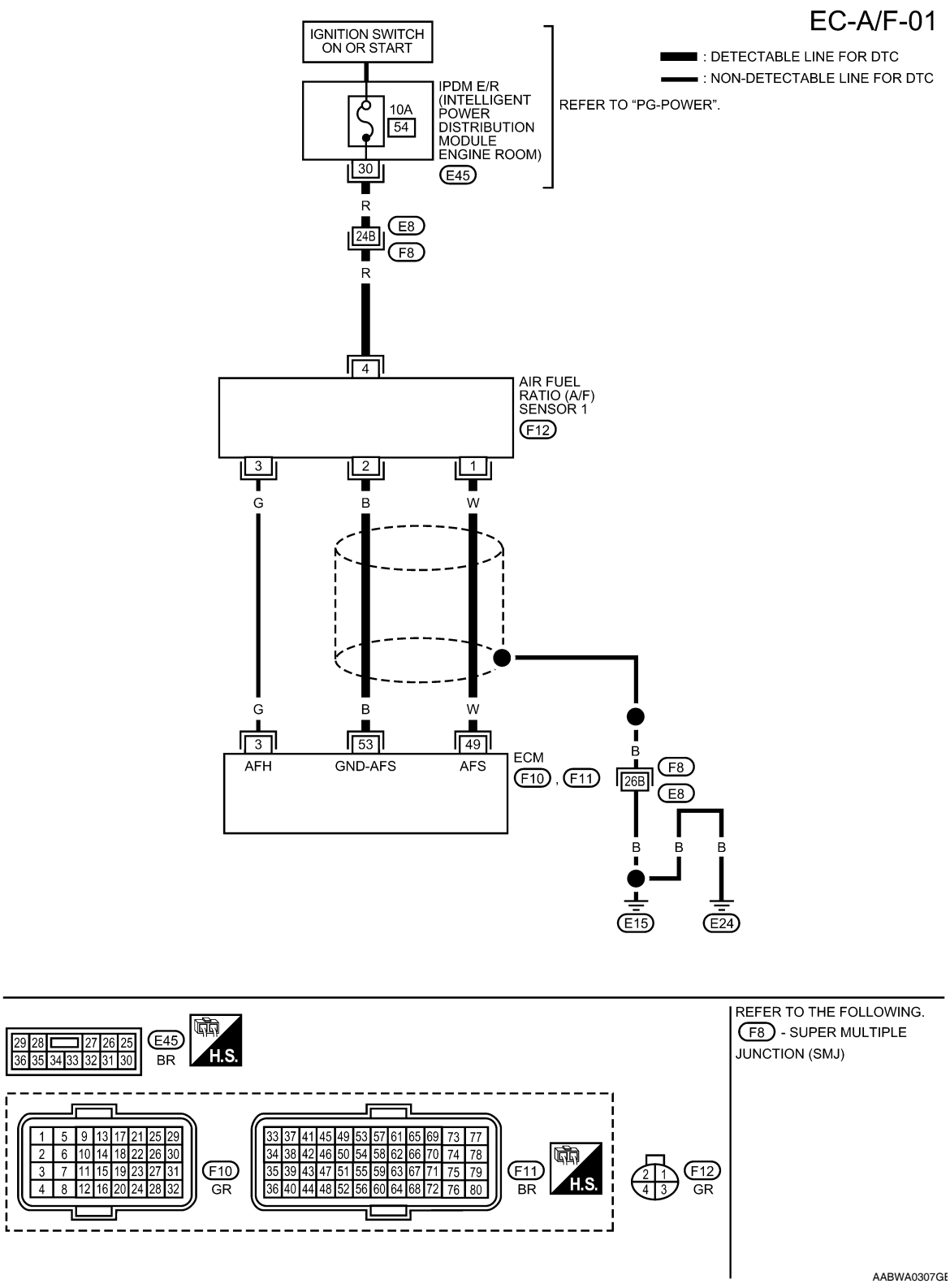
5. Fully release accelerator pedal and then let engine idle for about 1 minute.
6. Check 1st trip DTC detected?.

Is 1st trip DTC detected?

YES >> Go to EC-201, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780712



Diagnosis Procedure

INFOID:0000000004780119

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

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

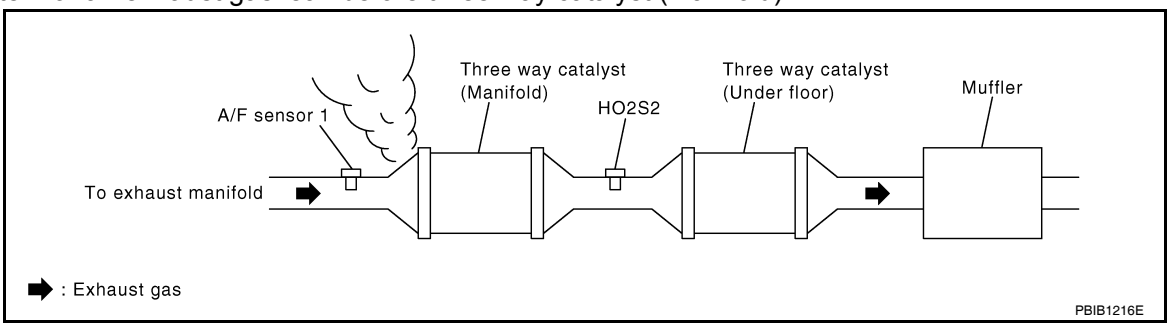
2.RETIGHTEN A/F SENSOR 1

Loosen and retighten the A/F sensor 1. Refer to EM-31, "Exploded View".

>> GO TO 3.

3.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

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

4.CHECK FOR INTAKE AIR LEAK

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

Is intake air leak detected?

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

5.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-33, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Run engine for at least 10 minutes at idle speed.

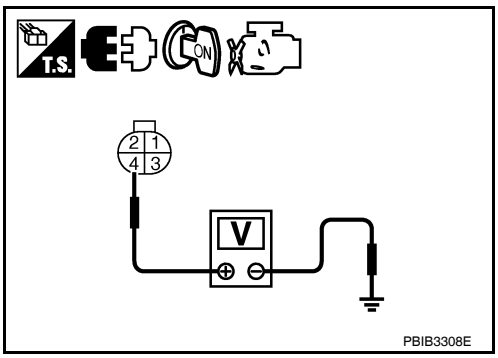
Is the 1st trip DTC P0171 or P172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-229, "DTC Logic" or EC-235, "DTC Logic".
NO >> GO TO 6.

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

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.

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



A/F sensor 1		Ground	Voltage
Connector	Terminal		
F12	4	Ground	Battery voltage

Is the inspection result normal?

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

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- IPDM E/R harness connector E45
- 10 A fuse (No. 54)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

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

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

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

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

5. Also check harness for short to power.

Is the inspection result normal?

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

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

Refer to EC-139, "Component Inspection".

Is the inspection result normal?

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

10. CHECK MASS AIR FLOW SENSOR

Refer to EC-153, "Component Inspection".

Is the inspection result normal?

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

11. CHECK PCV VALVE

Refer to EC-456, "Component Inspection".

Is the inspection result normal?

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

12. CHECK INTERMITTENT INCIDENT

Perform EC-120, "Diagnosis Procedure".

Is the inspection result normal?

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

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

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

CAUTION:

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

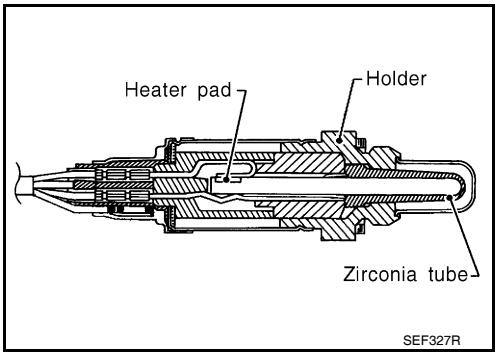
>> INSPECTION END

P0137 HO2S2

Description

INFOID:0000000004780120

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.

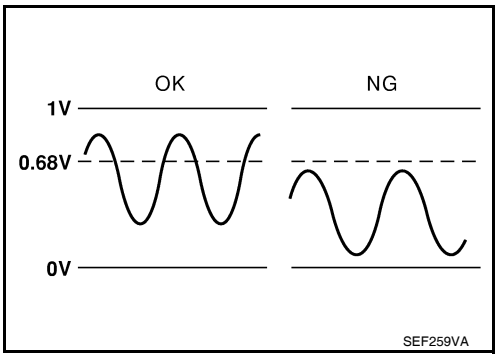


DTC Logic

INFOID:0000000004780121

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0137	Heated oxygen sensor 2 circuit low voltage	The maximum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-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:
For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches 70°C (158°F).
7. Open engine hood.
8. Select “HO2S2 (B1) P1147” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-III.
9. Follow the instruction of CONSULT-III.
   NOTE:
   It will take at most 10 minutes until “COMPLETED” is displayed.
10. Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-207, "Diagnosis Procedure".
CAN NOT BE DIAGNOSED>>GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-205, "Component Function Check".
NOTE:
Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

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

Component Function Check

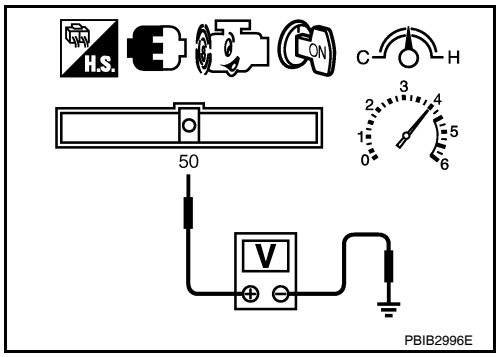
INFOID:0000000004780122

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

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

ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure.

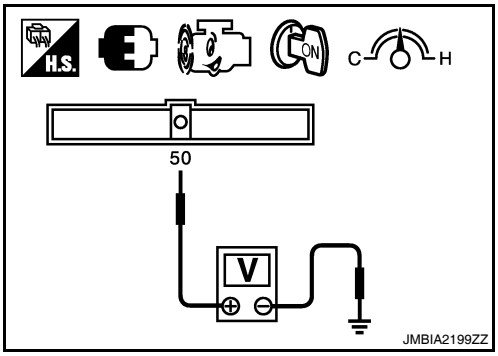


Is the inspection result normal?

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

2.PERFORM COMPONENT FUNCTION CHECK-II

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



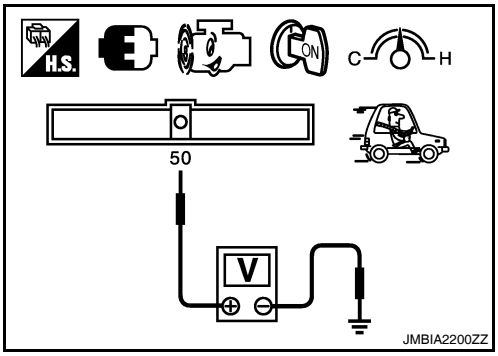
ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

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

3. PERFORM COMPONENT FUNCTION CHECK-III

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



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

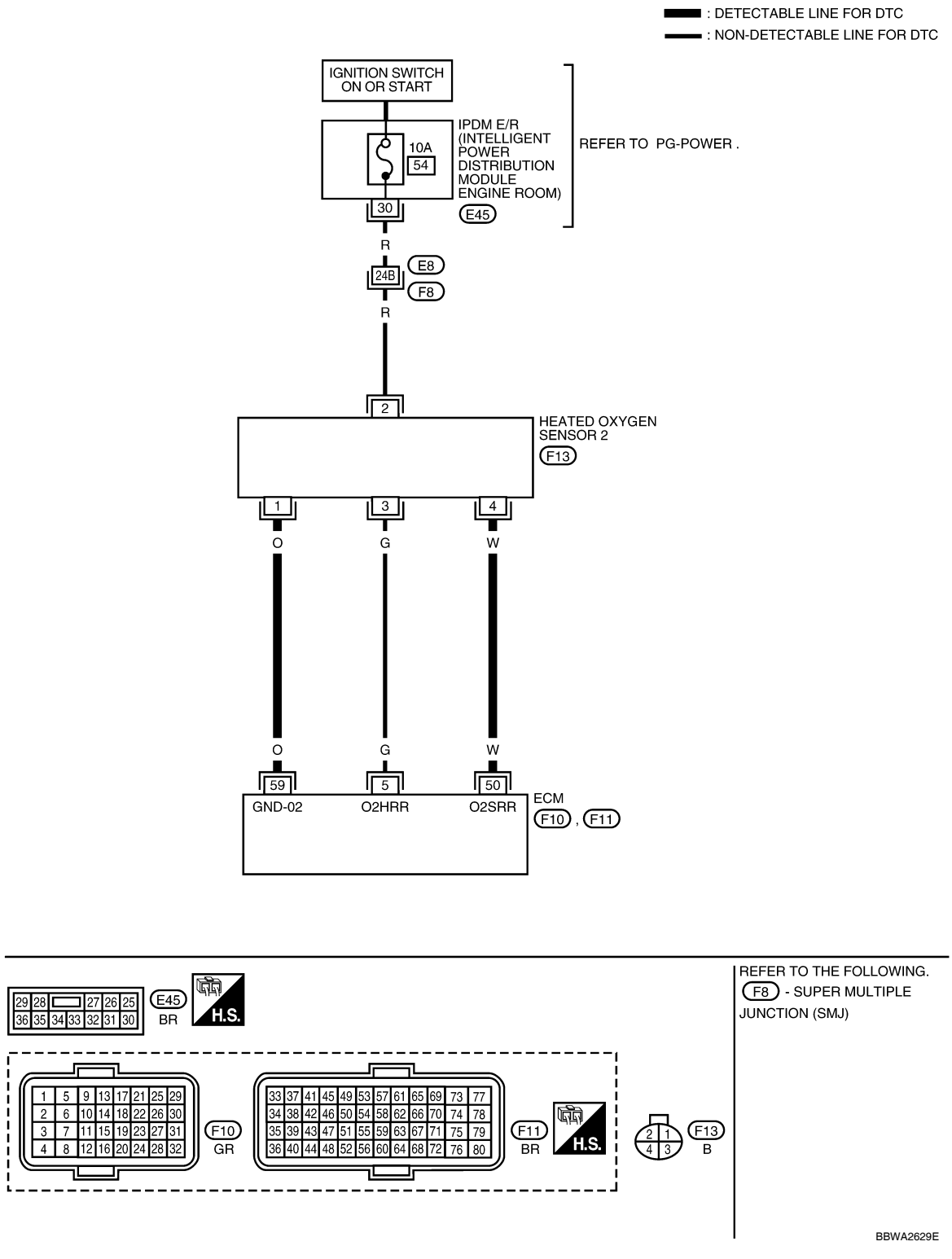
Is the inspection result normal?

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

Wiring Diagram

INFOID:0000000004780682

EC-HO2S2-01



Diagnosis Procedure

INFOID:0000000004780123

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

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

2.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-33, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171. Refer to EC-229, "DTC Logic".
NO >> GO TO 3.

3.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F13	1	F11	59	Existed

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

Is the inspection result normal?

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

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

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

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

HO2S2		Ground	Continuity
Connector	Terminal		
F13	4	Ground	Not existed

ECM		Ground	Continuity
Connector	Terminal		
F11	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

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

5.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-209, "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 sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

Component Inspection

INFOID:0000000004780124

1. INSPECTION START

Do you have CONSULT-III?

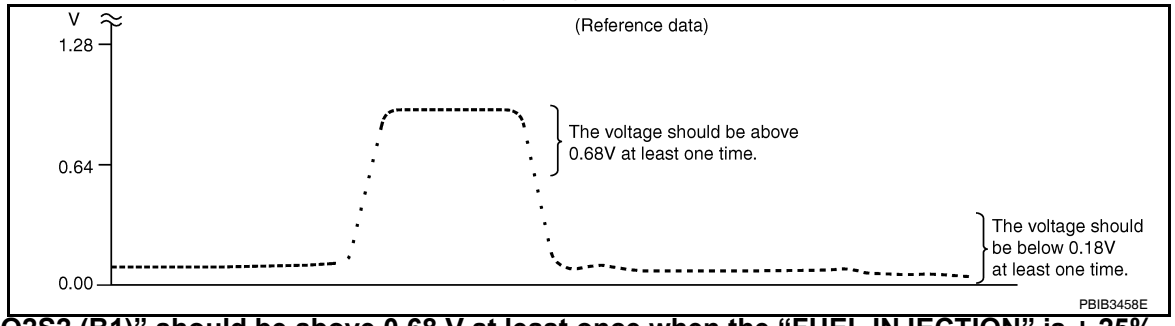
Do you have CONSULT-III?

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

Is the inspection result normal?

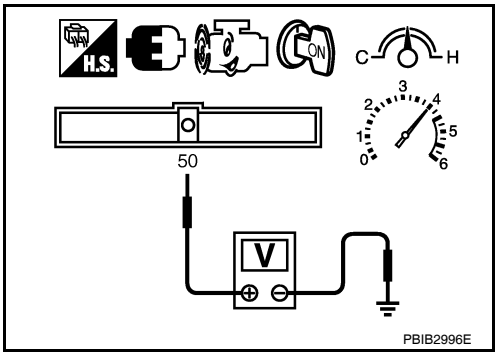
YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

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

5. Check the voltage between ECM harness connector and ground under the following condition.



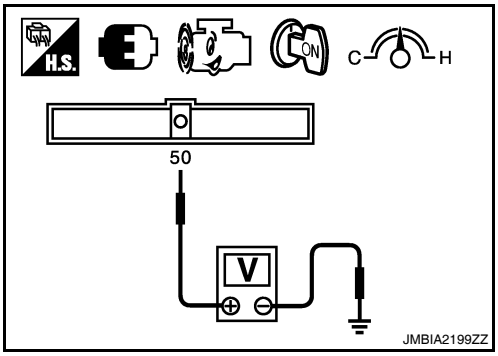
ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

4. CHECK HEATED OXYGEN SENSOR 2-II

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



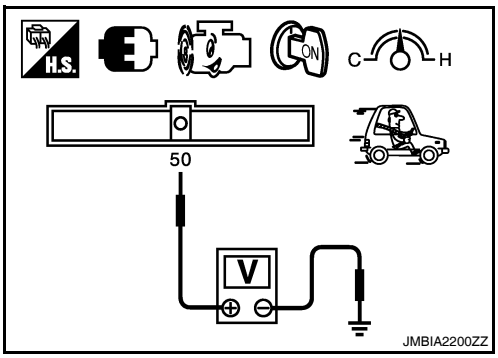
ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

5. CHECK HEATED OXYGEN SENSOR 2-III

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



ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

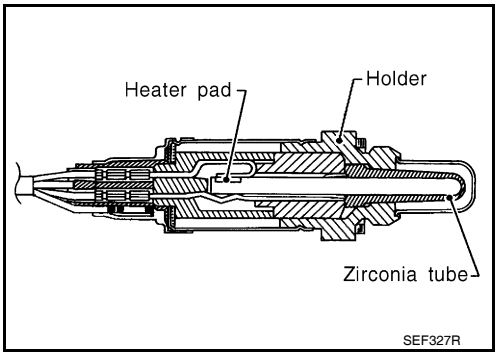
>> INSPECTION END

P0138 HO2S2

Description

INFOID:0000000004780125

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

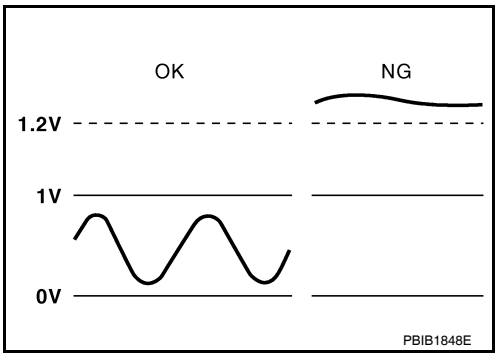
INFOID:0000000004780126

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time.

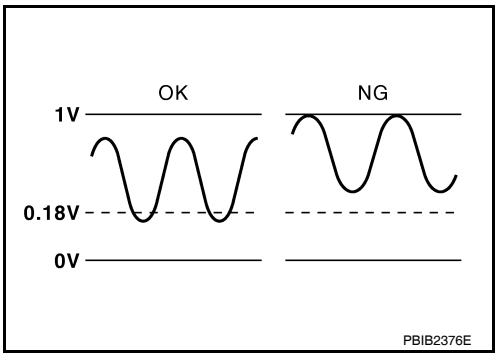
MALFUNCTION A

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



MALFUNCTION B

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



DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0138	Heated oxygen sensor 2 circuit high voltage	A)	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2
		B)	The minimum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

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

Is 1st trip DTC detected?

YES >> Go to EC-215, "Diagnosis Procedure".
NO-1 >> With CONSULT-III: GO TO 3.
NO-2 >> Without CONSULT-III: GO TO 5.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

NOTE:
For better results, perform “DTC WORK SUPPORT” at a temperature of 0 to 30°C (32 to 86°F).
1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indication is more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches 70°C (158°F).
7. Open engine hood.
8. Select “HO2S2 (B1) P1146” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-III.
9. Follow the instruction of CONSULT-III.
   NOTE:
   It will take at most 10 minutes until “COMPLETED” is displayed.
10. Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT-III

OK >> INSPECTION END
NG >> Go to EC-215, "Diagnosis Procedure".
CAN NOT BE DIAGNOSED>>GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALUNCTION B AGAIN

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to EC-215, "Diagnosis Procedure".
NOTE:
Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-215, "Diagnosis Procedure".

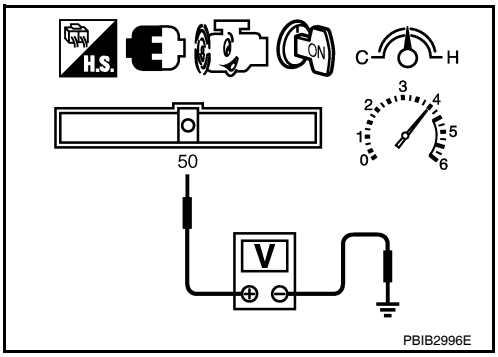
Component Function Check

INFOID:0000000004780127

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

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



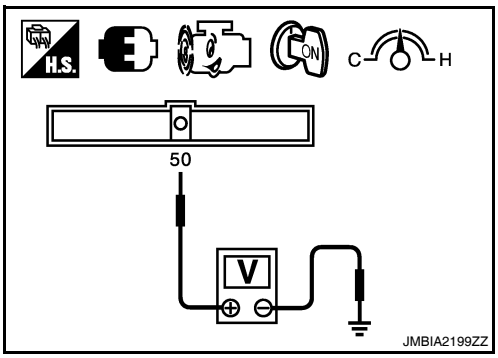
ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.18 V at least once during this procedure.

Is the inspection result normal?

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

2. PERFORM COMPONENT FUNCTION CHECK-II

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



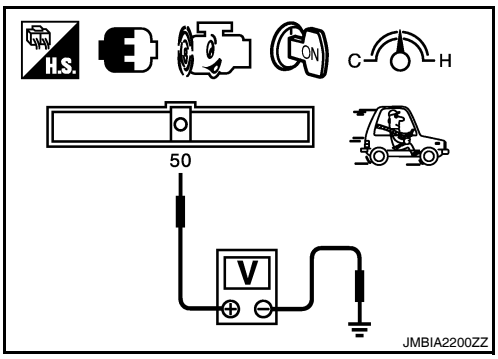
ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.18 V at least once during this procedure.

Is the inspection result normal?

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

3. PERFORM COMPONENT FUNCTION CHECK-III

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



ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T)	The voltage should be above 0.18 V at least once during this procedure.

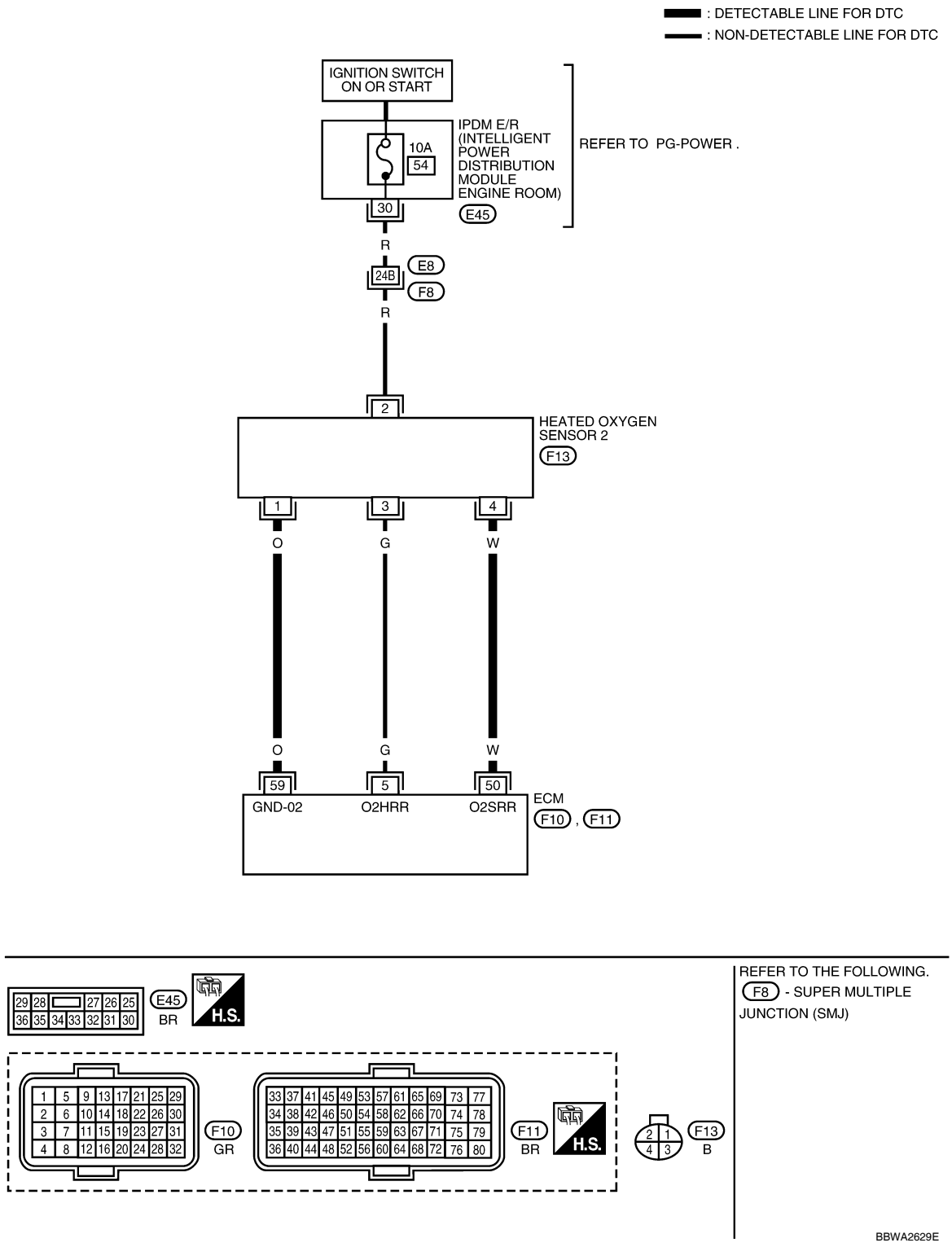
Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-215, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004780713

EC-HO2S2-01



Diagnosis Procedure

INFOID:0000000004780128

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-212, "DTC Logic".

Which malfunction is detected?

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

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

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

3.CHECK HO2S2 CONNECTOR FOR WATER

1. Disconnect heated oxygen sensor 2 harness connector.
2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

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

4.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F13	1	F11	59	Existed

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

Is the inspection result normal?

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

5.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

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

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

HO2S2		Ground	Continuity
Connector	Terminal		
F13	4	Ground	Not existed

ECM		Ground	Continuity
Connector	Terminal		
F11	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

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

6.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-218, "Component Inspection".

Is the inspection result normal?

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

7. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

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

>> INSPECTION END

8. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

9. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace ground connection.

10. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-33, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Run engine for at least 10 minutes at idle speed.

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

YES >> Perform trouble diagnosis for DTC P0172. Refer to EC-235, "DTC Logic".
NO >> GO TO 11.

11. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F13	1	F11	59	Existed

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

Is the inspection result normal?

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

12. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

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

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

HO2S2		Ground	Continuity
Connector	Terminal		
F13	4	Ground	Not existed

ECM		Ground	Continuity
Connector	Terminal		
F11	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

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

13. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-218, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> GO TO 14.

14. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

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

>> INSPECTION END

15. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

Component Inspection

INFOID:0000000004780129

1. INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

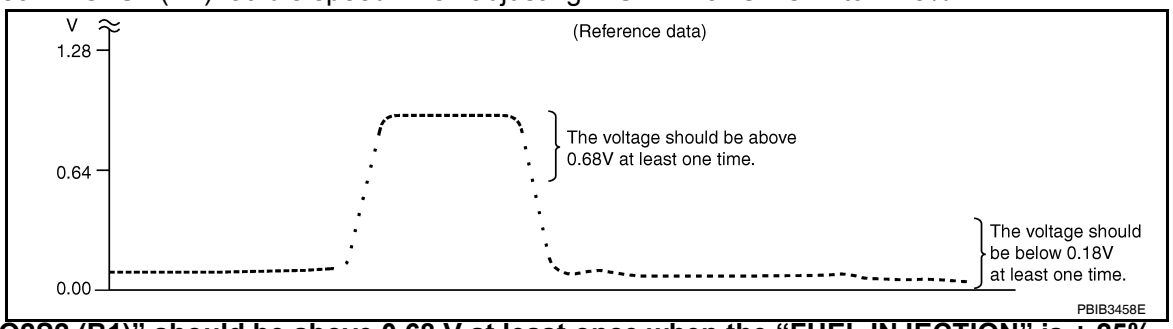
YES >> GO TO 2.
NO >> GO TO 3.

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

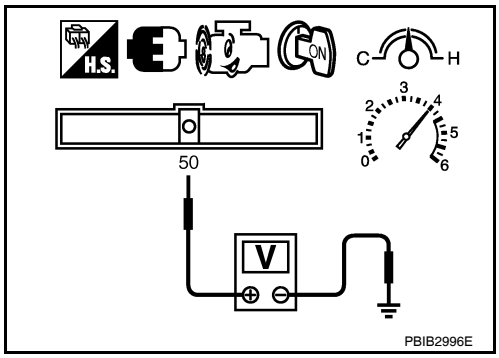
Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

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



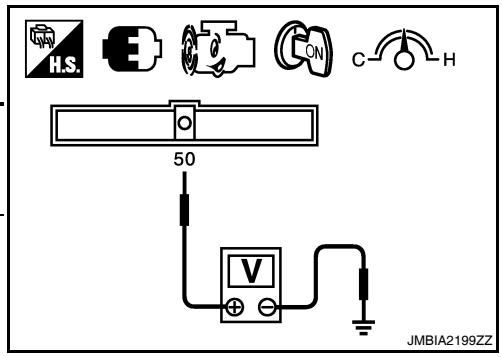
ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

4. CHECK HEATED OXYGEN SENSOR 2-II

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



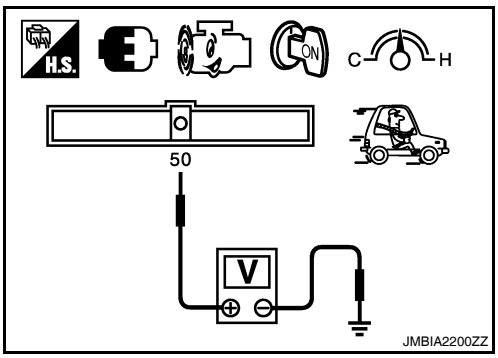
ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

5. CHECK HEATED OXYGEN SENSOR 2-III

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



ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

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

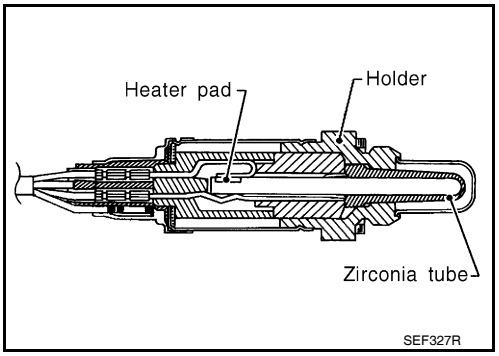
>> INSPECTION END

P0139 HO2S2

Description

INFOID:0000000004780130

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.

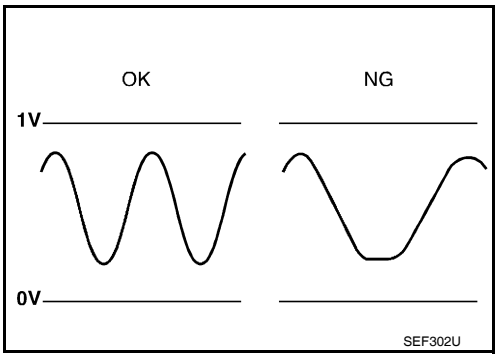


DTC Logic

INFOID:0000000004780131

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 switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond between rich and lean than the specified time.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 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.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to normal operating temperature.

3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.
6. Select “HO2S2 (B1) P0139” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-III.
7. Follow the instruction of CONSULT-III.
   NOTE:
   It will take at most 10 minutes until “COMPLETED” is displayed.
8. Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT-III?

OK >> INSPECTION END
NG >> GO TO 4.
CAN NOT BE DIAGNOSED>>GO TO 4.

4.PERFORM THE RESULT OF DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-222, "Component Function Check".
NOTE:
Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

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

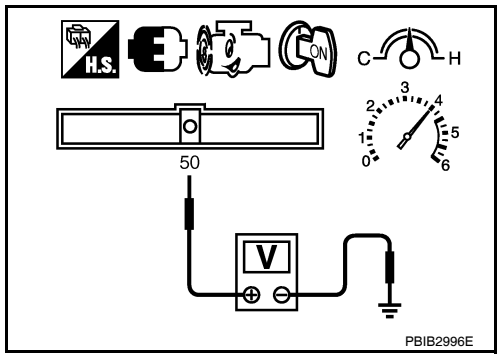
Component Function Check

INFOID:0000000004780132

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT-III

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



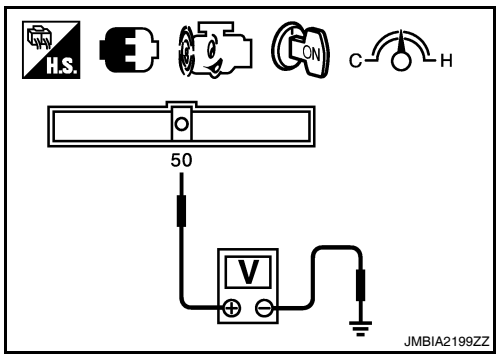
ECM		Ground	Condition	Voltage
Con-nector	Terminal			
F11	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.30 V at least once during this procedure.

Is the inspection result normal?

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

2.PERFORM COMPONENT FUNCTION CHECK-II

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



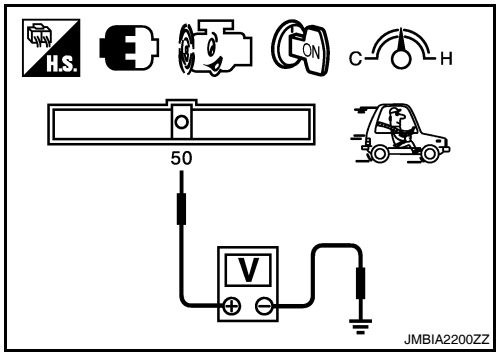
ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	33 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.30 V at least once during this procedure.

Is the inspection result normal?

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

3. PERFORM COMPONENT FUNCTION CHECK-III

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



ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	33 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T)	The voltage should be above 0.30 V at least once during this procedure.

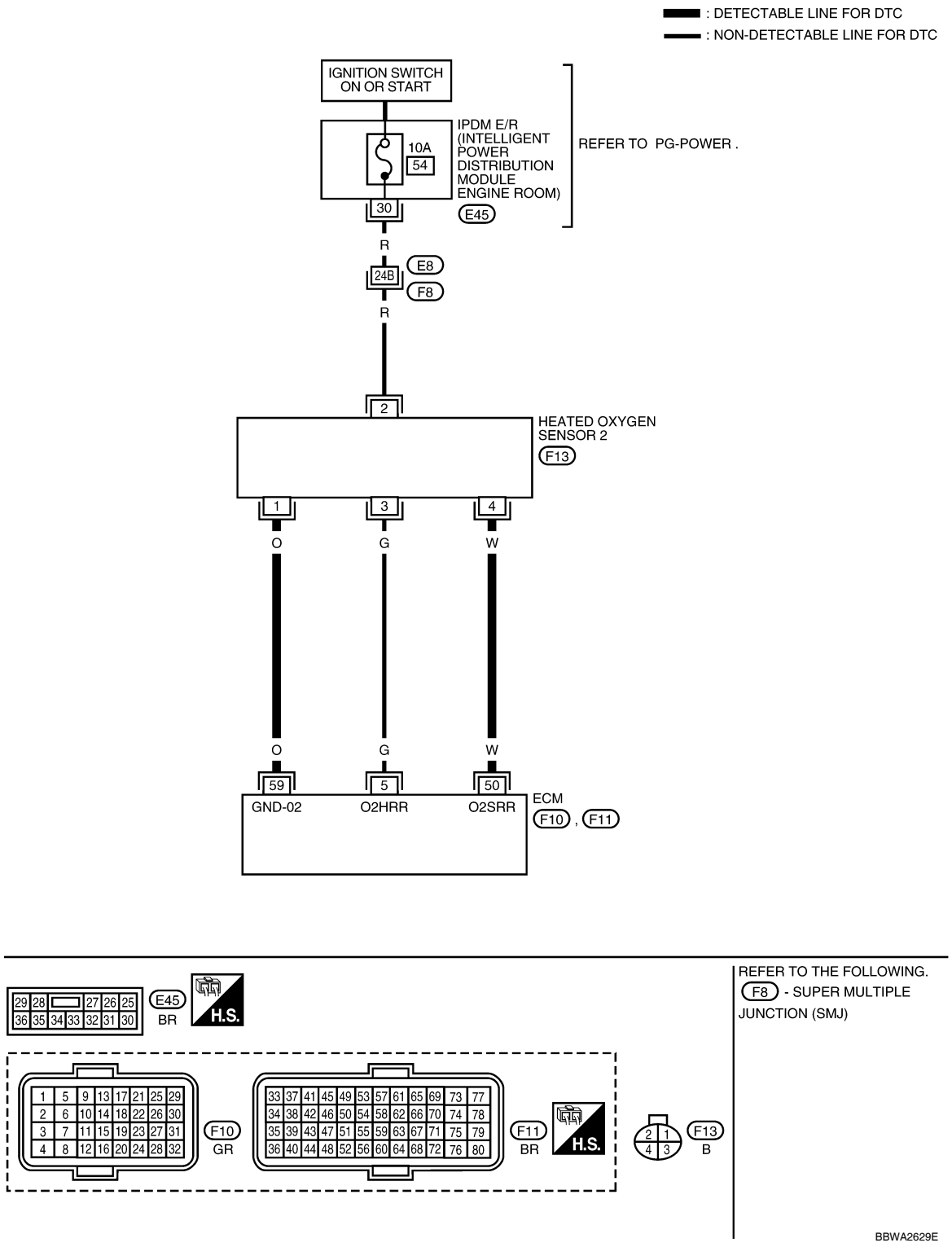
Is the inspection result normal?

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

Wiring Diagram

INFOID:0000000004780714

EC-HO2S2-01



Diagnosis Procedure

INFOID:0000000004780133

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

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

2. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-33, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-229, "DTC Logic" or EC-235, "DTC Logic".
NO >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

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

HO2S2		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F13	1	F11	59	Existed

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

Is the inspection result normal?

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

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

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

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

HO2S2		Ground	Continuity
Connector	Terminal		
F13	4	Ground	Not existed

ECM		Ground	Continuity
Connector	Terminal		
F11	50	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

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

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-226, "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 sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

Component Inspection

INFOID:0000000004780134

1.INSPECTION START

Do you have CONSULT-III?

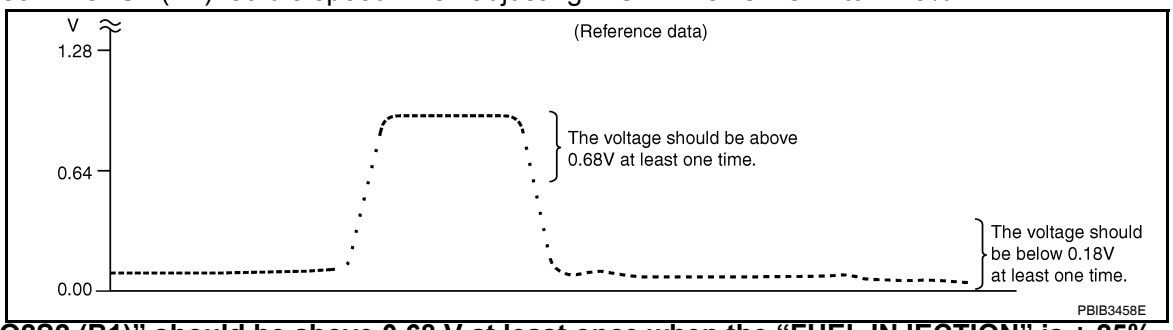
Do you have CONSULT-III?

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

Is the inspection result normal?

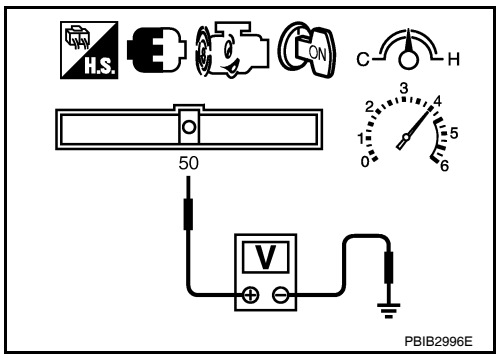
YES >> INSPECTION END
NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT-III

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

5. Check the voltage between ECM harness connector and ground under the following condition.



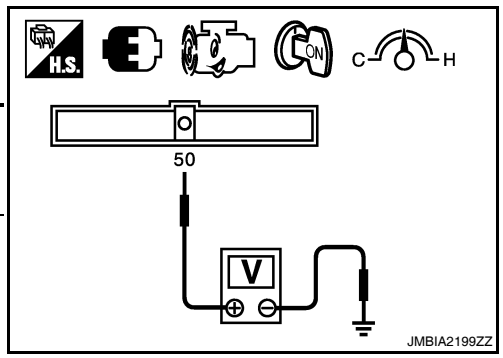
ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	50 (HO2S2 signal)	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

4. CHECK HEATED OXYGEN SENSOR 2-II

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



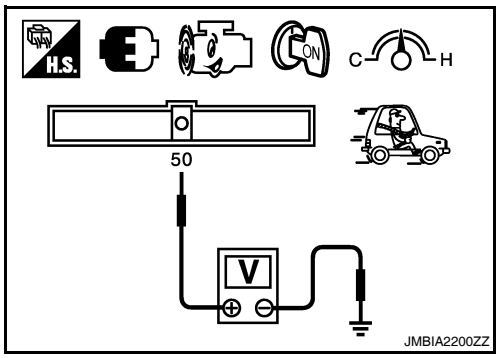
ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	50 (HO2S2 signal)	Ground	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

5. CHECK HEATED OXYGEN SENSOR 2-III

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



ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	50 (HO2S2 signal)	Ground	Coasting from 80 km/h (50 MPH) in D position (A/T), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000004780135

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171	Fuel injection system too lean	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	• Intake air leaks • A/F sensor 1 • Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor • Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to EC-33, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Start engine.

Is it difficult to start engine?

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

3.RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.
Crank engine while depressing accelerator pedal.
NOTE:
When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Go to EC-231, "Diagnosis Procedure".
NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

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

Is 1st trip DTC detected?

YES >> Go to EC-231, "Diagnosis Procedure".
NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine.
3. Maintain the following conditions for at least 10 consecutive minutes.
   Hold the accelerator pedal as steady as possible.

VHCL SPEED SE	50 - 120 km/h (31 - 75 MPH)

CAUTION:
Always drive vehicle at a safe speed.

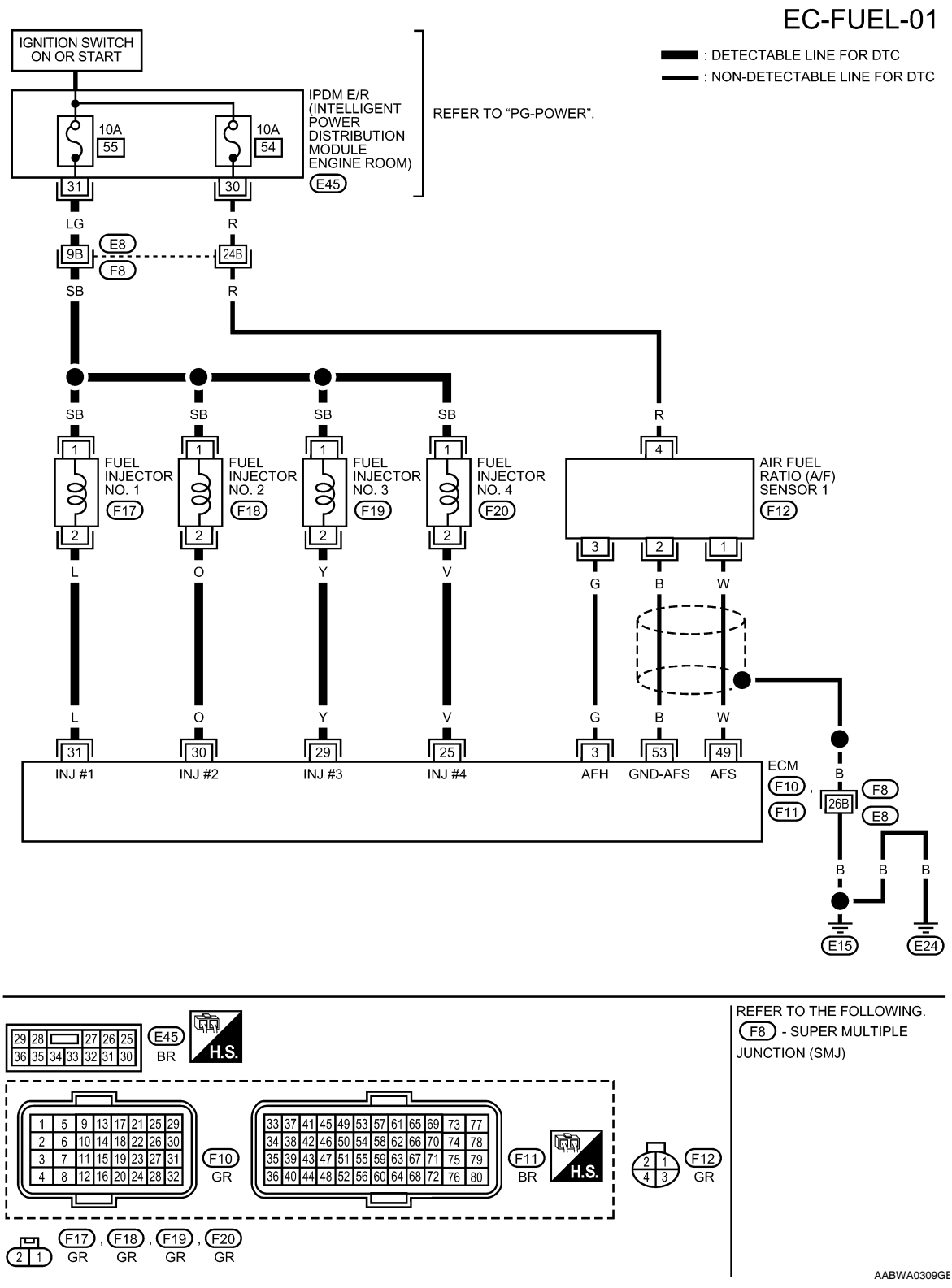
4. Check 1st trip DTC.

Is 1st trip DTC detected?

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

Wiring Diagram

INFOID:0000000004780683



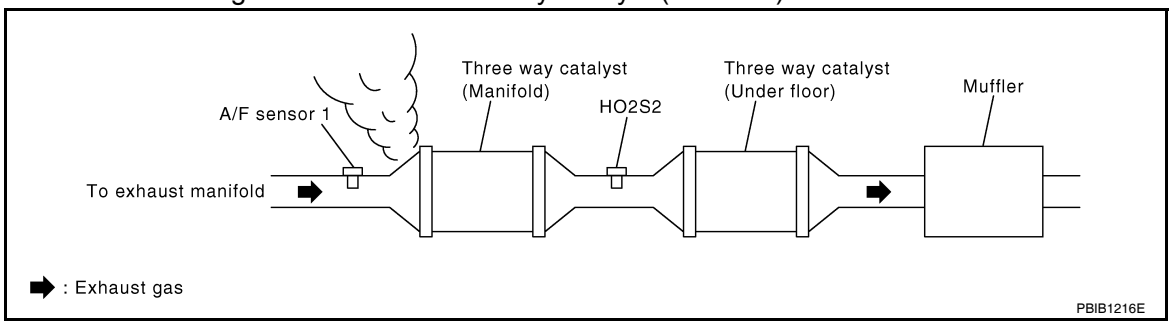
Diagnosis Procedure

INFOID:0000000004780136

1. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.

2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

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

2.CHECK FOR INTAKE AIR LEAK

1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

Intake air leak detected?

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

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

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

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

6. Also check harness for short to power.

Is the inspection result normal?

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

4.CHECK FUEL PRESSURE

1. Check fuel pressure. Refer to EC-498, "Inspection".

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”.
NO >> Repair or replace

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-III.
3. For specification, refer to EC-504, "Mass Air Flow Sensor".

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.
3. For specification, refer to EC-504, "Mass Air Flow Sensor".

Is the measurement value within the specification?

YES >> GO TO 7.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-148, "DTC Logic".

7. CHECK FUNCTION OF FUEL INJECTOR

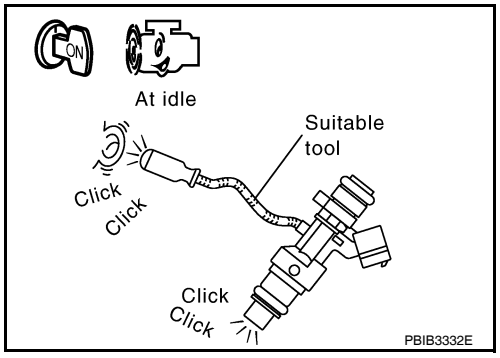
With CONSULT-III

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-III

1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



Is the inspection result normal?

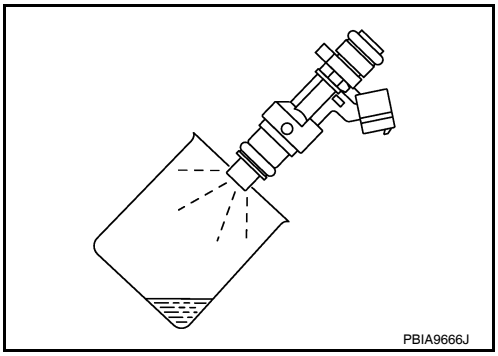
YES >> GO TO 8.
NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-430, "Component Function Check".

8. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all fuel injector harness connectors.
4. Remove fuel tube assembly. Refer to EM-34, "Removal and Installation".
   Keep fuel hose and all fuel injectors connected to fuel tube.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each fuel injector.

7. Crank engine for about 3 seconds.

Fuel should be sprayed evenly for each fuel injector.



Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000004780137

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172	Fuel injection system too rich	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• A/F sensor 1 • Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to EC-33, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Start engine.

Is it difficult to start engine?

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

3.RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.
Crank engine while depressing accelerator pedal.
NOTE:
When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Go to EC-237, "Diagnosis Procedure".
NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

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

Is 1st trip DTC detected?

YES >> Go to EC-237, "Diagnosis Procedure".
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-III

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

3. Maintain the following conditions for at least 10 consecutive minutes.
   Hold the accelerator pedal as steady as possible.

VHCL SPEED SE	50 - 120 km/h (31 - 75 MPH)

CAUTION:
Always drive vehicle at a safe speed.

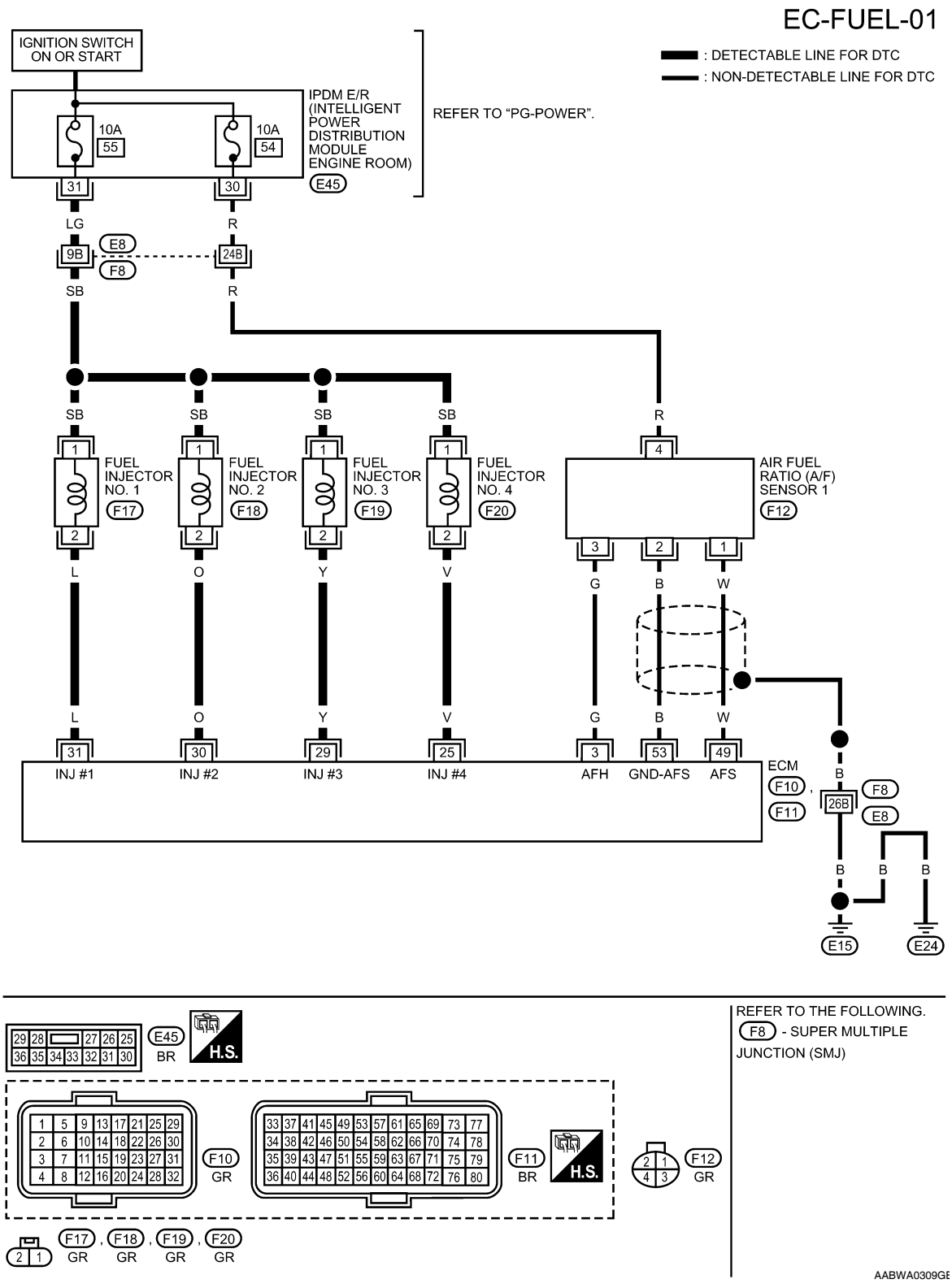
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-237, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780715



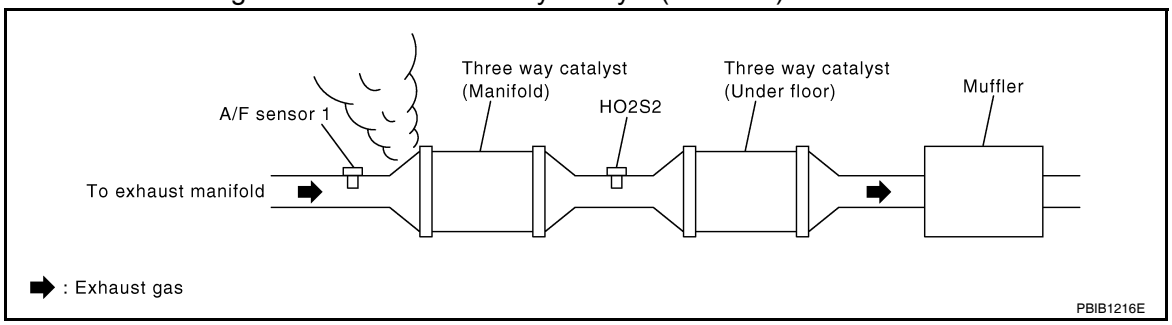
Diagnosis Procedure

INFOID:0000000004780138

1. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.

2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

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

2.CHECK FOR INTAKE AIR LEAK

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

Is intake air leak detected?

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

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

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

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

6. Also check harness for short to power.

Is the inspection result normal?

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

4.CHECK FUEL PRESSURE

1. Check fuel pressure. Refer to EC-498, "Inspection".

Is the inspection result normal?

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

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”.
NO >> Repair or replace

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-III.
3. For specification, refer to EC-504, "Mass Air Flow Sensor".

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in “Service $01” with GST.
3. For specification, refer to EC-504, "Mass Air Flow Sensor".

Is the measurement value within the specification?

YES >> GO TO 7.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-148, "DTC Logic".

7. CHECK FUNCTION OF FUEL INJECTOR

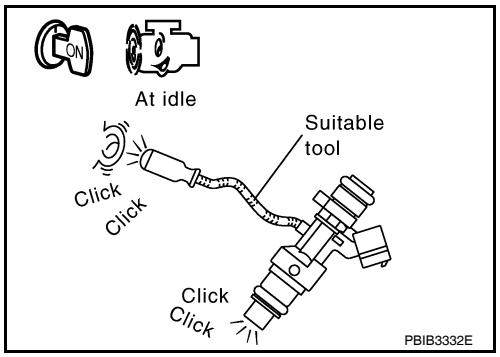
With CONSULT-III

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT-III

1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



Is the inspection result normal?

YES >> GO TO 8.
NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-430, "Component Function Check".

8. CHECK FUEL INJECTOR

1. Remove fuel injector assembly. Refer to EM-34, "Removal and Installation".
   Keep fuel hose and all fuel injectors connected to fuel tube.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all fuel injector harness connectors.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each fuel injectors.
6. Crank engine for about 3 seconds.
   Make sure fuel does not drip from fuel injector.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

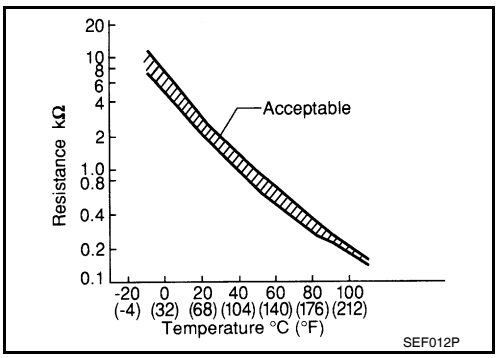
P0181 FTT SENSOR

Description

INFOID:0000000004780139

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

<Reference data>



Fluid temperature [°C (°F)]	Voltage* [V]	Resistance [kΩ]
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminal 43 (Fuel tank temperature sensor) and ground.

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:0000000004780140

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0181	Fuel tank temperature sensor circuit range/performance	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	• Harness or connectors (The sensor circuit is open or shorted) • Fuel tank temperature sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

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

Is 1st trip DTC detected?

YES >> Go to EC-242, "Diagnosis Procedure".
NO >> GO TO 3.

3.CHECK ENGINE COOLANT TEMPERATURE

With CONSULT-III

1. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-III.
2. Check “COOLAN TEMP/S” indication.

With GST

Follow the procedure “With CONSULT-III” above.

Is “COOLAN TEMP/S” indication less than 60°C (140°F)?

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

4.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT-III

1. Cool engine down until “COOLAN TEMP/S” indication is less than 60°C (140°F).
2. Wait at least 10 seconds.
3. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT-III” above.

Is 1st trip DTC detected?

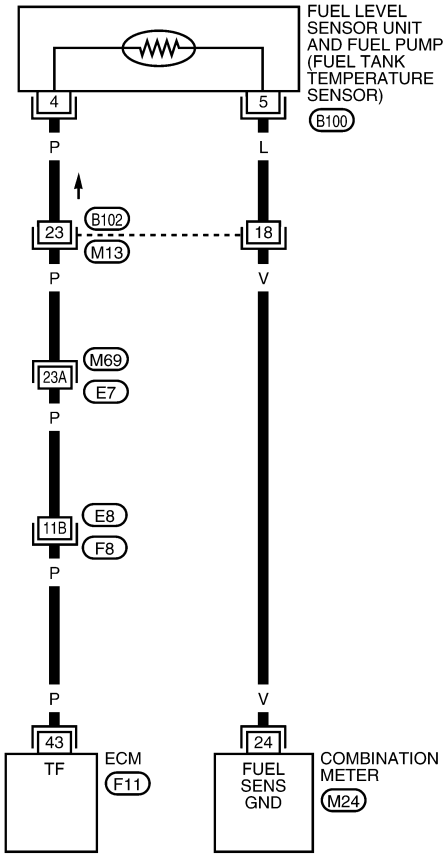
YES >> Go to EC-242, "Diagnosis Procedure".
NO >> INSPECTION END

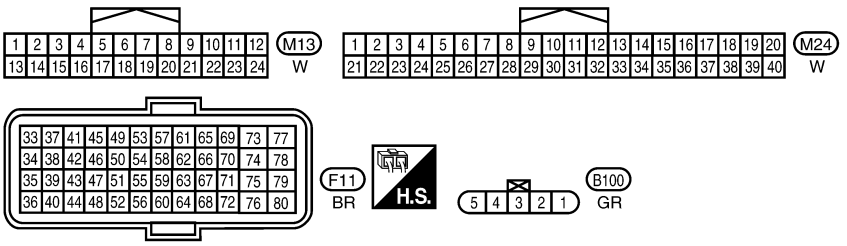
Wiring Diagram

INFOID:0000000004780684

EC-FTTS-01

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





REFER TO THE FOLLOWING.
M69 , F8 - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2636E

Diagnosis Procedure

INFOID:0000000004780141

1. CHECK GROUND CONNECTION

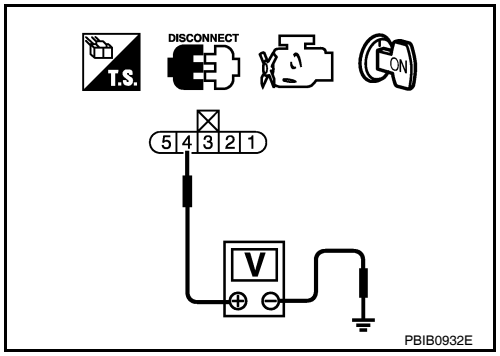
1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

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

2. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Turn ignition switch ON.
4. Check the voltage between “fuel level sensor unit and fuel pump” harness connector and ground.



Fuel level sensor unit and fuel pump		Ground	Voltage
Connector	Terminal		
B100	4	Ground	Approx. 5 V

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B102, M13
- Harness connectors M69, E7
- Harness connectors E8, F8
- Harness for open or short between ECM and “fuel level sensor unit and fuel pump”

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

4. CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect combination meter harness connector.
3. Check the continuity between “fuel level sensor unit and fuel pump” harness connector and combination meter harness connector.

Fuel level sensor unit and fuel pump		Combination meter		Continuity
Connector	Terminal	Connector	Terminal	
B100	5	M24	24	Existed

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

Is the inspection result normal?

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

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B102, M13
- Harness for open or short between “fuel level sensor unit and fuel pump” and combination meter

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

6. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-244, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace “fuel level sensor unit and fuel pump”.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

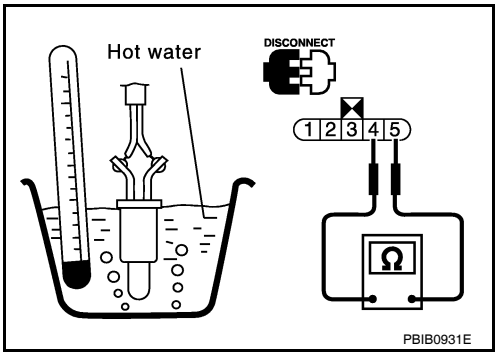
>> INSPECTION END

Component Inspection

INFOID:0000000004780142

1.CHECK FUEL TANK TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Remove fuel level sensor unit.
4. Check resistance between “fuel level sensor unit and fuel pump” terminals by heating with hot water as shown in the figure.



Terminals	Condition		Resistance
4 and 5	Temperature [°C (°F)]	20 (68)	2.3 - 2.7 kΩ
		50 (122)	0.79 - 0.90 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace “fuel level sensor unit and fuel pump”.

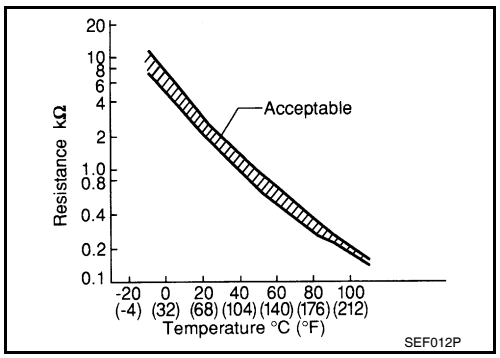
P0182, P0183 FTT SENSOR

Description

INFOID:0000000004780143

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

<Reference data>



Fluid temperature [°C (°F)]	Voltage* [V]	Resistance [kΩ]
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminal 43 (Fuel tank temperature sensor) and ground.

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:0000000004780144

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0182	Fuel tank temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Fuel tank temperature sensor
P0183	Fuel tank 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?

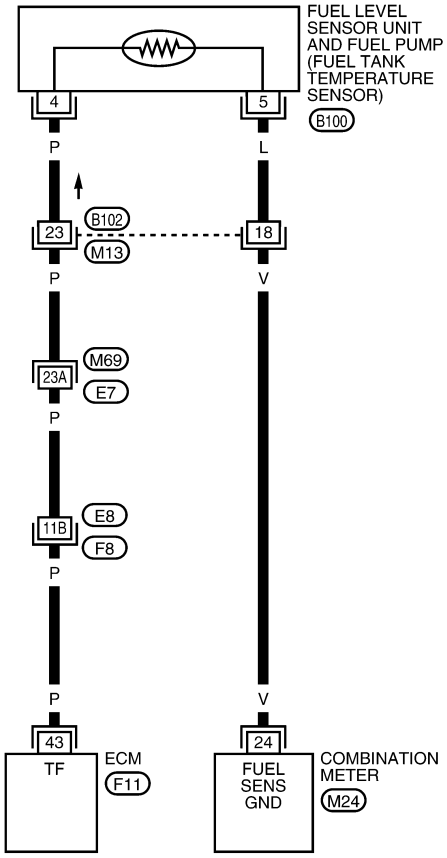
YES >> Go to EC-246, "Diagnosis Procedure".
NO >> INSPECTION END

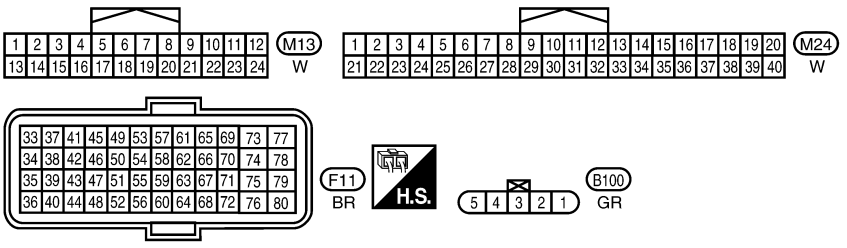
Wiring Diagram

INFOID:0000000004780716

EC-FTTS-01

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





REFER TO THE FOLLOWING.
M69 , F8 - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2636E

Diagnosis Procedure

INFOID:0000000004780145

1. CHECK GROUND CONNECTION

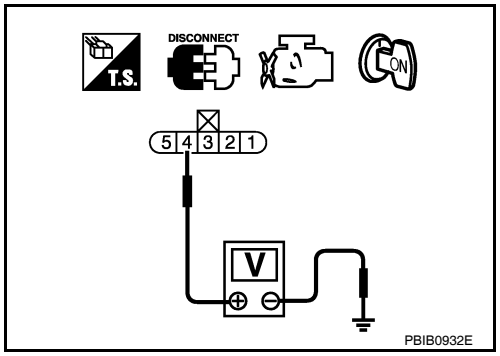
1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

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

2. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Turn ignition switch ON.
4. Check the voltage between “fuel level sensor unit and fuel pump” harness connector and ground.



Fuel level sensor unit and fuel pump		Ground	Voltage
Connector	Terminal		
B100	4	Ground	Approx. 5 V

Is the inspection result normal?

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

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B102, M13
- Harness connectors M69, E7
- Harness connectors E8, F8
- Harness for open or short between ECM and “fuel level sensor unit and fuel pump”

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

4. CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect combination meter harness connector.
3. Check the continuity between “fuel level sensor unit and fuel pump” harness connector and combination meter harness connector.

Fuel level sensor unit and fuel pump		Combination meter		Continuity
Connector	Terminal	Connector	Terminal	
B100	5	M24	24	Existed

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

Is the inspection result normal?

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

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B102, M13
- Harness for open or short between “fuel level sensor unit and fuel pump” and combination meter

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

6. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-248, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace “fuel level sensor unit and fuel pump”.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

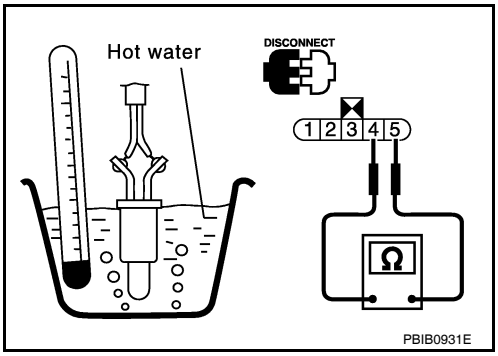
>> INSPECTION END

Component Inspection

INFOID:0000000004780146

1.CHECK FUEL TANK TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Remove fuel level sensor unit.
4. Check resistance between “fuel level sensor unit and fuel pump” terminals by heating with hot water as shown in the figure.



Terminals	Condition		Resistance
4 and 5	Temperature [°C (°F)]	20 (68)	2.3 - 2.7 kΩ
		50 (122)	0.79 - 0.90 kΩ

Is the inspection result normal?

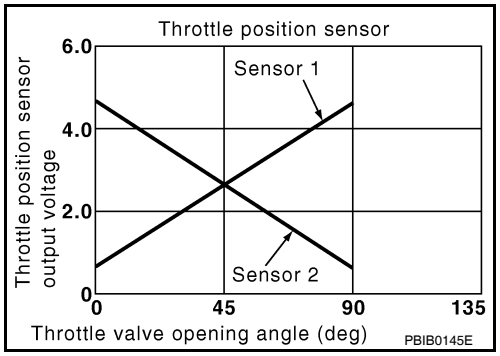
YES >> INSPECTION END
NO >> Replace “fuel level sensor unit and fuel pump”.

P0222, P0223 TP SENSOR

Description

INFOID:0000000004780147

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



DTC Logic

INFOID:0000000004780148

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 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.

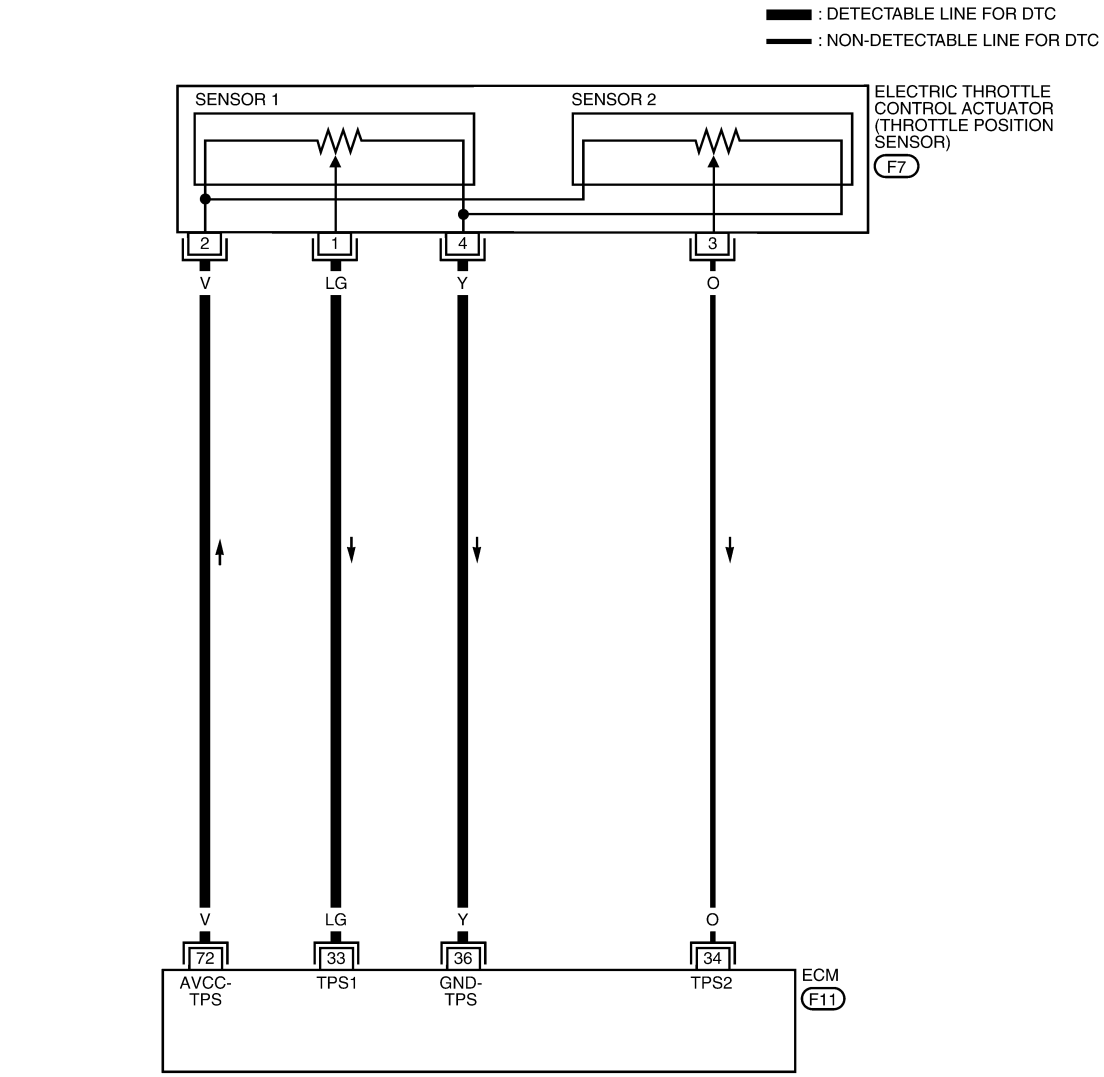
Is DTC detected?

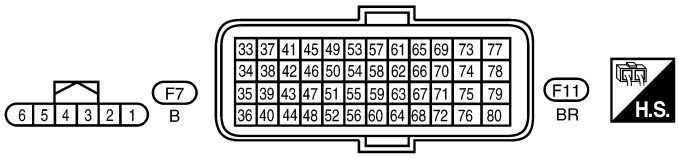
YES >> Go to EC-250, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780688

EC-TPS1-01





BBWA2655E

Diagnosis Procedure

INFOID:0000000004780149

1.CHECK GROUND CONNECTION

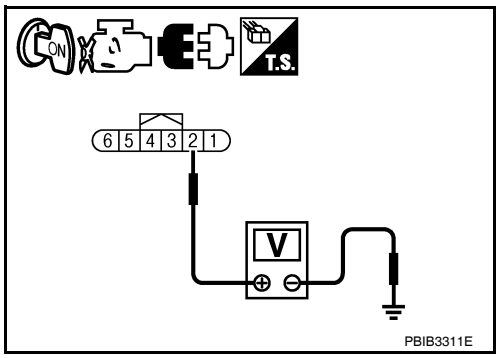
1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

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

2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

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



Electric throttle control actuator		Ground	Voltage
Connector	Terminal		
F7	2	Ground	Approx. 5 V

Is the inspection result normal?

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

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

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	4	F11	36	Existed

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

Is the inspection result normal?

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

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

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	1	F11	33	Existed

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

Is the inspection result normal?

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

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-252, "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. Perform EC-252, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

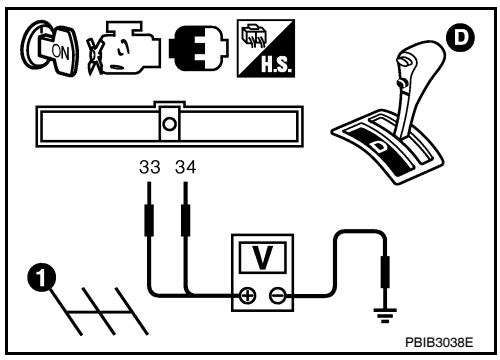
>> INSPECTION END

Component Inspection

INFOID:0000000004780150

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".
4. Turn ignition switch ON.
5. Set selector lever to D (A/T) or 1st (M/T) position.
6. Check the voltage between ECM harness connector and ground.



ECM		Ground	Condition		Voltage
Connector	Terminal				
F11	33 (TP sensor 1 signal)	Ground	Accelerator pedal	Fully released	More than 0.36V
				Fully de-pressed	Less than 4.75V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75V
				Fully de-pressed	More than 0.36V

Is the inspection result normal?

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

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-252, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000004780151

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-32, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

INFOID:0000000004780152

DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the 1st trip , when a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
   If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300	Multiple cylinder misfire detected	Multiple cylinders misfire.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • The fuel injector circuit is open or shorted • Fuel injector • Intake air leak • The ignition signal circuit is open or shorted • Lack of fuel • Signal plate • A/F sensor 1 • Incorrect PCV hose connection
P0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for about 15 minutes.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-254, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

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

2. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
Hold the accelerator pedal as steady as possible.
The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.
CAUTION:
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Base fuel schedule	Base fuel schedule in freeze frame data × (1 ± 0.1)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).
	When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).

The time to driving varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-254, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000004780153

1.CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.
3. Check PCV hose connection.

Is intake air leak detected?

YES >> Discover air leak location and repair.
NO >> GO TO 2.

2.CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 3.
YES-2 >> Without CONSULT-III: GO TO 4.
NO >> Repair or replace it.

3.PERFORM POWER BALANCE TEST

With CONSULT-III

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-III.
3. Make sure that each circuit produces a momentary engine speed drop.

Is the inspection result normal?

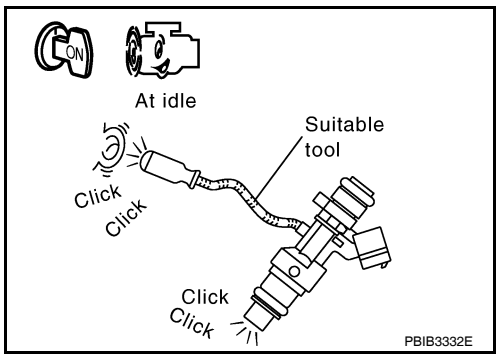
YES >> GO TO 9.
NO >> GO TO 4.

4.CHECK FUNCTION OF FUEL INJECTOR

1. Start engine and let engine idle.

2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



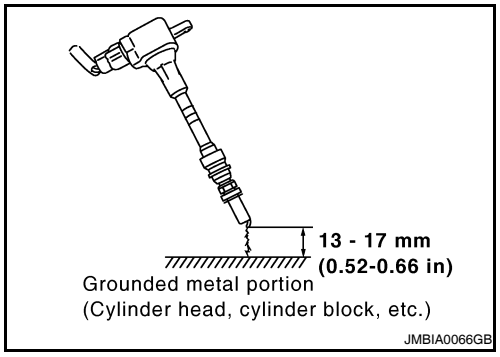
Is the inspection result normal?

YES >> GO TO 5.
NO >> Perform trouble diagnosis for FUEL INJECTOR, refer to EC-432, "Component Inspection".

5. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:
- **During the operation, always stay 0.5 m (19.7 in) away from the spark plug and the ignition coil within. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.**

NOTE:
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 6.

6. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

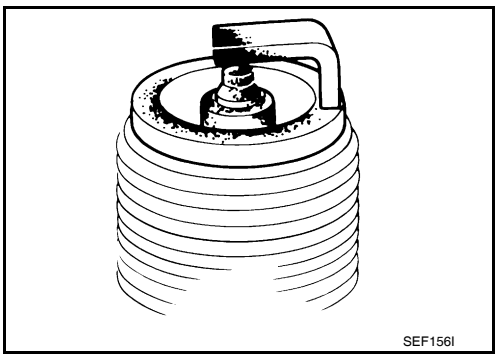
YES >> GO TO 7.
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-439, "Component Function Check".

7. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-117, "Spark Plug".
NO >> Repair or clean spark plug. Then GO TO 8.



8. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-117, "Spark Plug".

9. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-23, "Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

10. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Check fuel pressure. Refer to EC-498, "Inspection".

Is the inspection result normal?

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

11. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”.
NO >> Repair or replace.

12. CHECK IGNITION TIMING

Check the following items. Refer to EC-26, "BASIC INSPECTION : Special Repair Requirement".
For specification, refer to EC-504, "Ignition Timing" .

Is the inspection result normal?

YES >> GO TO 13.
NO >> Follow the EC-26, "BASIC INSPECTION : Special Repair Requirement".

13. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

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

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK A/F SENSOR 1 HEATER

Refer to EC-139, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace A/F sensor 1.

15. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-III.
For specification, refer to EC-504, "Mass Air Flow Sensor".

With GST

Check mass air flow sensor signal in Service $01 with GST.
For specification, refer to EC-504, "Mass Air Flow Sensor".

Is the measurement value within the specification?

YES >> GO TO 16.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-148, "DTC Logic".

16. CHECK SYMPTOM TABLE

Check items on the rough idle symptom in EC-487, "Symptom Table".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair or replace.

17. ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to “How to Erase DTC and 1st Trip DTC” in EC-90, "Diagnosis Description".

>> GO TO 18.

18. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

P0327, P0328 KS

Description

INFOID:0000000004780154

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:0000000004780155

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 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-260, "Diagnosis Procedure".

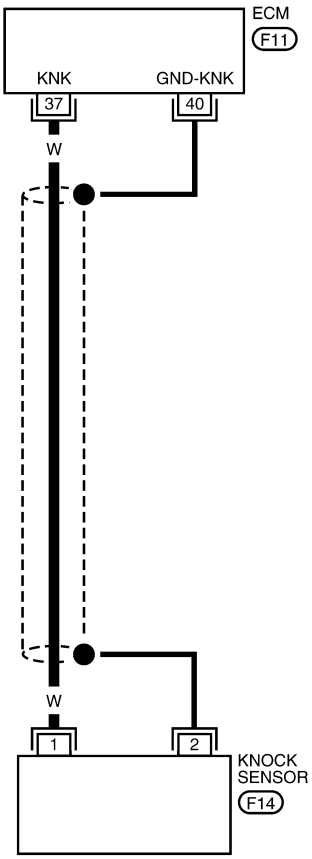
NO >> INSPECTION END

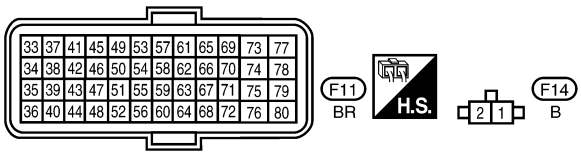
Wiring Diagram

INFOID:0000000004780689

EC-KS-01

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





BBWA2637E

Diagnosis Procedure

INFOID:0000000004780156

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground 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.
2. Disconnect ECM harness connector.
3. Check the continuity between knock sensor harness connector and ECM harness connector.

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

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 KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Knock sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F14	1	F11	37	Existed

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

Is the inspection result normal?

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

4.CHECK KNOCK SENSOR

Refer to EC-261, "Component Inspection".

Is the inspection result normal?

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

5.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

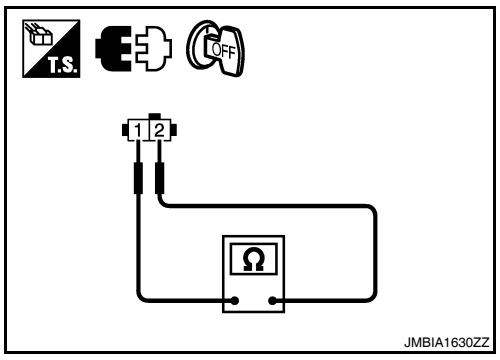
>> INSPECTION END

Component Inspection

INFOID:0000000004780157

1.CHECK KNOCK SENSOR

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

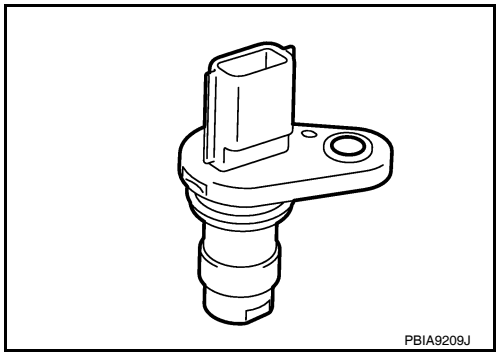
YES >> INSPECTION END
NO >> Replace knock sensor.

P0335 CKP SENSOR (POS)

Description

INFOID:0000000004780158

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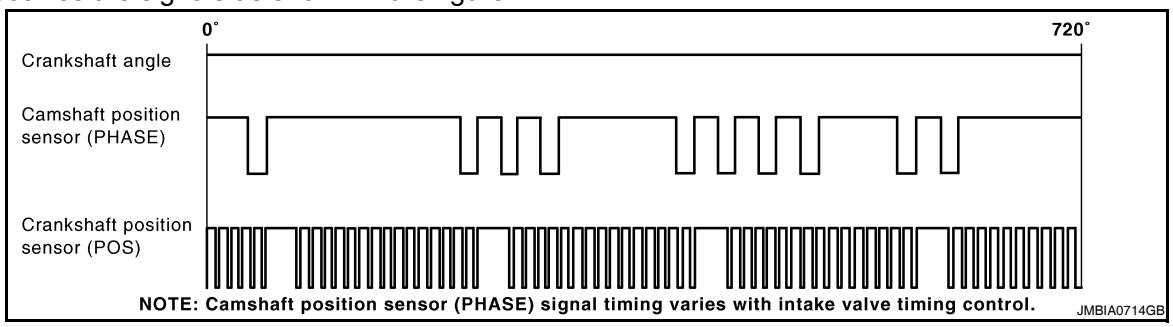
ECM receives the signals as shown in the figure.



DTC Logic

INFOID:0000000004780159

DTC DETECTION LOGIC

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

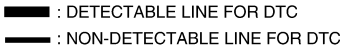
Is 1st trip DTC detected?

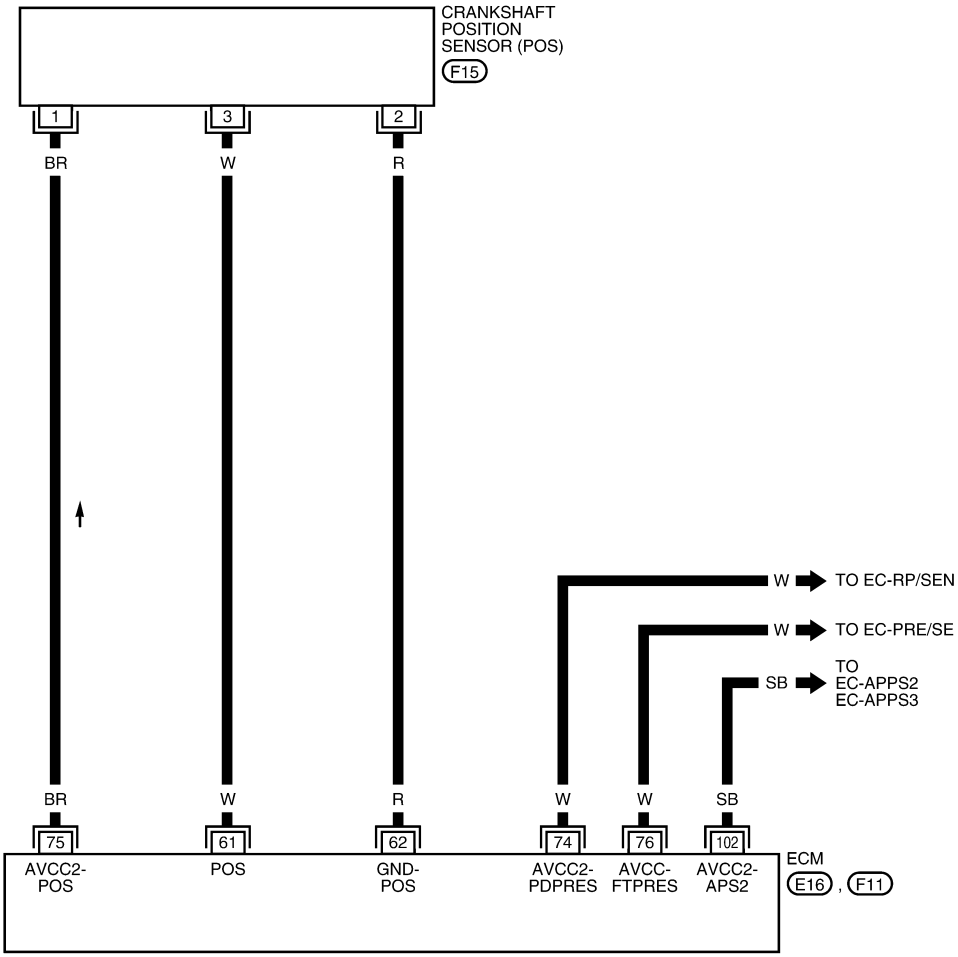
YES >> Go to EC-265, "Diagnosis Procedure".
NO >> INSPECTION END

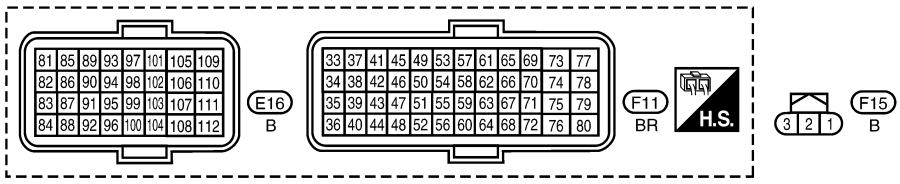
Wiring Diagram

INFOID:0000000004780690

EC-POS-01







BBWA3071E

Diagnosis Procedure

INFOID:0000000004780160

1.CHECK GROUND CONNECTION

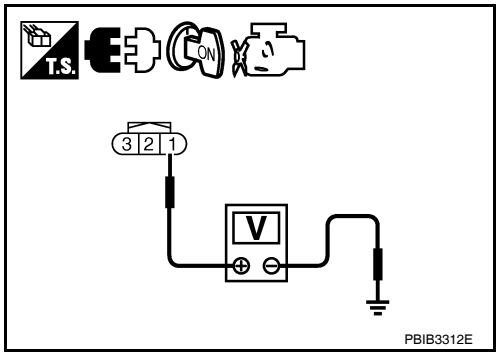
1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

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

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

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



CKP sensor (POS)		Ground	Voltage
Connector	Terminal		
F15	1	Ground	Approx. 5 V

Is the inspection result normal?

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

3.CHECK 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	
F15	1	F11	75	Existed

Is the inspection result normal?

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

4.CHECK CKP SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
	76	EVAP control system pressure sensor	B104	3
E16	102	APP sensor	E12	5

Is the inspection result normal?

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

5.CHECK COMPONENTS

Check the following.
- Refrigerant pressure sensor (Refer to EC-458, "Diagnosis Procedure".)
- EVAP control system pressure sensor (Refer to EC-314, "Component Inspection".)

Is the inspection result normal?

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

6.CHECK APP SENSOR

Refer to EC-402, "Component Inspection".

Is the inspection result normal?

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

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-402, "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	
F15	2	F11	62	Existed

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

Is the inspection result normal?

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

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

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

CKP sensor (POS)		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F15	3	F11	61	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-267, "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 EC-120, "Diagnosis Procedure".

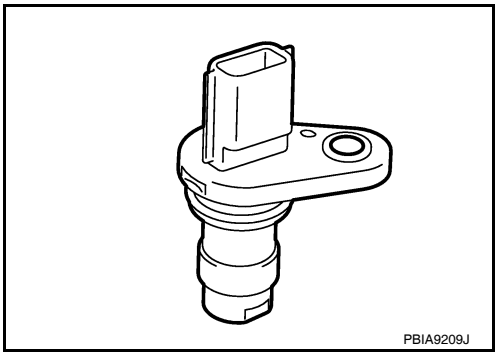
>> INSPECTION END

Component Inspection

INFOID:0000000004780161

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.

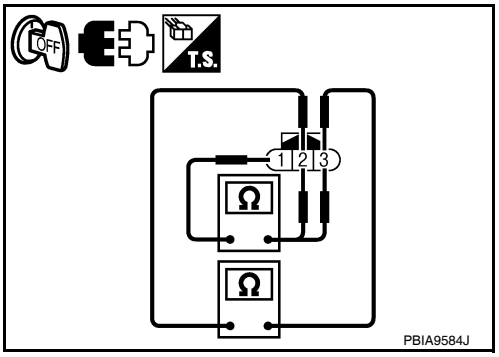

PBIA9209J

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 per the following.



PBIA9584J

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

Is the inspection result normal?

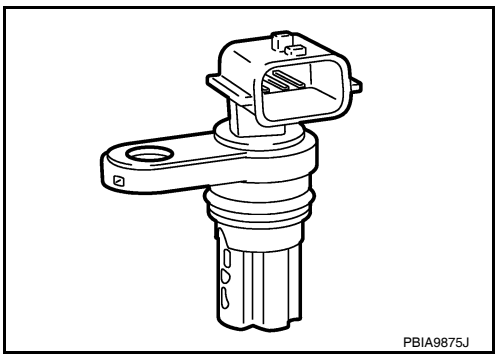
YES >> INSPECTION END
NO >> Replace crankshaft position sensor (POS).

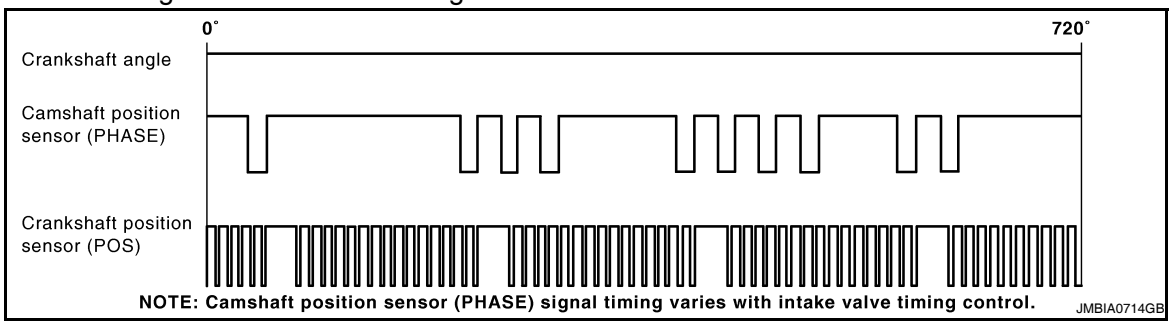
P0340 CMP SENSOR (PHASE)

Description

INFOID:0000000004780162

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:0000000004780163

DTC DETECTION LOGIC

NOTE:
If DTC P0340 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-358, "DTC Logic".

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

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-270, "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.

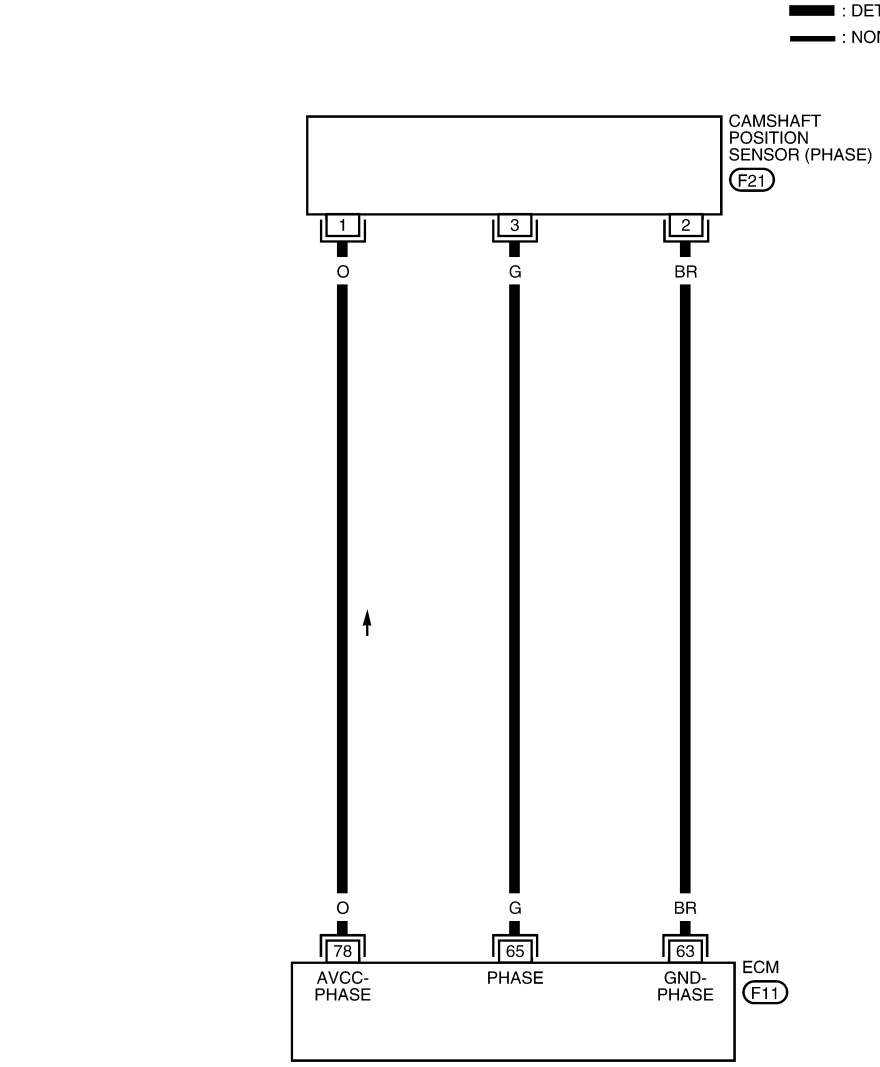
Is 1st trip DTC detected?

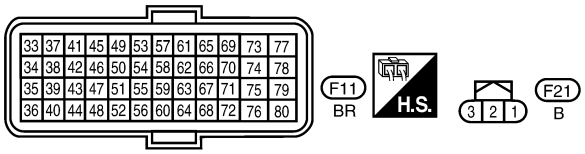
YES >> Go to EC-270, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780691

EC-PHASE-01





BBWA2639E

Diagnosis Procedure

INFOID:0000000004780164

1.CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

YES >> GO TO 2.
NO >> Check starting system (Refer to SC-16, "Trouble Diagnosis with Multitasking Battery Diagnostic Station".).

2.CHECK GROUND CONNECTION

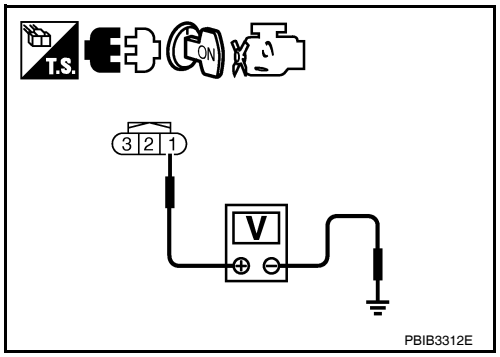
1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

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

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

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



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

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	
F21	2	F11	63	Existed

3. Also check harness for short to power.

Is the inspection result normal?

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

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	
F21	3	F11	65	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)

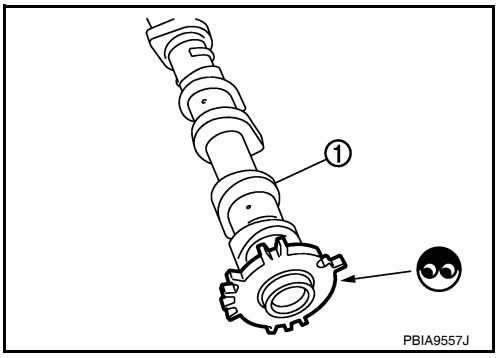
Refer to EC-272, "Component Inspection".

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 EC-120, "Diagnosis Procedure".

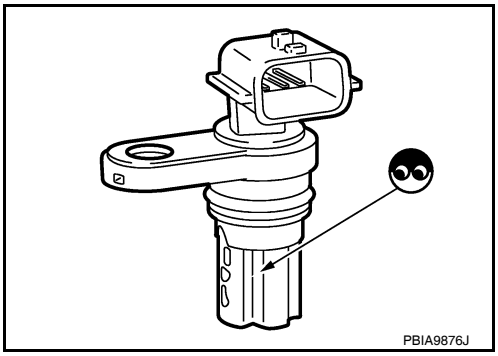
>> INSPECTION END

Component Inspection

INFOID:0000000004780165

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.



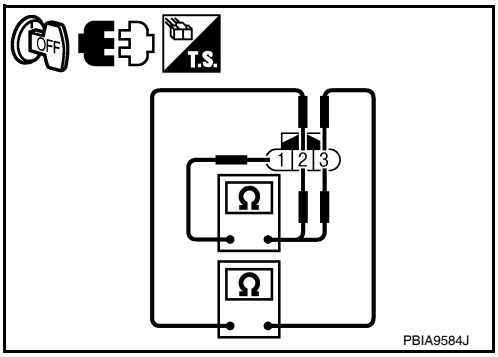
Is the inspection result normal?

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 per the following.

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 camshaft position sensor (PHASE).

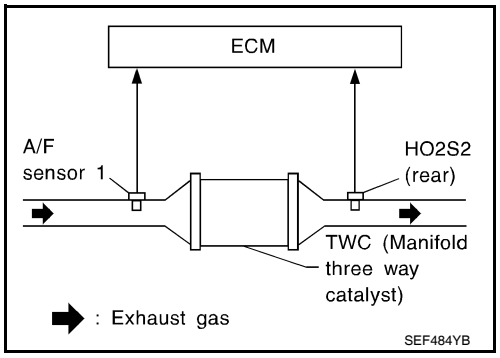
P0420 THREE WAY CATALYST FUNCTION

DTC Logic

INFOID:0000000004780166

DTC DETECTION LOGIC

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2.
A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.
When the frequency ratio of A/F sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420	Catalyst system efficiency below threshold	• Three way catalyst (manifold) does not operate properly. • Three way catalyst (manifold) does not have enough oxygen storage capacity.	• Three way catalyst (manifold) • Exhaust tube • Intake air leaks • Fuel injector • Fuel injector leaks • Spark plug • Improper ignition timing

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 7.

2.PRECONDITIONING

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

TESTING CONDITION:
Do not hold engine speed for more than the specified minutes below.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indication is more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches 70°C (158°F).
7. Open engine hood.
8. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-III.
9. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
10. Check the indication of “CATALYST”.

Which is displayed on CONSULT-III screen?

CMPLT >> GO TO 6.
INCMP >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Wait 5 seconds at idle.
2. Rev engine up to 2,000 to 3,000 rpm and maintain it until “INCMP” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes).

Does the indication change to “CMPLT”?

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

5. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Stop engine and cool it down to less than 70°C (158°F).
2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

6. PERFORM DTC CONFIRMATION PROCEDURE-III

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-275, "Diagnosis Procedure".
NO >> INSPECTION END

7. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-274, "Component Function Check".

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-275, "Diagnosis Procedure".

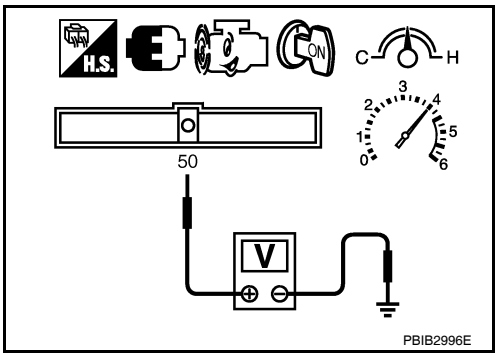
Component Function Check

INFOID:0000000004780167

1. PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

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



ECM		Ground	Condition	Voltage
Connector	Terminal			
F11	50 (HO2S2 signal)	Ground	Keeping engine speed at 2,500 rpm constant under no load	The voltage fluctuation cycle takes more than 5 seconds. 1 cycle: 0.6 - 1.0 → 0 - 0.3 → 0.6 - 1.0

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-275, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004780168

1.CHECK EXHAUST SYSTEM

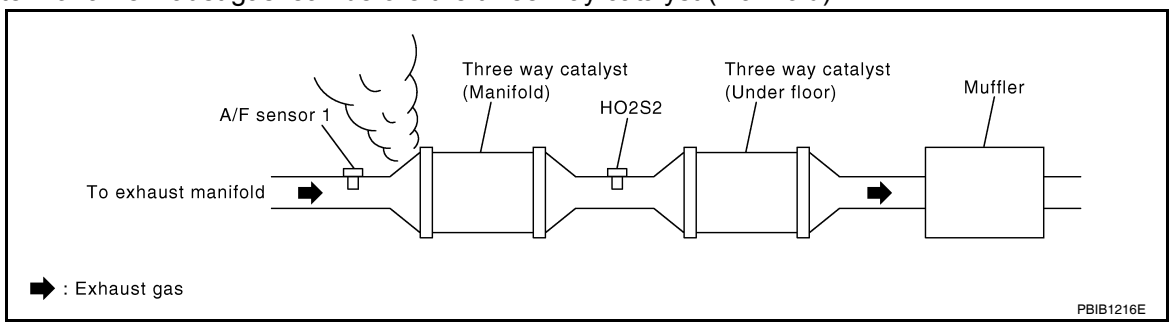
Visually check exhaust tubes and muffler for dent.

Is the inspection result normal?

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

2.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (manifold).



Is exhaust gas leak detected?

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

3.CHECK INTAKE AIR LEAK

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

Is intake air leak detected?

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

4.CHECK IDLE SPEED AND IGNITION TIMING

For procedure, refer to EC-30, "IGNITION TIMING : Special Repair Requirement".
For specification, refer toEC-504, "Idle Speed" and EC-504, "Ignition Timing".

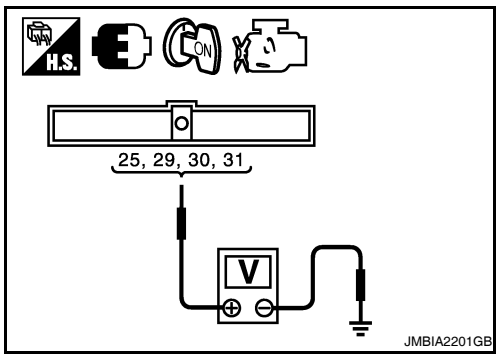
Is the inspection result normal?

YES >> GO TO 5.
NO >> Follow the instruction of EC-26, "BASIC INSPECTION : Special Repair Requirement".

5.CHECK FUEL INJECTOR

1. Stop engine and then turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM		Ground	Voltage
Connector	Terminal		
F10	25	Ground	Battery voltage
	29		
	30		
	31		



Is the inspection result normal?

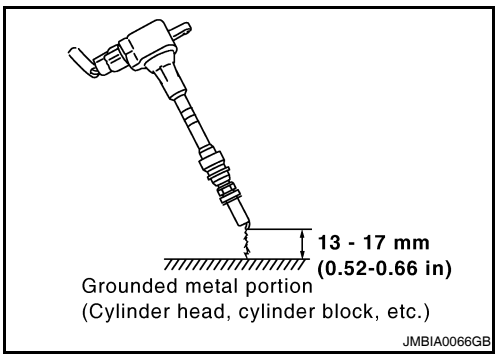
YES >> GO TO 6.
NO >> Perform EC-431, "Diagnosis Procedure".

6.CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **During the operation, always stay 0.5 m (19.7 in) away from the spark plug and the ignition coil. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.**

NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

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

7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

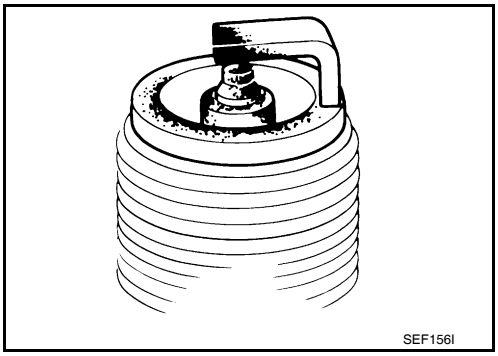
YES >> GO TO 8.
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-441, "Diagnosis Procedure".

8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-117, "Spark Plug".
NO >> Repair or clean spark plug. Then GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-117, "Spark Plug".

10. CHECK FUEL INJECTOR

1. Turn ignition switch OFF. Refer to EM-34, "Removal and Installation".
2. Remove fuel injector assembly.
   Keep fuel hose and all fuel injectors connected to fuel tube.
3. Disconnect all ignition coil harness connectors.
4. Reconnect all fuel injector harness connectors disconnected.
5. Turn ignition switch ON.

Does fuel drip from fuel injector?

YES >> GO TO 11.
NO >> Replace the fuel injector(s) from which fuel is dripping.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace three way catalyst assembly.
NO >> Repair or replace harness or connector

P0441 EVAP CONTROL SYSTEM

DTC Logic

INFOID:0000000004780169

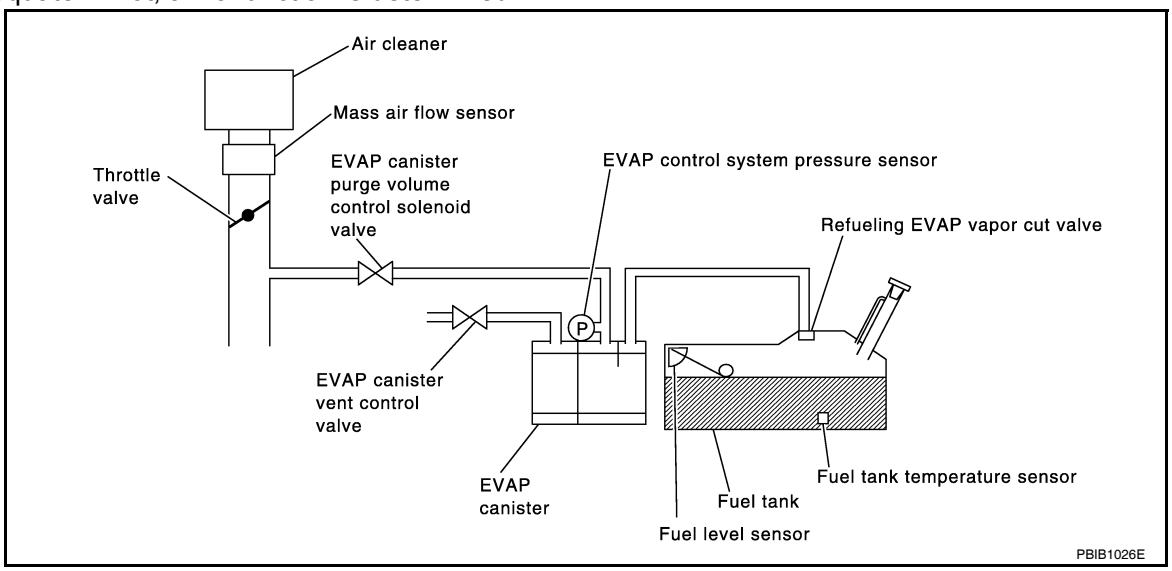
DTC DETECTION LOGIC

NOTE:

If DTC P0441 is displayed with other DTC such as P2122, P2123, P2127, P2128 or P2138, first perform trouble diagnosis for other DTC.

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a malfunction is determined.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0441	EVAP control system incorrect purge flow	EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	• EVAP canister purge volume control solenoid valve stuck closed • EVAP control system pressure sensor and the circuit • Loose, disconnected or improper connection of rubber tube • Blocked rubber tube • Cracked EVAP canister • EVAP canister purge volume control solenoid valve circuit • Accelerator pedal position sensor • Blocked purge port • EVAP canister vent control valve • Drain filter

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

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

2.PRECONDITIONING

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

TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 70 seconds.
4. Select “PURG FLOW P0441” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-III.
5. Touch “START”.

Is COMPLETED displayed on CONSULT-III screen?

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

4. PERFORM DTC CONFIRMATION PROCEDURE-II

When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 35 seconds.)

Selector lever	Suitable position
VHCL SPEED SE	32 - 120 km/h (20 - 75 mph)
ENG SPEED	500 - 3,800 rpm
B/FUEL SCHDL	1.0 - 10.0 msec
COOLAN TEMP/S	More than 0°C (32°F)

CAUTION:
Always drive vehicle at a safe speed.
If “TESTING” is not changed for a long time, retry from step 2.

Is “COMPLETED” displayed on CONSULT-III screen?

YES >> GO TO 5.
NO >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 3.

5. PERFORM DTC CONFIRMATION PROCEDURE-II

Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-280, "Diagnosis Procedure".

6. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-279, "Component Function Check".

NOTE:
Use component function check to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-280, "Diagnosis Procedure".

Component Function Check

INFOID:0000000004780170

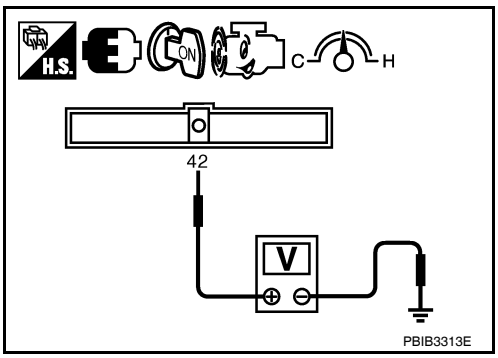
1. PERFORM COMPONENT FUNCTION CHECK

Without CONSULT-III

1. Lift up drive wheels.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and wait at least 70 seconds.

5. Set voltmeter probes to ECM harness connector and ground.

ECM		Ground
Connector	Terminal	
F11	42 (EVAP control system pressure sensor signal)	Ground



6. Check EVAP control system pressure sensor value at idle speed and note it.
7. Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch	ON
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Selector lever	Any position other than P, N or R

8. Verify that EVAP control system pressure sensor value stays 0.1 V less than the value at idle speed (measured at step 6 for at least 1 second.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-280, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004780171

1.CHECK EVAP CANISTER

1. Turn ignition switch OFF.
2. Check EVAP canister for cracks.

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 2.
YES-2 >> Without CONSULT-III: GO TO 3.
NO >> Replace EVAP canister.

2.CHECK PURGE FLOW

With CONSULT-III

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to EC-74, "System Description".
2. Start engine and let it idle.
3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III.
4. Rev engine up to 2,000 rpm.
5. Touch “Qd” and “Qu” on CONSULT-III screen to adjust “PURG VOL C/V” opening and check vacuum existence.

PURG VOL C/V	Vacuum
100%	Existed
0%	Not existed

Is the inspection result normal?

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

3.CHECK PURGE FLOW

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.

3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to EC-74, "System Description".
4. Start engine and let it idle.
   Do not depress accelerator pedal even slightly.
5. Check vacuum gauge indication before 60 seconds passed after starting engine.

Vacuum should not exist.

6. Revving engine up to 2,000rpm after 100 seconds passed after starting engine.

Vacuum should exist.

Is the inspection result normal?

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

4. CHECK EVAP PURGE LINE

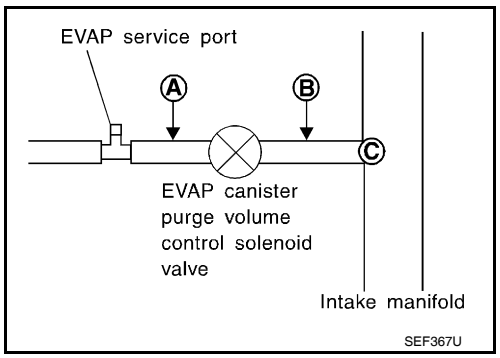
1. Turn ignition switch OFF.
2. Check EVAP purge line for improper connection or disconnection.
   Refer to EC-74, "System Description".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair it.

5. CHECK EVAP PURGE HOSE AND PURGE PORT

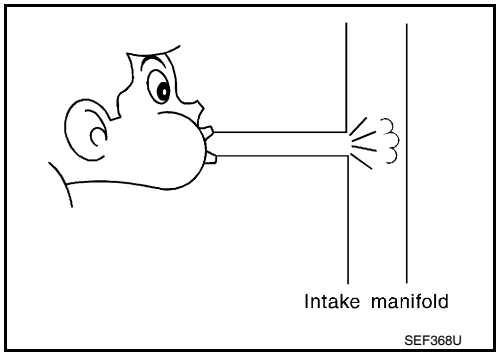
1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.
2. Blow air into each hose and EVAP purge port **C**.



3. Check that air flows freely.

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 6.
YES-2 >> Without CONSULT-III: GO TO 7.
NO >> Repair or clean hoses and/or purge port.



6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

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

Is the inspection result normal?

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

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-296, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace EVAP canister purge volume control solenoid valve.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace EVAP control system pressure sensor.

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to EC-315, "DTC Logic" for DTC P0452, EC-322, "DTC Logic" for DTC P0453.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace EVAP control system pressure sensor.

10. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Clean the rubber tube using an air blower.

11. CHECK DRAIN FILTER

Refer to EC-283, "Component Inspection (Drain filter)".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace drain filter.

12. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-304, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace EVAP canister vent control valve.

13. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to EC-500, "Inspection".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Replace it.

14. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 15.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

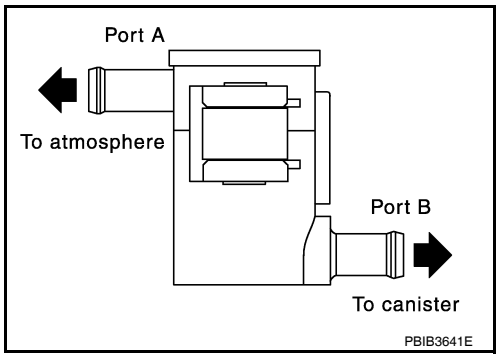
>> INSPECTION END

Component Inspection (Drain filter)

INFOID:0000000004803069

1.CHECK DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace drain filter.

P0442 EVAP CONTROL SYSTEM

DTC Logic

INFOID:0000000004780172

DTC DETECTION LOGIC

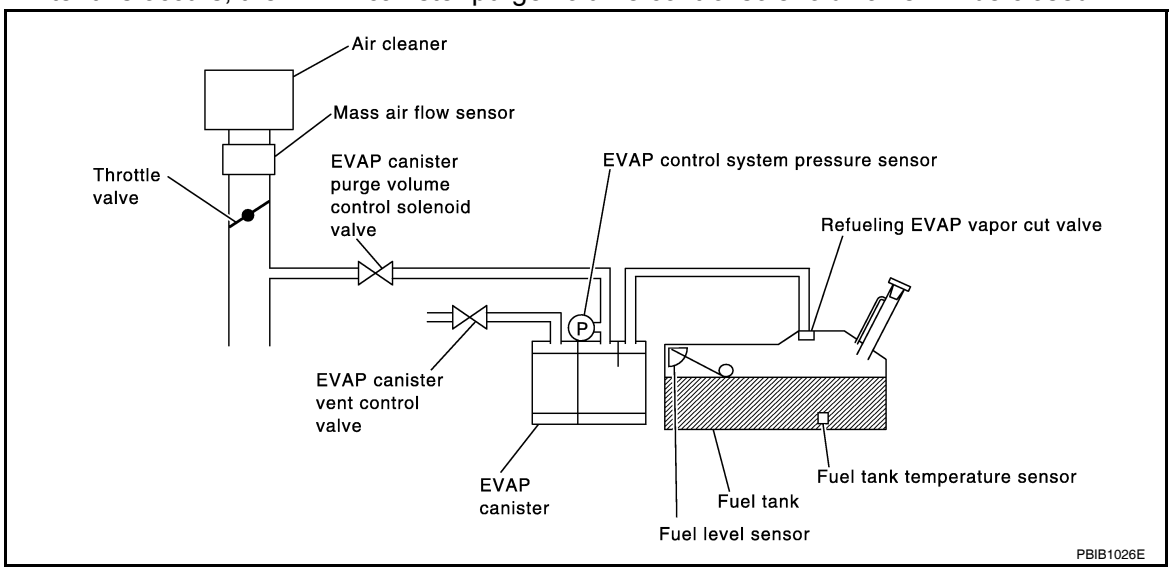
NOTE:

If DTC P0442 is displayed with DTC P0456, first perform the trouble diagnosis for DTC P0456. Refer to **EC-335, "DTC Logic"**.

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.

If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following “Vacuum test” conditions.

The EVAP canister vent control valve is closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve will then be opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0442	EVAP control system small leak detected (negative pressure)	EVAP control system has a leak, EVAP control system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or fails to close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Fuel tank temperature sensor • O-ring of EVAP canister vent control valve is missing or damaged • EVAP canister is saturated with water • EVAP control system pressure sensor • Fuel level sensor and the circuit • Refueling EVAP vapor cut valve • ORVR system leaks • Drain filter

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**

- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**

NOTE:

Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.

Do you have CONSULT-III?

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

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
4. Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 30°C (32 - 86°F)
5. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
   Follow the instruction displayed.
   NOTE:
   If the engine speed cannot be maintained within the range displayed on the CONSULT-III screen, go to EC-26, "BASIC INSPECTION : Special Repair Requirement".

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> Go to EC-285, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

With GST

NOTE:

Be sure to read the explanation of DRIVING PATTERN in EC-478, "How to Set SRT Code" before driving vehicle.

1. Start engine.
2. Drive vehicle according to DRIVING PATTERN.
3. Stop vehicle.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Select Service $07 with GST.

Is 1st trip DTC displayed?

YES-1 >> P0441: Go to EC-280, "Diagnosis Procedure".
YES-2 >> P0442: Go to EC-285, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000004780173

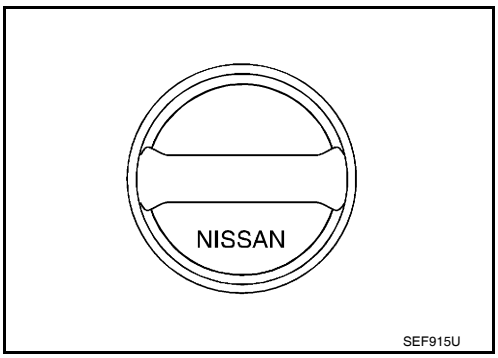
1.CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.

2. Check for genuine NISSAN fuel filler cap design.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace with genuine NISSAN fuel filler cap.



2.CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Then retighten until ratcheting sound is heard.

3.CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

Is the inspection result normal?

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

4.CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-289, "Component Inspection (Fuel filler cap)".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace fuel filler cap with a genuine one.

5.CHECK FOR EVAP LEAK

Refer to EC-500, "Inspection".

Is there any leak in EVAP line?

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

6.CHECK DRAIN FILTER

Refer to EC-289, "Component Inspection (Drain filter)".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace drain filter.

7.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.
- EVAP canister vent control valve is installed properly.
  Refer to EC-502, "Exploded View".
- EVAP canister vent control valve.
  Refer to EC-304, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace EVAP canister vent control valve and O-ring.

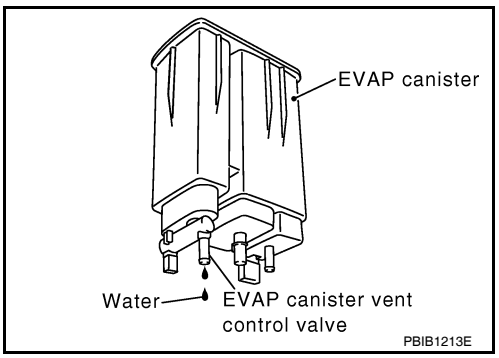
8.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

2. Does water drain from the EVAP canister?

Does water drain from the EVAP canister?

YES >> GO TO 9.
NO-1 >> With CONSULT-III: GO TO 11.
NO-2 >> Without CONSULT-III: GO TO 12.



9. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 11.
YES-2 >> Without CONSULT-III: GO TO 12.
NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-III screen to increase “PURG VOL C/V” opening to 100%.
5. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

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

12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

Is the inspection result normal?

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

13. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-74, "System Description".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair or reconnect the hose.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-296, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace EVAP canister purge volume control solenoid valve.

15. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-244, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace fuel level sensor unit.

16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-312, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Replace EVAP control system pressure sensor.

17. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to EC-74, "System Description".

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair or reconnect the hose.

18. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 19.

19. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-450, "Description".

Is the inspection result normal?

YES >> GO TO 20.
NO >> Repair or replace hoses and tubes.

20. CHECK RECIRCULATION LINE

Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 21.
NO >> Repair or replace hose, tube or fuel filler tube.

21. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-453, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> GO TO 22.
NO >> Replace refueling EVAP vapor cut valve with fuel tank.

22. CHECK FUEL LEVEL SENSOR

Refer to DI-16, "Fuel Level Sensor Signal Inspection".

Is the inspection result normal?

YES >> GO TO 23.

NO >> Replace fuel level sensor unit.

23. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

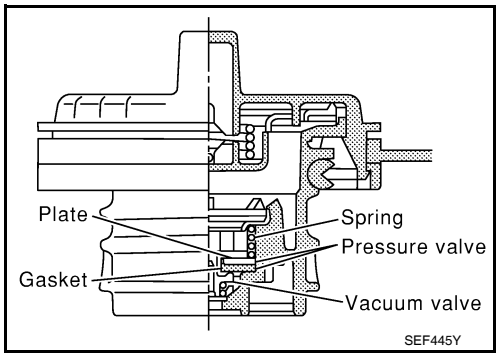
>> INSPECTION END

Component Inspection (Fuel filler cap)

INFOID:0000000004803116

1. CHECK FUEL FILLER CAP

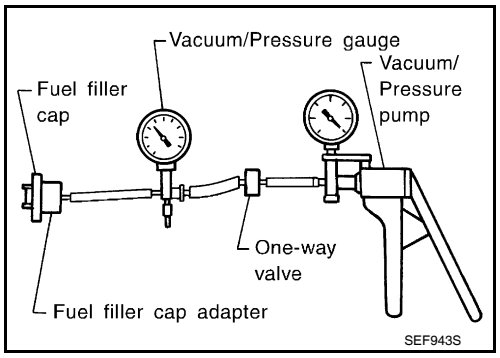
1. Turn ignition switch OFF.
2. Remove fuel filler cap.
3. Wipe clean valve housing.



4. Install fuel filler cap adapter (commercial service tool) to fuel filler cap.
5. Check valve opening pressure and vacuum.

Pressure: **15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)**

Vacuum: **−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)**



Is the inspection result normal?

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

2. REPLACE FUEL FILLER CAP

Replace fuel filler cap.

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.

>> INSPECTION END

Component Inspection (Drain filter)

INFOID:0000000004803095

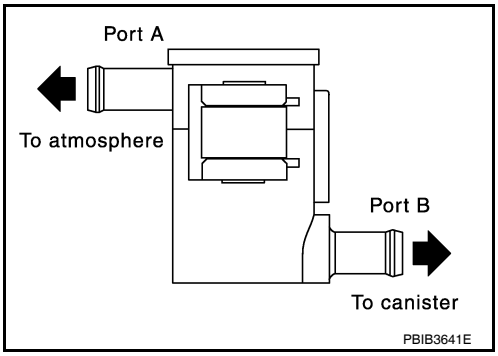
1. CHECK DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.

4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace drain filter.

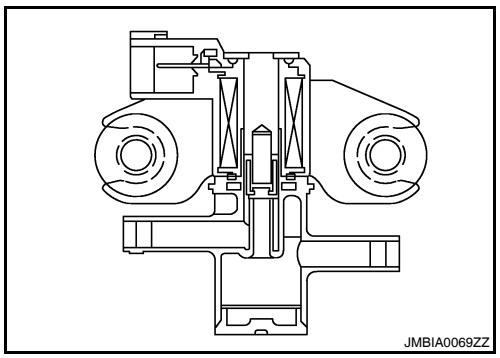


P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:0000000004780175

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:0000000004780176

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0443	EVAP canister purge volume control solenoid valve	A	The canister purge flow is detected during the vehicle is stopped while the engine is running, even when EVAP canister purge volume control solenoid valve is completely closed.	• EVAP control system pressure sensor • EVAP canister purge volume control solenoid valve (The valve is stuck open.) • EVAP canister vent control valve • EVAP canister • Hoses (Hoses are connected incorrectly or clogged.)
		B	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

- **Perform DTC CONFIRMATION PROCEDURE when the fuel is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 5 to 60°C (41 to 140°F).**
- **Cool the vehicle so that engine coolant temperature becomes same level as ambient temperature.**

Do you have CONSULT-III

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

2.PERFORM DTC CONFIRMATION PROCEDURE A

With CONSULT-III

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Check that the following condition are met.
   FUEL T/TMP SE: 0 - 35°C (32 - 95°F)
4. Start engine and wait at least 60 seconds.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-293, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE B

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “PURG VOL CN/V P1444” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-III.
5. Touch “START”.
6. Start engine and let it idle until “TESTING” on CONSULT-III changes to “COMPLETED”. (It will take approximately 10 seconds.)
   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7. Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT-III?

OK >> INSPECTION END
NG >> Go to EC-293, "Diagnosis Procedure".

4. PERFORM DTC CONFIRMATION PROCEDURE A

With GST

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

ECM		Ground	Voltage (V)
Connector	Terminal		
F11	43 (Fuel tank temperature sensor signal)	Ground	3.1 - 4.0

3. Start engine and wait at least 60 seconds.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-293, "Diagnosis Procedure".
NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE

With GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 20 seconds.
4. Check 1st trip DTC.

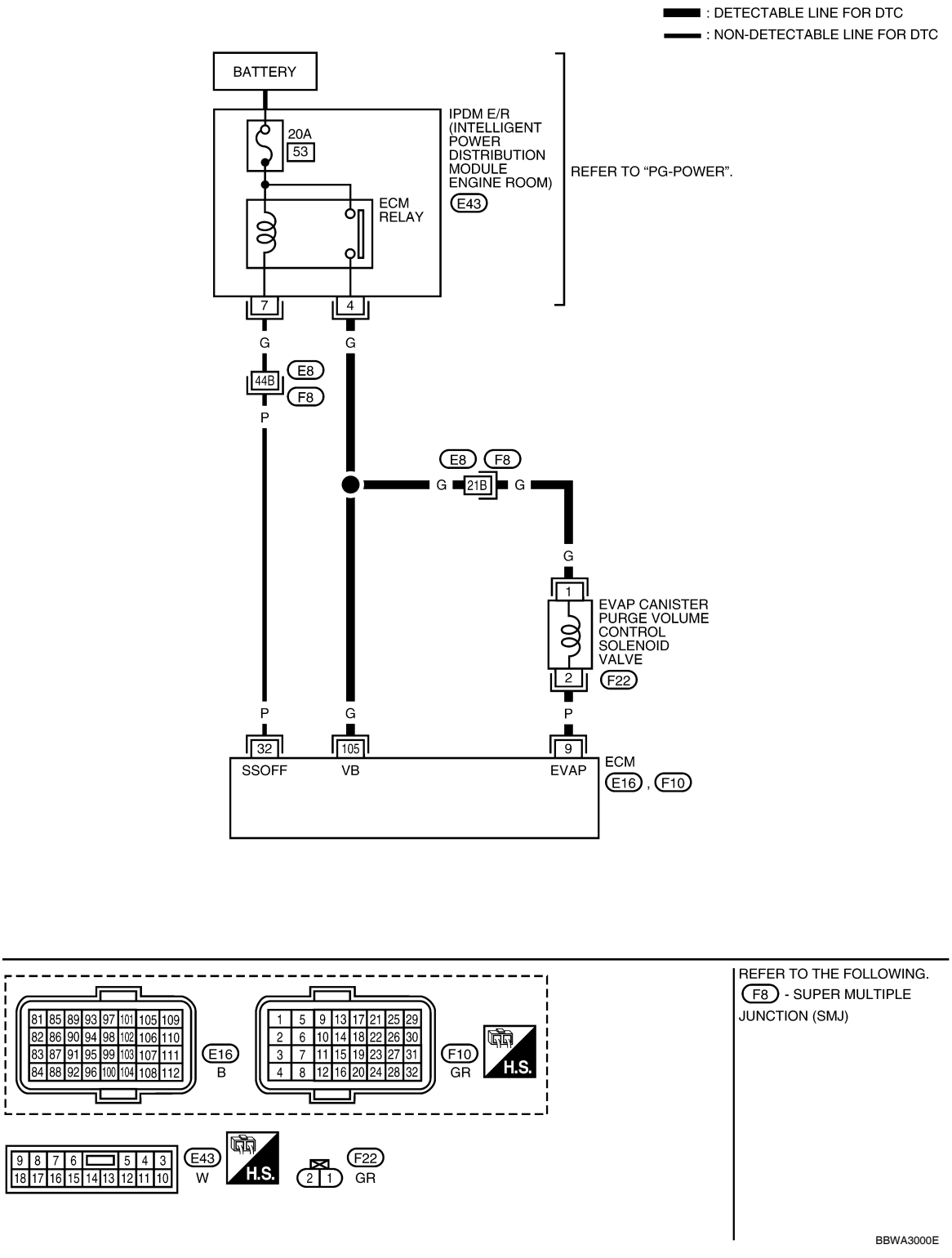
Is 1st trip DTC detected?

YES >> Go to EC-293, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780686

EC-PGC/V-01



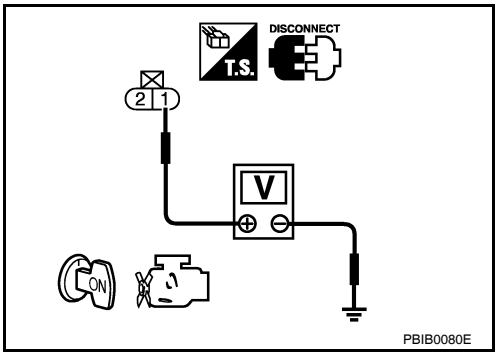
Diagnosis Procedure

INFOID:0000000004780177

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.

4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.



EVAP canister purge volume control solenoid valve		Ground	Voltage
Connector	Terminal		
F22	1	Ground	Battery voltage

Is the inspection result normal?

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

2. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- IPDM E/R harness connector E43
- 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	
F22	2	F10	9	Existed

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

Is the inspection result normal?

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

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace EVAP control system pressure sensor.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-314, "Component Inspection".

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 6.
YES-2 >> Without CONSULT-III: GO TO 7.
NO >> Replace EVAP control system pressure sensor.

6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

1. Turn ignition switch OFF.

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

Is the inspection result normal?

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

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-296, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace EVAP canister purge volume control solenoid valve.

8. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Clean the rubber tube using an air blower.

9. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-304, "Component Inspection".

Is the inspection result normal?

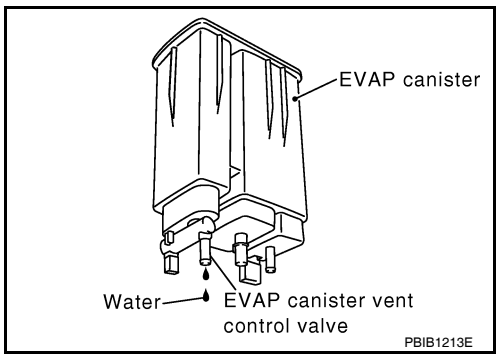
YES >> GO TO 10.
NO >> Replace EVAP canister vent control valve.

10. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 11.
NO >> GO TO 13.



11. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

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

12. DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

13. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

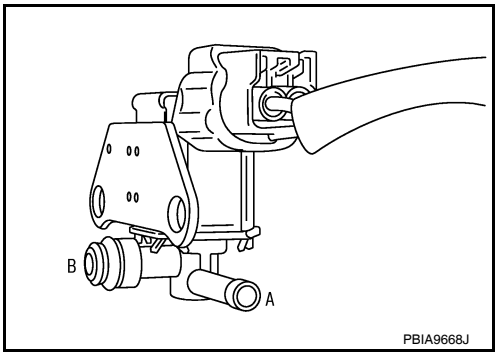
Component Inspection

INFOID:0000000004780178

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

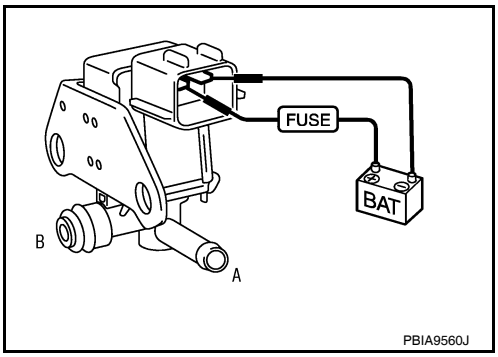
1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Turn ignition switch ON.
5. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III.
6. Touch “Qd” and “Qu” on CONSULT-III screen to adjust “PURG VOL C/V” opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed

Without CONSULT-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

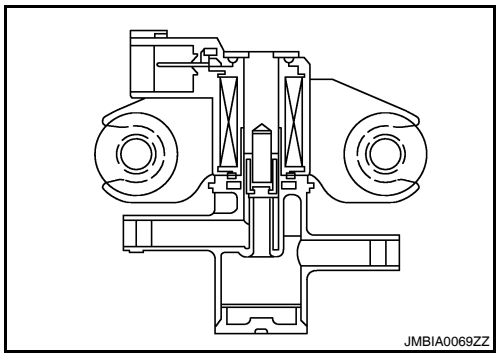
NO >> Replace EVAP canister purge volume control solenoid valve

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:0000000004780179

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:0000000004780180

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	• Harness or connectors (The solenoid valve circuit is open or shorted.) • EVAP canister purge volume control solenoid valve
P0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	• Harness or connectors (The solenoid valve circuit is shorted.) • EVAP canister purge volume control solenoid valve

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

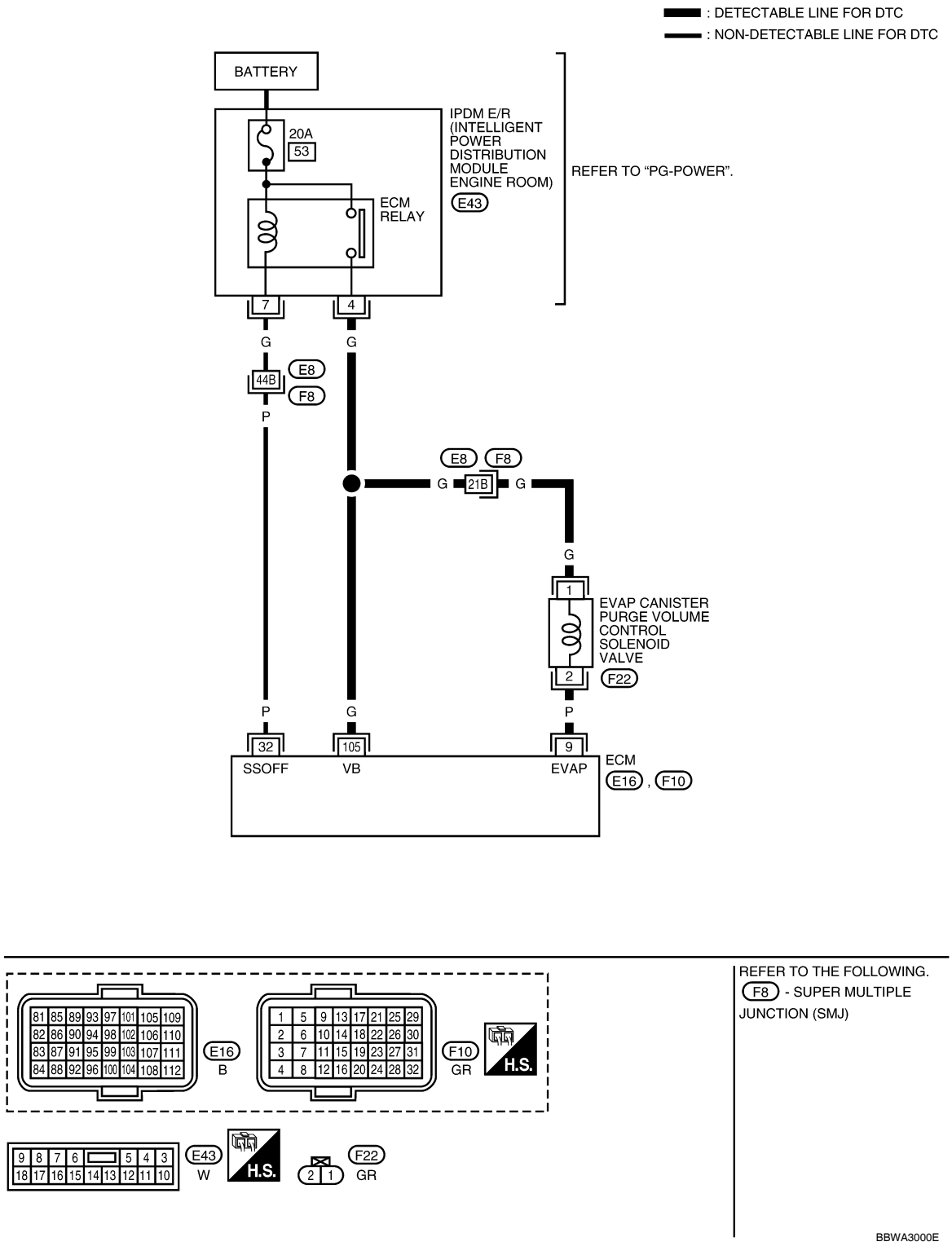
YES >> Go to EC-298, "Diagnosis Procedure".

NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780719

EC-PGC/V-01



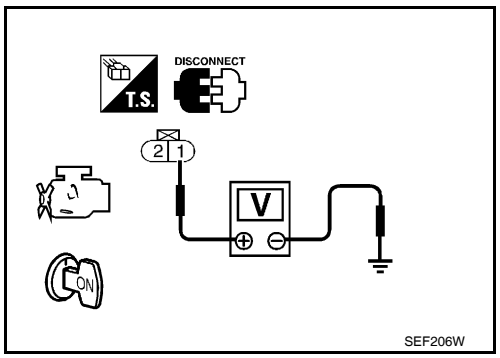
Diagnosis Procedure

INFOID:0000000004780181

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.

4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.



EVAP canister purge volume control solenoid valve		Ground	Voltage
Connector	Terminal		
F22	1	Ground	Battery voltage

Is the inspection result normal?

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

2. DETECT MALFUNCTIONING PART

Check the following.
- IPDM E/R harness connector E43
- Harness connectors E8, F8
- 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	
F22	2	F10	9	Existed

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

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 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-300, "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 EC-120, "Diagnosis Procedure".

>> INSPECTION END

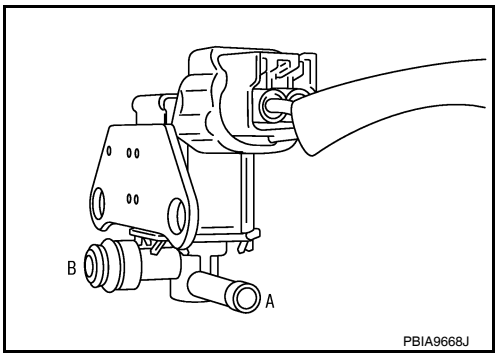
Component Inspection

INFOID:0000000004780182

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

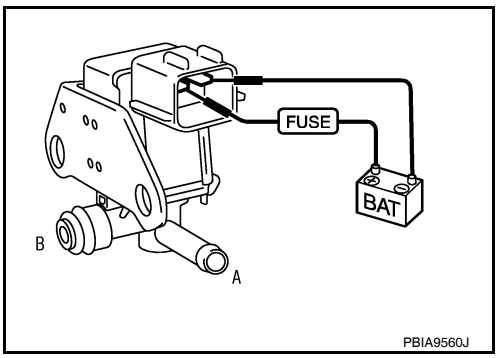
1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Turn ignition switch ON.
5. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III.
6. Touch “Qd” and “Qu” on CONSULT-III screen to adjust “PURG VOL C/V” opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.



Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed

Without CONSULT-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?

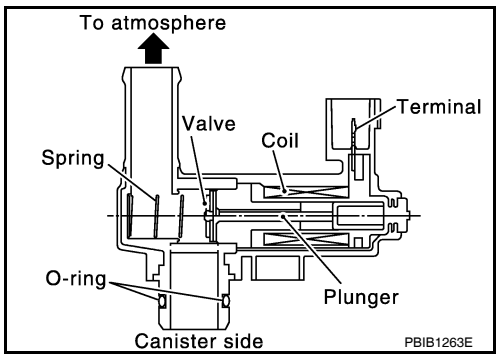
YES >> INSPECTION END
NO >> Replace EVAP canister purge volume control solenoid valve

P0447 EVAP CANISTER VENT CONTROL VALVE

Description

INFOID:0000000004780183

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows “EVAP Control System” diagnosis.



DTC Logic

INFOID:0000000004780184

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0447	EVAP canister vent control valve circuit open	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	• Harness or connectors (The valve circuit is open or shorted.) • EVAP canister vent control valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

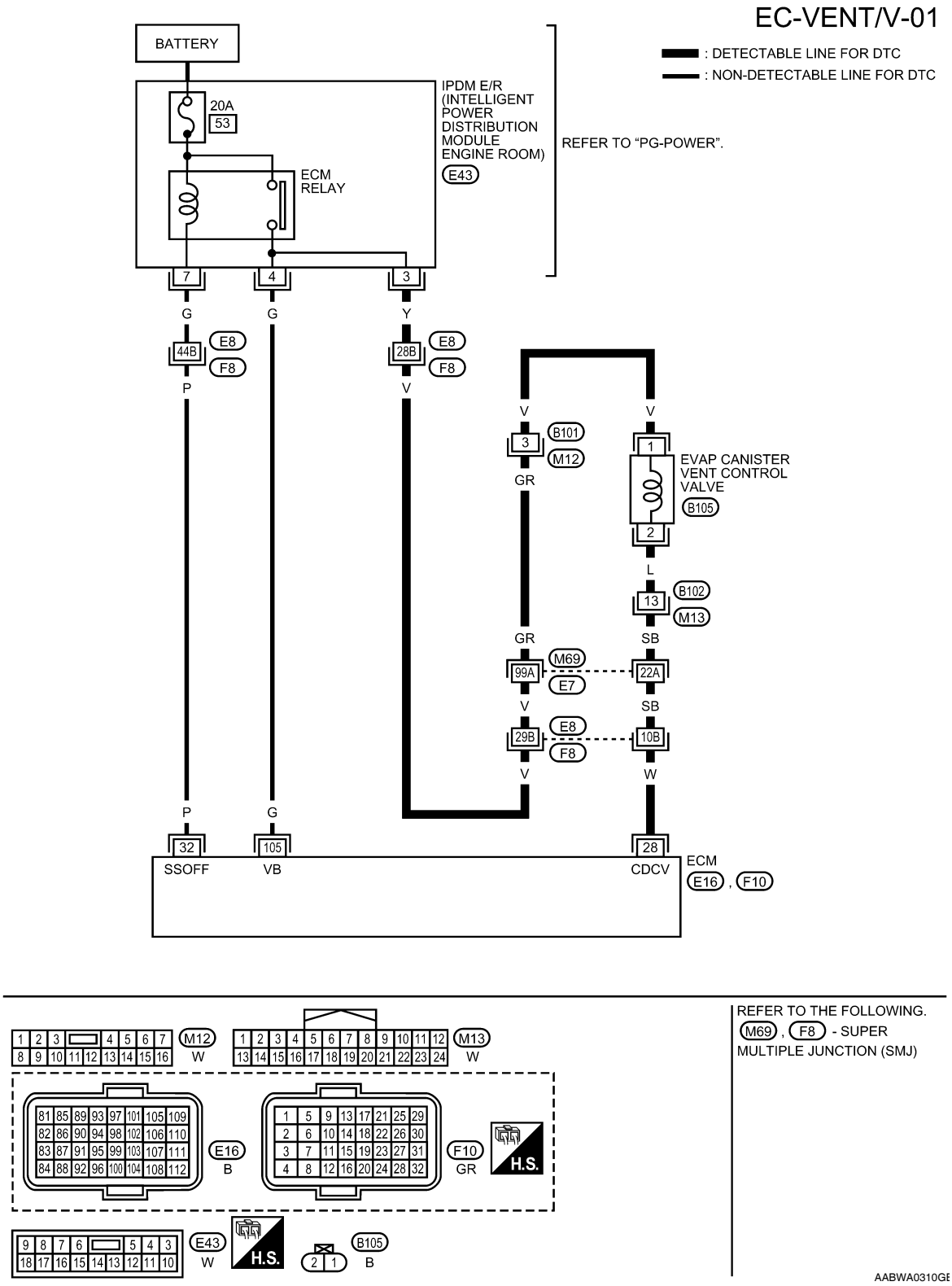
1. Start engine and wait at least 8 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-302, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780687



Diagnosis Procedure

INFOID:0000000004780185

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

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

2. CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

With CONSULT-III

1. Turn ignition switch OFF and then turn ON.
2. Select “VENT CONTROL/V” in “ACTIVE TEST” mode with CONSULT-III.
3. Touch “ON/OFF” on CONSULT-III screen.
4. Check for operating sound of the valve.

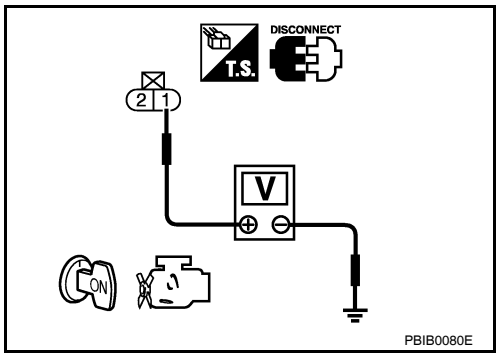
Clicking sound should be heard.

Is the inspection result normal?

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

3. CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister vent control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister vent control valve harness connector and ground.



EVAP canister vent control valve		Ground	Voltage
Connector	Terminal		
B105	1	Ground	Battery voltage

Is the inspection result normal?

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

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors E7, M69
- Harness connectors M12, B101
- 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.

5. 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	
B105	2	E16	28	Existed

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

Is the inspection result normal?

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

6. DETECT MALFUNCTIONING PART

Check the following.
- Junction block connector F8, E8

- Harness connectors E7, M69
- Harness connectors M13, B102
- Harness for open or short between EVAP canister vent control valve and ECM

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

7.CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Clean the rubber tube using an air blower.

8.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-304, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace EVAP canister vent control valve.

9.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

Component Inspection

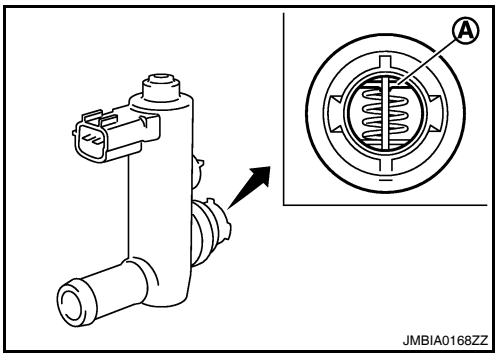
INFOID:0000000004780186

1.CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Turn ignition switch OFF.
2. Remove EVAP canister vent control valve from EVAP canister.
3. Check portion (A) of EVAP canister vent control valve for being rusted.

Is it rusted?

YES >> Replace EVAP canister vent control valve.
NO >> GO TO 2.



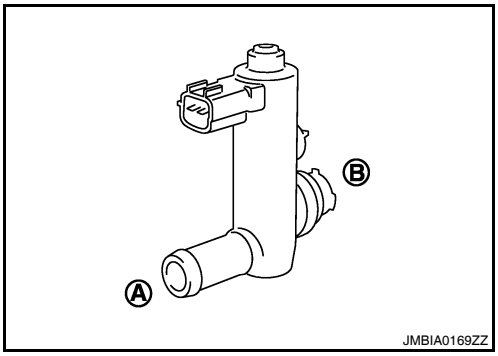
2.CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-III

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time.
   Make sure new O-ring is installed properly.

VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.



Without CONSULT-III

Check air passage continuity and operation delay time under the following conditions.
Make sure new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

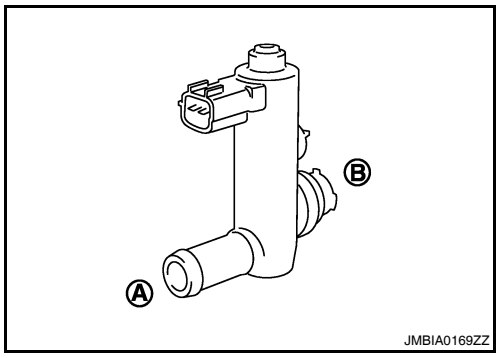
Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace EVAP canister vent control valve.

3. CHECK EVAP CANISTER VENT CONTROL VALVE-III

With CONSULT-III

1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
2. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
3. Check air passage continuity and operation delay time.
   Make sure new O-ring is installed properly.



VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT-III

1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
2. Check air passage continuity and operation delay time under the following conditions.
   Make sure new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

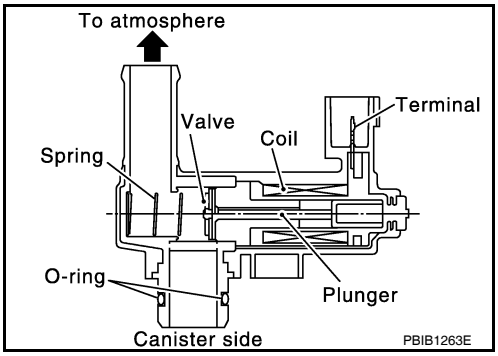
YES >> INSPECTION END
NO >> Replace EVAP canister vent control valve.

P0448 EVAP CANISTER VENT CONTROL VALVE

Description

INFOID:0000000004780187

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows “EVAP Control System” diagnosis.



DTC Logic

INFOID:0000000004780188

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0448	EVAP canister vent control valve close	EVAP canister vent control valve remains closed under specified driving conditions.	• EVAP canister vent control valve • EVAP control system pressure sensor and the circuit • Blocked rubber tube to EVAP canister vent control valve • EVAP canister is saturated with water

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
4. Start engine and let it idle for at least 1 minute.
5. Repeat next procedures three times.

- Increase the engine speed up to 3,000 to 3,500 rpm and keep it for 2 minutes and 50 seconds to 3 minutes.

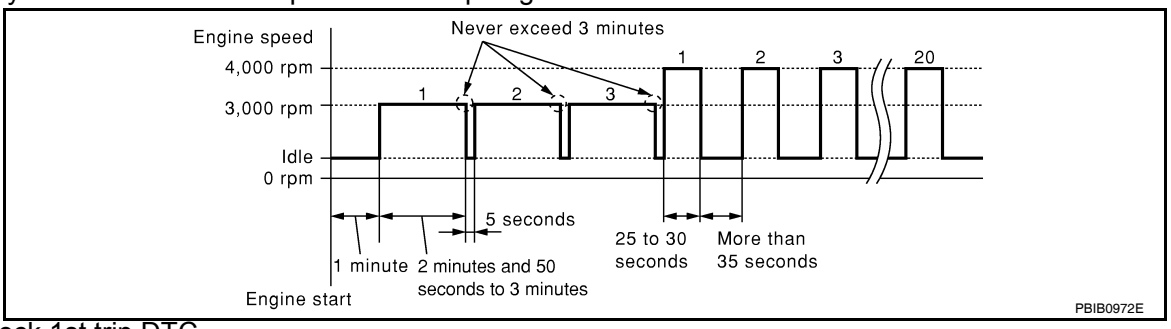
Never exceed 3 minutes.

- Fully released accelerator pedal and keep engine idle for about 5 seconds.

6. Repeat next procedure 20 times.

- Quickly increase the engine speed up to 4,000 to 4,500 rpm or more and keep it for 25 to 30 seconds.

- Fully released accelerator pedal and keep engine idle for at least 35 seconds.



7. Check 1st trip DTC.

With GST

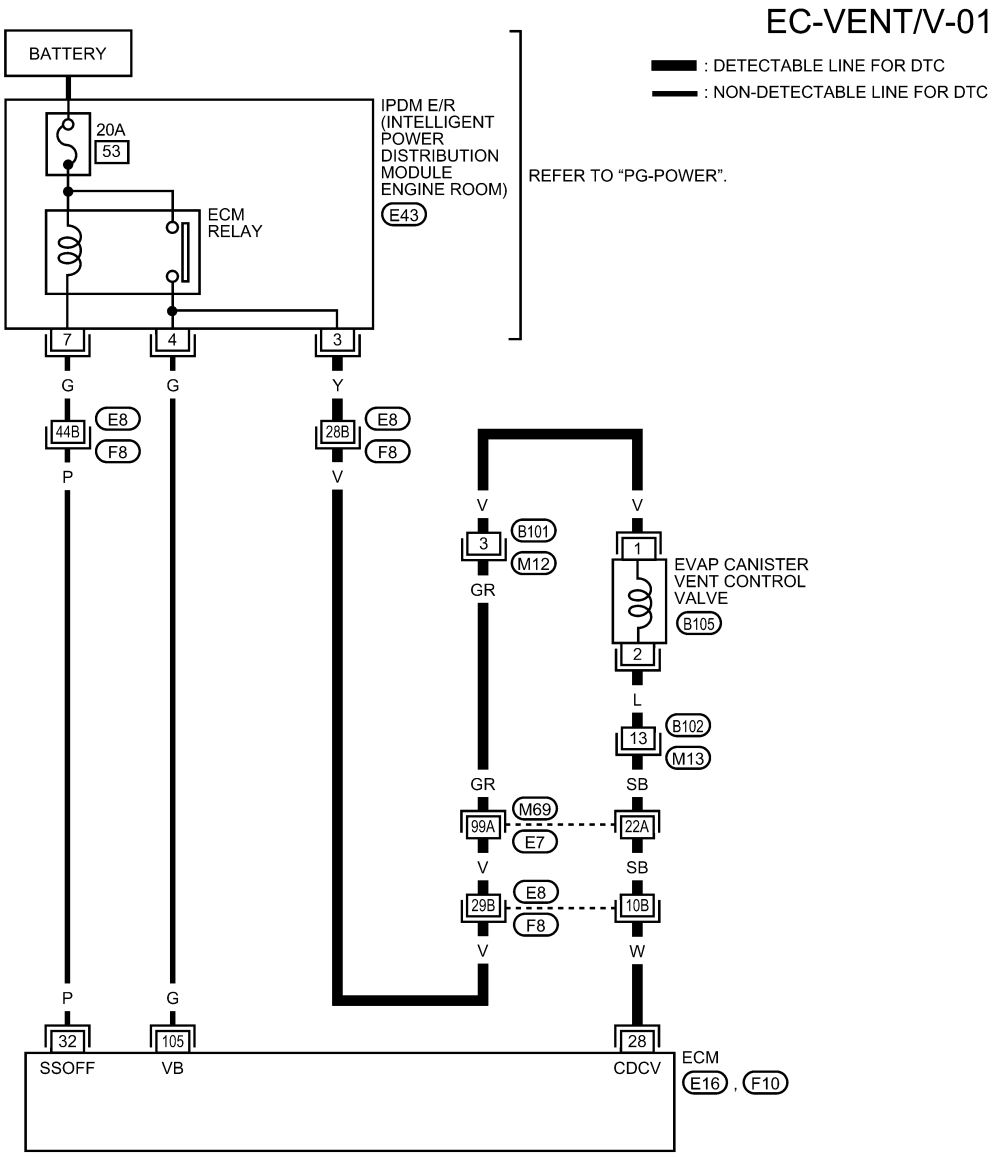
Follow the procedure “With CONSULT-III” above.

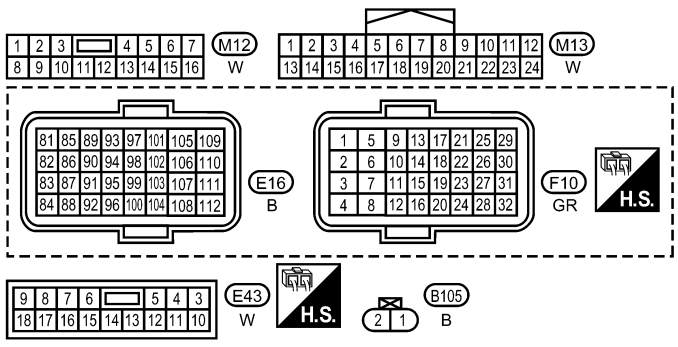
Is 1st trip DTC detected?

YES >> Go to EC-308, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780720





REFER TO THE FOLLOWING.
M69 , F8 - SUPER MULTIPLE JUNCTION (SMJ)

AABWA0310GE

Diagnosis Procedure

INFOID:0000000004780189

1.CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Disconnect rubber tube connected to EVAP canister vent control valve.
3. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Clean rubber tube using an air blower.

2. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-310, "Component Inspection".

Is the inspection result normal?

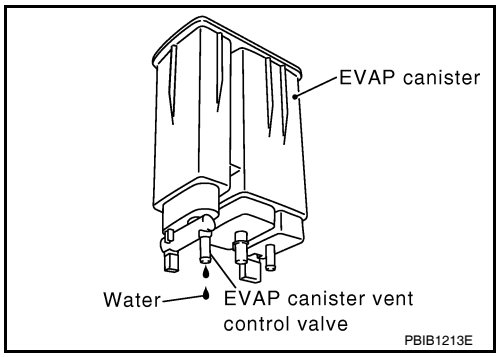
YES >> GO TO 3.
NO >> Replace EVAP canister vent control valve.

3. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from the EVAP canister.

Does water drain from EVAP canister?

YES >> GO TO 4.
NO >> GO TO 6.



4. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

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

5. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace EVAP control system pressure sensor.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-314, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace EVAP control system pressure sensor.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

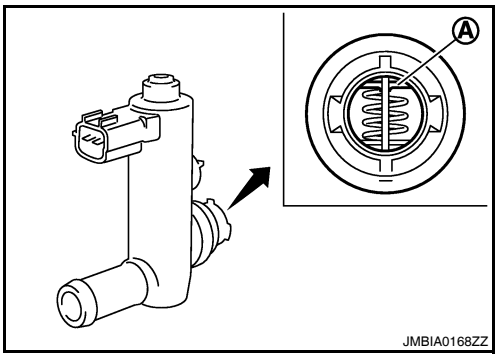
>> INSPECTION END

Component Inspection

INFOID:0000000004780190

1. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Turn ignition switch OFF.
2. Remove EVAP canister vent control valve from EVAP canister.
3. Check portion (A) of EVAP canister vent control valve for being rusted.



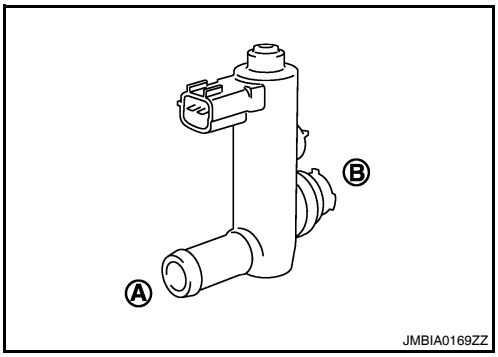
Is it rusted?

YES >> Replace EVAP canister vent control valve.
NO >> GO TO 2.

2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT-III

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.
4. Check air passage continuity and operation delay time.
   Make sure new O-ring is installed properly.



VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT-III

Check air passage continuity and operation delay time under the following conditions.
Make sure new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

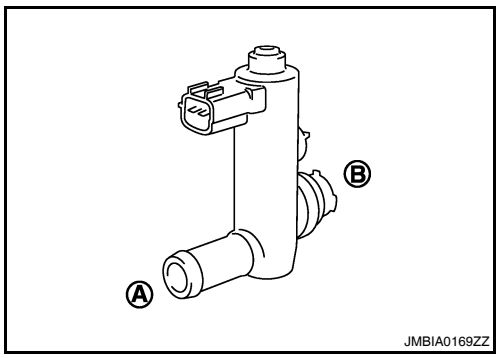
YES >> GO TO 3.
NO >> Replace EVAP canister vent control valve.

3. CHECK EVAP CANISTER VENT CONTROL VALVE-III

With CONSULT-III

1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
2. Perform "VENT CONTROL/V" in "ACTIVE TEST" mode.

3. Check air passage continuity and operation delay time.
Make sure new O-ring is installed properly.



VENT CONT/V condition	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT-III

1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
2. Check air passage continuity and operation delay time under the following conditions.
Make sure new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

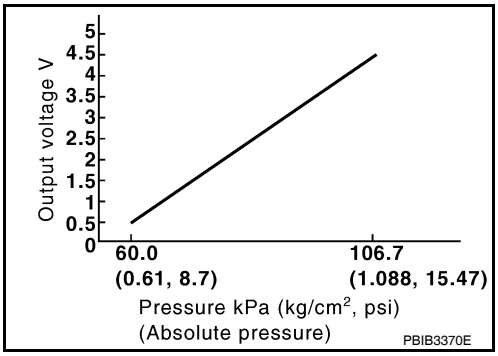
YES >> INSPECTION END
NO >> Replace EVAP canister vent control valve.

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description

INFOID:0000000004780191

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



DTC Logic

INFOID:0000000004780192

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0451	EVAP control system pressure sensor performance	ECM detects a sloshing signal from the EVAP control system pressure sensor	• Harness or connectors (EVAP control system pressure sensor circuit is shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Crankshaft position sensor (POS) • Accelerator pedal position sensor • 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.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and wait at least 40 seconds.
   NOTE:
   Do not depress accelerator pedal even slightly.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-312, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000004780193

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

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

2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.

Water should not exist.

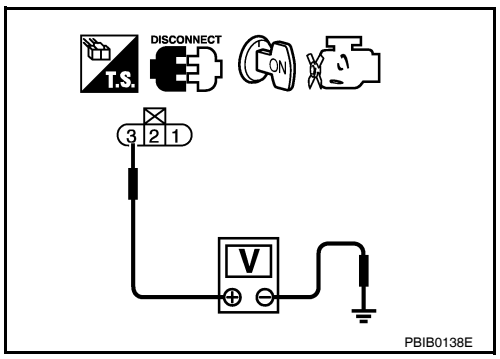
Is the inspection result normal?

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

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

EVAP control system pressure sensor		Ground	Voltage
Connector	Terminal		
B104	3	Ground	Approx. 5 V



Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 4.

4.CHECK SENSOR POWER SUPPLY CIRCUITS

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
	76	EVAP control system pressure sensor	B104	3
E16	102	APP sensor	E12	5

Is the inspection result normal?

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

5.CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-267, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-458, "Diagnosis Procedure".)

Is the inspection result normal?

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

6.CHECK APP SENSOR

Refer to EC-402, "Component Inspection".

Is the inspection result normal?

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

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly
2. Perform EC-402, "Special Repair Requirement".

>> INSPECTION END

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-314, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace EVAP control system pressure sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

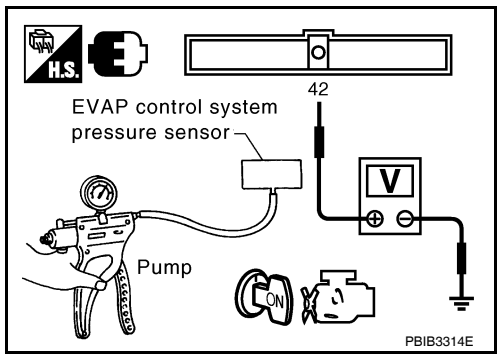
>> INSPECTION END

Component Inspection

INFOID:0000000004780194

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.



ECM		Condition [Applied vacuum kPa (kg/cm^2, psi)	Voltage
Connector	Terminal		
F11	42 (EVAP control system pressure sensor signal)	Not applied	1.8 - 4.8 V
		-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-0.952 kg/cm^2, -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm^2, 14.69 psi).**

Is the inspection result normal?

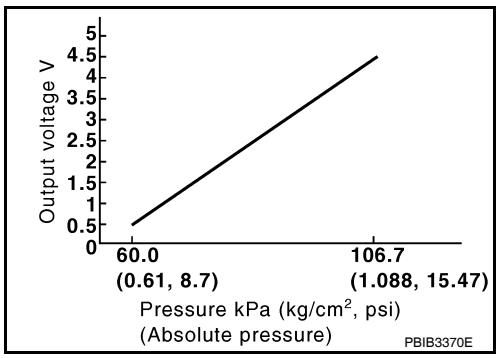
YES >> INSPECTION END
NO >> Replace EVAP control system pressure sensor

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description

INFOID:0000000004780195

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



DTC Logic

INFOID:0000000004780196

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0452	EVAP control system pressure sensor low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Crankshaft position sensor (POS) • Accelerator pedal position sensor • 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:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

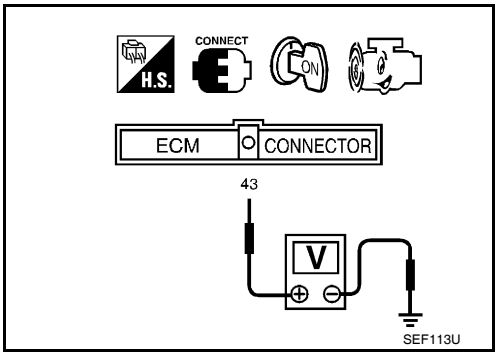
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Make sure that “FUEL T/TMP SE” indication is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
7. Check 1st trip DTC.

With GST

1. Start engine and warm it up to normal operating temperature.

2. Set voltmeter probes to ECM harness connector and ground as per the following.

ECM		Ground
Connector	Terminal	
F11	43 (Fuel tank temperature sensor signal)	Ground



3. Make sure that the voltage is less than 4.2 V.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and wait at least 20 seconds.
6. Check 1st trip DTC.

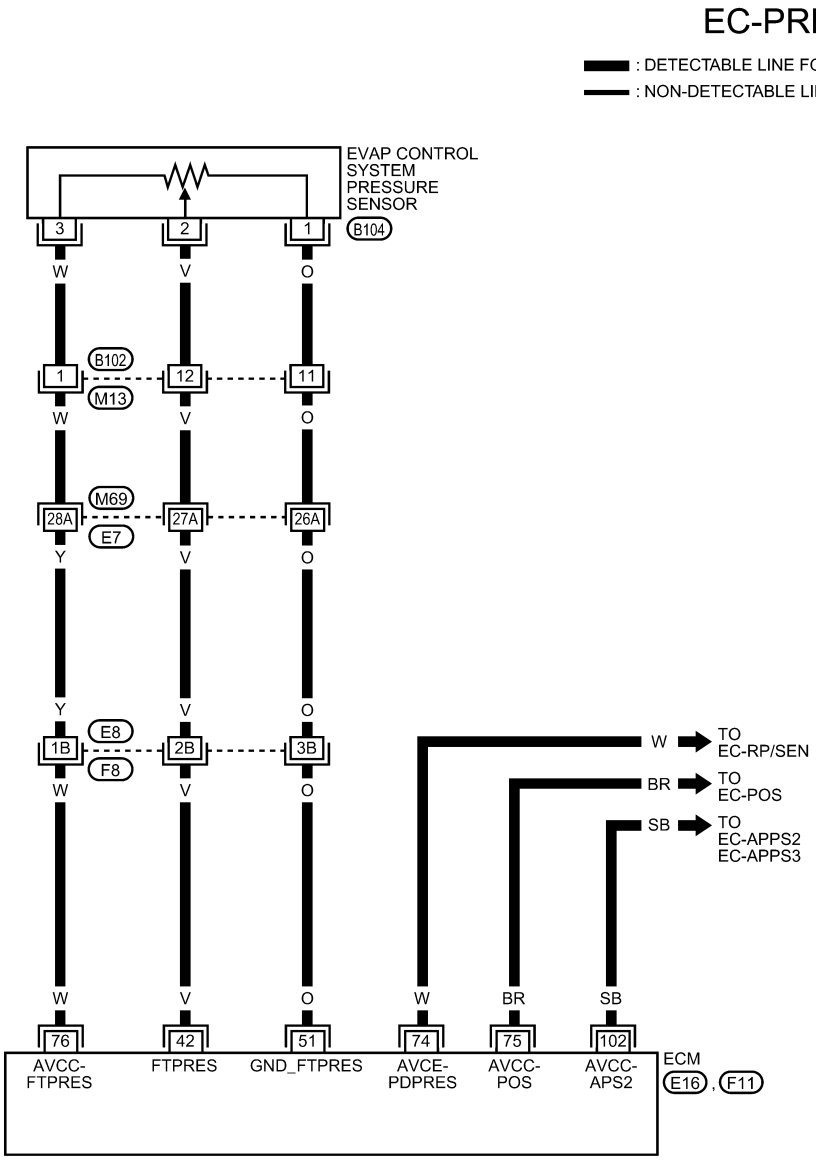
Is 1st trip DTC detected?

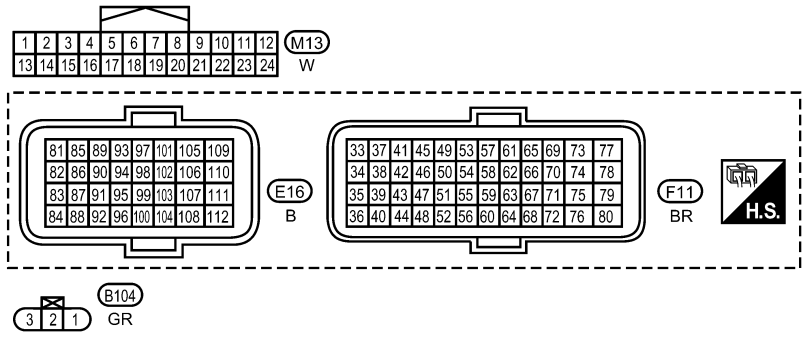
YES >> Go to EC-317, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780692

EC-PRE/SE-01





REFER TO THE FOLLOWING.
M69, F8 - SUPER MULTIPLE JUNCTION (SMJ)

AABWA0311GE

Diagnosis Procedure

INFOID:0000000004780197

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

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

2.CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.

Water should not exist.

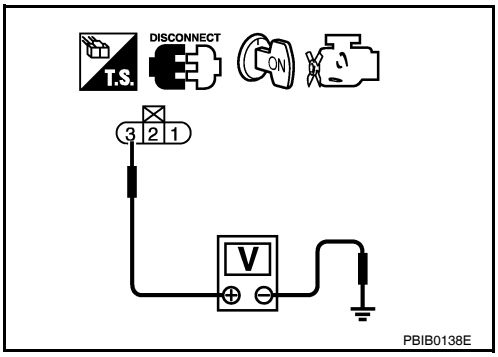
Is the inspection result normal?

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

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

EVAP control system pressure sensor		Ground	Voltage
Connector	Terminal		
B104	3	Ground	Approx. 5 V



Is the inspection result normal?

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

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B104	3	F11	76	Existed

Is the inspection result normal?

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

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B102, M13
- Harness connectors M69, E7
- Harness connectors E8, F8
- Harness for open or short between EVAP control system pressure sensor and ECM

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

6.CHECK SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
	76	EVAP control system pressure sensor	B104	3
E16	102	APP sensor	E12	5

Is the inspection result normal?

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

7.CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-267, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-458, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace malfunctioning component.

8.CHECK APP SENSOR

Refer to EC-402, "Component Inspection".

Is the inspection result normal?

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

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly
2. Perform EC-402, "Special Repair Requirement".

>> INSPECTION END

10.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B104	1	F11	51	Existed

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

Is the inspection result normal?

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

11.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B102, M13
- Harness connectors M69, E7
- Harness connectors E8, F8
- Harness for open or short between EVAP control system pressure sensor and ECM

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

12. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B104	2	F11	42	Existed

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

Is the inspection result normal?

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

13. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B102, M13
- Harness connectors M69, E7
- Harness connectors E8, F8
- Harness for open or short between EVAP control system pressure sensor and ECM

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

14. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-320, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace EVAP control system pressure sensor.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

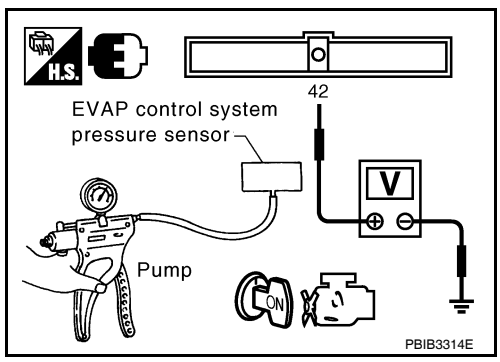
>> INSPECTION END

Component Inspection

INFOID:0000000004780451

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.



ECM		Condition [Applied vacuum kPa (kg/cm^2, psi)]	Voltage
Connector	Terminal		
F11	42 (EVAP control system pressure sensor signal)	Not applied	1.8 - 4.8 V
		-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-0.952 kg/cm^2, -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm^2, 14.69 psi).**

Is the inspection result normal?

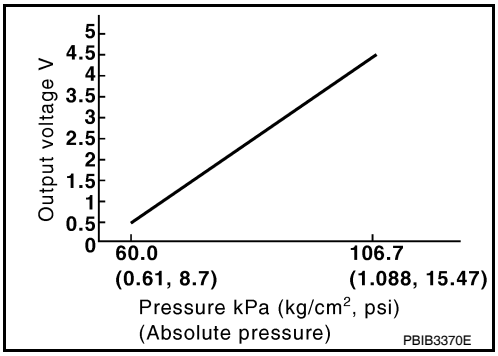
YES >> INSPECTION END
NO >> Replace EVAP control system pressure sensor

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

Description

INFOID:0000000004780199

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.



DTC Logic

INFOID:0000000004780200

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0453	EVAP control system pressure sensor high input	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Accelerator pedal circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Crankshaft position sensor (POS) • Accelerator pedal position sensor • Refrigerant pressure sensor • EVAP canister vent control valve • EVAP canister • Rubber hose from EVAP canister vent control valve to vehicle frame

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

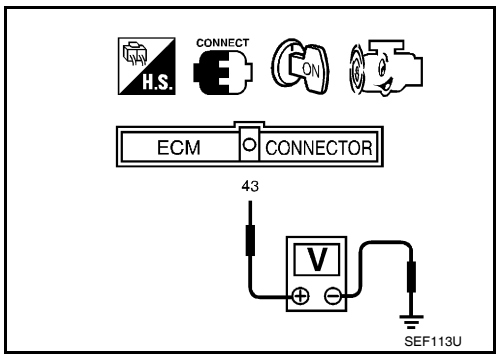
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Make sure that “FUEL T/TMP SE” indication is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
7. Check 1st trip DTC.

With GST

1. Start engine and warm it up to normal operating temperature.

2. Set voltmeter probes to ECM harness connector and ground as per the following.

ECM		Ground
Connector	Terminal	
F11	43 (Fuel tank temperature sensor signal)	Ground



3. Make sure that the voltage is less than 4.2 V.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and wait at least 20 seconds.
6. Check 1st trip DTC.

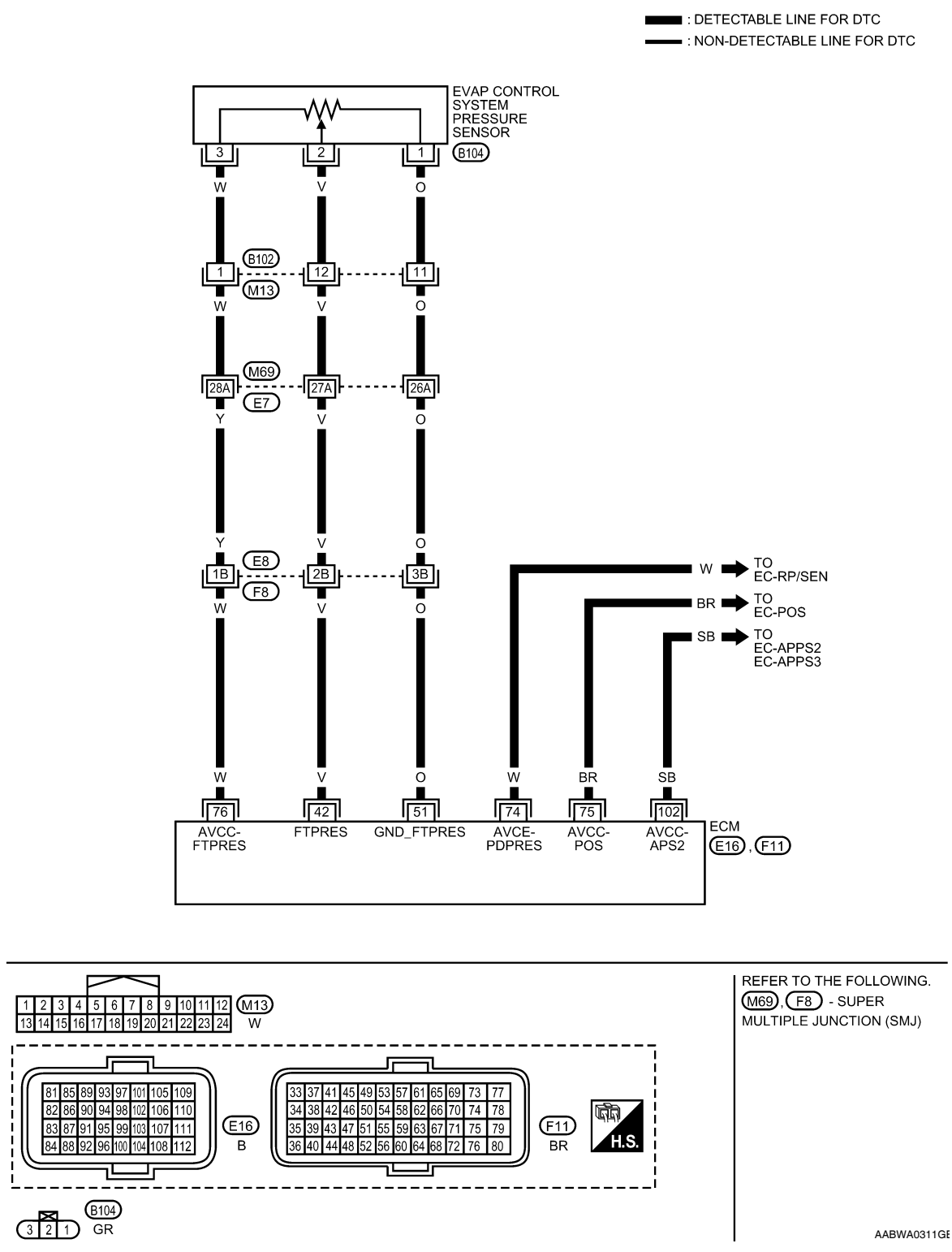
Is 1st trip DTC detected?

YES >> Go to EC-324, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780721

EC-PRE/SE-01



Diagnosis Procedure

INFOID:0000000004780201

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

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

2.CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.

Water should not exist.

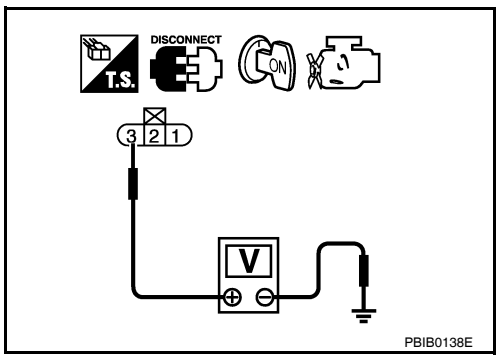
Is the inspection result normal?

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

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

EVAP control system pressure sensor		Ground	Voltage
Connector	Terminal		
B104	3	Ground	Approx. 5 V



Is the inspection result normal?

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

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B104	3	F11	76	Existed

Is the inspection result normal?

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

5.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B102, M13
- Harness connectors M69, E7
- Harness connectors E8, F8
- Harness for open or short between EVAP control system pressure sensor and ECM

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

6.CHECK SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
	76	EVAP control system pressure sensor	B104	3
E16	102	APP sensor	E12	5

Is the inspection result normal?

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

7.CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-267, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-458, "Diagnosis Procedure".)

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace malfunctioning component.

8.CHECK APP SENSOR

Refer to EC-402, "Component Inspection".

Is the inspection result normal?

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

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly
2. Perform EC-402, "Special Repair Requirement".

>> INSPECTION END

10.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B104	1	F11	51	Existed

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

Is the inspection result normal?

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

11.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B102, M13
- Harness connectors M69, E7
- Harness connectors E8, F8
- Harness for open or short between EVAP control system pressure sensor and ECM

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

12. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B104	2	F11	42	Existed

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

Is the inspection result normal?

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

13. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B102, M13
- Harness connectors M69, E7
- Harness connectors E8, F8
- Harness for open or short between EVAP control system pressure sensor and ECM

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

14. CHECK RUBBER TUBE

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 15.
NO >> Clean the rubber tube using an air blower, repair or replace rubber tube.

15. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-304, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace EVAP canister vent control valve.

16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-328, "Component Inspection".

Is the inspection result normal?

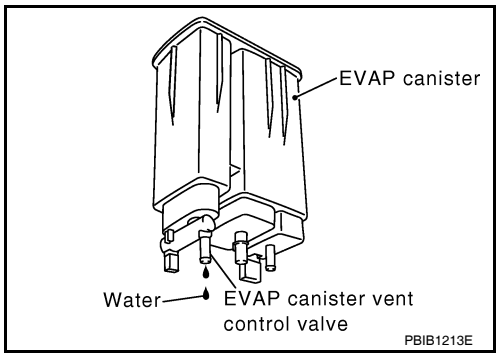
YES >> GO TO 17.
NO >> Replace EVAP control system pressure sensor.

17. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from the EVAP canister.

Does water drain from EVAP canister?

YES >> GO TO 18.
NO >> GO TO 20.



18. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

YES >> GO TO 15.
NO >> GO TO 14.

19. DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

20. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

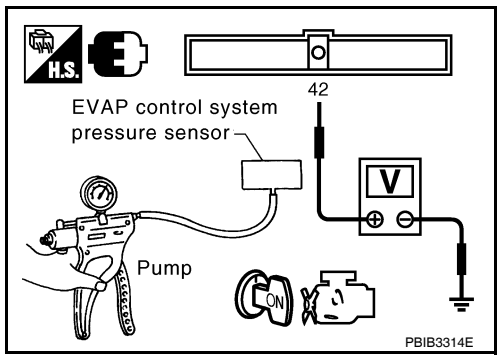
Component Inspection

INFOID:0000000004780452

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister.
   Always replace O-ring with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

ECM		Condition [Applied vacuum kPa (kg/cm^2, psi)]	Voltage
Connector	Terminal		
F11	42 (EVAP control system pressure sensor signal)	Not applied	1.8 - 4.8 V
		-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value



CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-0.952 kg/cm^2, -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm^2, 14.69 psi).**

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP control system pressure sensor

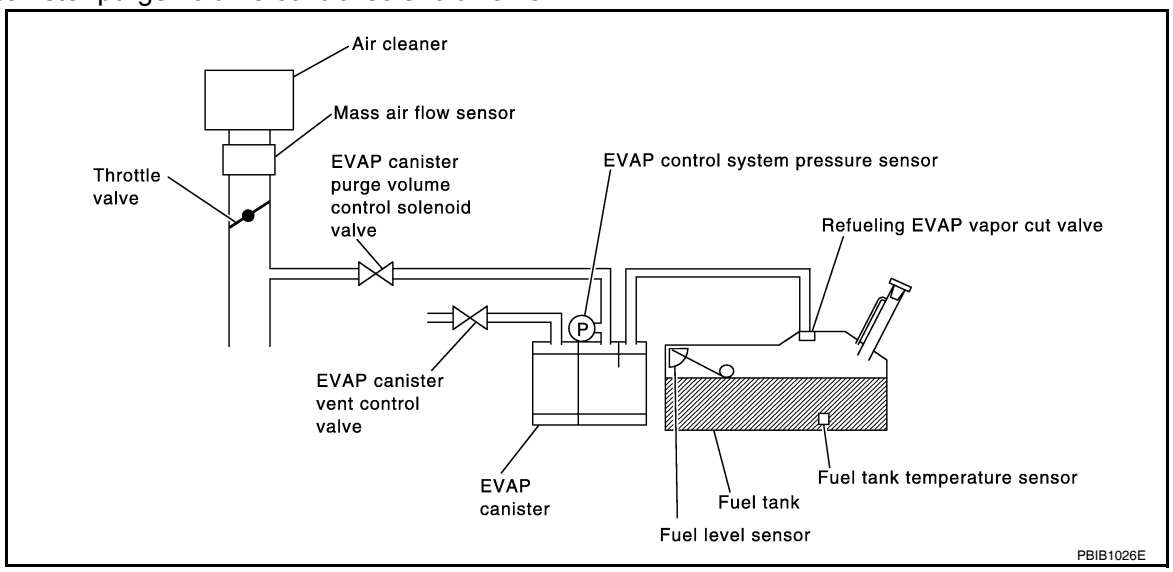
P0455 EVAP CONTROL SYSTEM

DTC Logic

INFOID:0000000004780203

DTC DETECTION LOGIC

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in EVAP system between the fuel tank and EVAP canister purge volume control solenoid valve.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0455	EVAP control system gross leak detected	EVAP control system has a very large leak such as fuel filler cap fell off, EVAP control system does not operate properly.	• Fuel filler cap remains open or fails to close. • Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent. • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Fuel tank temperature sensor • O-ring of EVAP canister vent control valve is missing or damaged. • EVAP control system pressure sensor • Refueling EVAP vapor cut valve • ORVR system leaks • Drain filter

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

CAUTION:
Never remove fuel filler cap during the DTC CONFIRMATION PROCEDURE.
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
NOTE:
Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.
TESTING CONDITION:
- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedures.**

Do you have CONSULT-III?

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

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III
1. Tighten fuel filler cap securely until ratcheting sound is heard.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
5. Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 60°C (32 - 140°F)
6. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
   Follow the instruction displayed.
   NOTE:
   If the engine speed cannot be maintained within the range displayed on the CONSULT-III screen, go to EC-26, "BASIC INSPECTION : Special Repair Requirement".

Which is displayed on CONSULT-III screen?

OK >> INSPECTION END
NG >> GO TO 3.

3. CHECK DTC

Check DTC.

Which DTC is detected?

P0455 >> Go to EC-330, "Diagnosis Procedure".
P0442 >> Go to EC-285, "Diagnosis Procedure".

4. PERFORM DTC CONFIRMATION PROCEDURE

With GST
NOTE:
Be sure to read the explanation of DIRVING PATTERN in EC-478, "How to Set SRT Code" before driving vehicle.
1. Start engine.
2. Drive vehicle according to DRIVING PATTERN.
3. Stop vehicle.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES-1 >> P0455: Go to EC-330, "Diagnosis Procedure".
YES-2 >> P0442: Go to EC-285, "Diagnosis Procedure".
YES-3 >> P0441: Go to EC-280, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

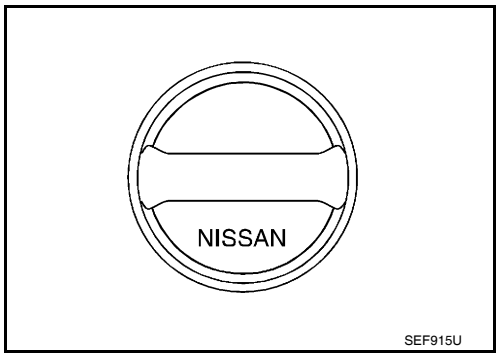
INFOID:0000000004780204

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace with genuine NISSAN fuel filler cap.



2.CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Then retighten until ratcheting sound is heard.

3.CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

Is the inspection result normal?

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

4.CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-333, "Component Inspection (Fuel filler cap)".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace fuel filler cap with a genuine one.

5.CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection.
Refer to EC-74, "System Description".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or reconnect the hose.

6.CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 7.

7.CHECK DRAIN FILTER

Refer to EC-334, "Component Inspection (Drain filter)".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace drain filter.

8.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.
- EVAP canister vent control valve is installed properly.
  Refer to EC-502, "Exploded View".
- EVAP canister vent control valve.
  Refer to EC-304, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace EVAP canister vent control valve and O-ring.

9. CHECK FOR EVAP LEAK

Refer to EC-500, "Inspection".

Is there any leak in EVAP line?

YES >> Repair or replace.
NO-1 >> With CONSULT-III: GO TO 10.
NO-2 >> Without CONSULT-III: GO TO 11.

10. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-III screen to increase “PURG VOL C/V” opening to 100%.
5. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

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

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 14.
NO >> GO TO 12.

12. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-74, "System Description".

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 13.
YES-2 >> Without CONSULT-III: GO TO 14.
NO >> Repair or reconnect the hose.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

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

Does engine speed vary according to the valve opening?

YES >> GO TO 15.
NO >> GO TO 14.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-296, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.

NO >> Replace EVAP canister purge volume control solenoid valve.

15. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-244, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace fuel level sensor unit.

16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-314, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Replace EVAP control system pressure sensor.

17. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-450, "Description".

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair or replace hoses and tubes.

18. CHECK RECIRCULATION LINE

Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 19.
NO >> Repair or replace hose, tube or fuel filler tube.

19. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-453, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> GO TO 20.
NO >> Replace refueling EVAP vapor cut valve with fuel tank.

20. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

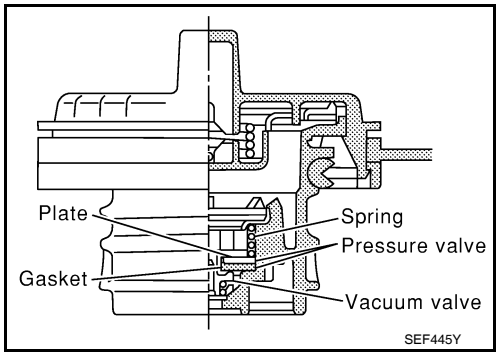
>> INSPECTION END

Component Inspection (Fuel filler cap)

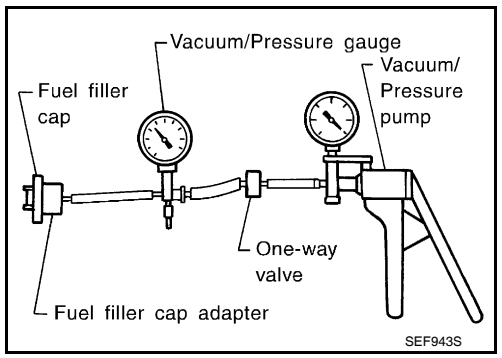
INFOID:0000000004803117

1. CHECK FUEL FILLER CAP

1. Turn ignition switch OFF.
2. Remove fuel filler cap.
3. Wipe clean valve housing.



4. Install fuel filler cap adapter (commercial service tool) to fuel filler cap.
5. Check valve opening pressure and vacuum.



Pressure: **15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)**

Vacuum: **−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)**

Is the inspection result normal?

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

2.REPLACE FUEL FILLER CAP

Replace fuel filler cap.

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.

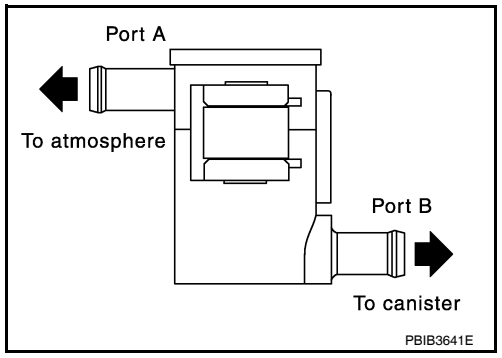
>> INSPECTION END

Component Inspection (Drain filter)

INFOID:0000000004803096

1.CHECK DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace drain filter.

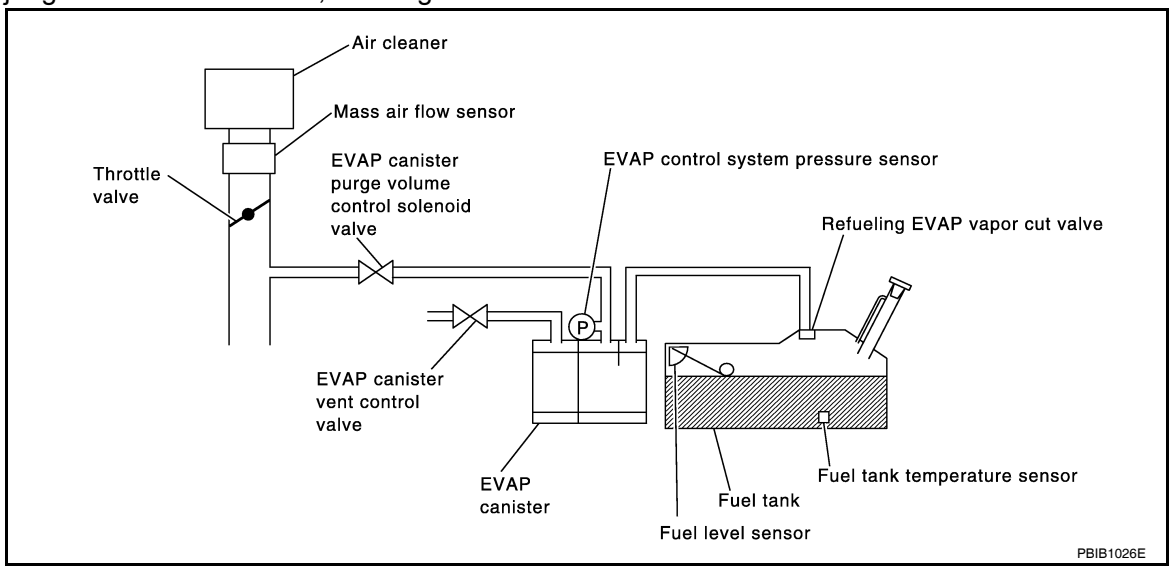
P0456 EVAP CONTROL SYSTEM

DTC Logic

INFOID:0000000004780206

DTC DETECTION LOGIC

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.
If ECM judges a leak which corresponds to a very small leak, the very small leak P0456 will be detected.
If ECM judges a leak equivalent to a small leak, EVAP small leak P0442 will be detected.
If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0456	Evaporative emission control system very small leak (negative pressure check)	• EVAP system has a very small leak. • EVAP system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or fails to close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Fuel tank temperature sensor • O-ring of EVAP canister vent control valve is missing or damaged • EVAP canister is saturated with water • EVAP control system pressure sensor • Refueling EVAP vapor cut valve • ORVR system leaks • Fuel level sensor and the circuit • Foreign matter caught in EVAP canister purge volume control solenoid valve • Drain filter

CAUTION:
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**

- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

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

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:

- **If DTC P0456 is displayed with P0442, first perform trouble diagnosis for DTC P0456.**
- **After repair, make sure that the hoses and clips are installed properly.**
- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

TESTING CONDITION:

- **Open engine hood before conducting following procedure.**
- **If any of following conditions are met just before the DTC CONFIRMATION PROCEDURE, leave the vehicle for more than 1 hour.**
  - **Fuel filler cap is removed.**
  - **Fuel is refilled or drained.**
  - **EVAP component parts is/are removed.**
- **Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.**

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Make sure the following conditions are met.
   FUEL LEVEL SE: 0.25 - 1.4 V
   COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
   FUEL T/TMP SE: 0 - 35°C (32 - 95°F)
   INT A/TEMP SE: More than 0°C (32°F)
   If NG, turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the “FUEL LEVEL SE” meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “EVAP V/S LEAK P0456/P1456” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-III.
   Follow the instruction displayed.
   NOTE:
   If the engine speed cannot be maintained within the range displayed on CONSULT-III screen, go to EC-26, "BASIC INSPECTION : Special Repair Requirement".

Which is displayed on CONSULT-III?

OK >> INSPECTION END
NG >> Go to EC-337, "Diagnosis Procedure".

4.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-337, "Component Function Check".

NOTE:

Use component function check to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to EC-337, "Diagnosis Procedure".

Component Function Check

INFOID:0000000004780207

1. PERFORM COMPONENT FUNCTION CHECK

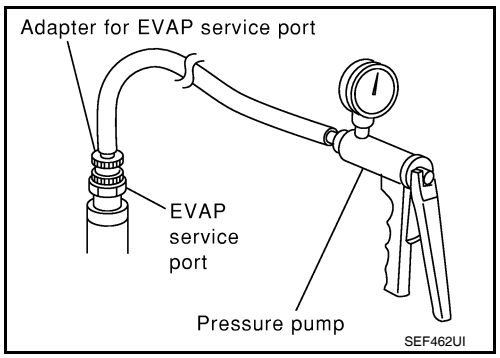
With GST

CAUTION:

- **Do not use compressed air, doing so may damage the EVAP system.**
- **Do not start engine.**
- **Do not exceeded 4.12 kPa (0.042 kg/cm^2, 0.6 psi).**

1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Set the pressure pump and a hose.
3. Also set a vacuum gauge via 3-way connector and a hose.
4. Turn ignition switch ON.
5. Connect GST and select Service $08.
6. Using Service $08 control the EVAP canister vent control valve (close).
7. Apply pressure and make sure the following conditions are satisfied.

   Pressure to be applied: 2.7 kPa (0.028 kg/cm^2, 0.39 psi)
   Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (0.004 kg/cm^2, 0.06 psi).



Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-337, "Diagnosis Procedure".

2. RELEASE PRESSURE

1. Disconnect GST.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Restart engine and let it idle for 90 seconds.
5. Keep engine speed at 2,000 rpm for 30 seconds.
6. Turn ignition switch OFF.

   NOTE:
   For more information, refer to GST Instruction Manual.

>> INSPECTION END

Diagnosis Procedure

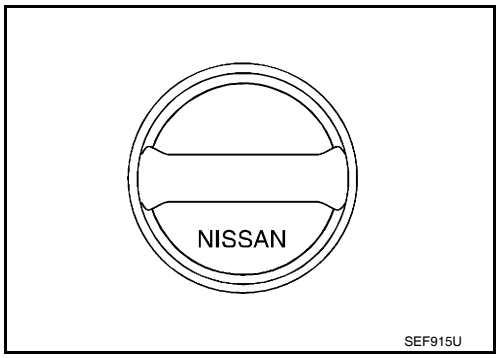
INFOID:0000000004780208

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Then retighten until ratcheting sound is heard.

3.CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

Is the inspection result normal?

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

4.CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-340, "Component Inspection (Fuel filler cap)".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace fuel filler cap with a genuine one.

5.CHECK FOR EVAP LEAK

Refer to EC-500, "Inspection".

Is there any leak in EVAP line?

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

6.CHECK DRAIN FILTER

Refer to EC-341, "Component Inspection (Drain filter)".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace drain filter.

7.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.
- EVAP canister vent control valve is installed properly.
  Refer to EC-502, "Exploded View".
- EVAP canister vent control valve.
  Refer to EC-304, "Component Inspection".

Is the inspection result normal?

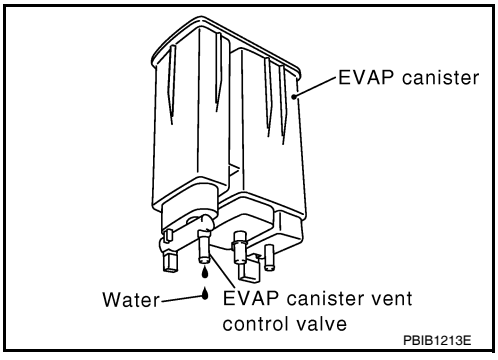
YES >> GO TO 8.
NO >> Repair or replace EVAP canister vent control valve and O-ring.

8.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from the EVAP canister.

Does water drain from EVAP canister?

YES >> GO TO 9.
NO-1 >> With CONSULT-III: GO TO 11.
NO-2 >> Without CONSULT-III: GO TO 12.



9.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

YES-1 >> With CONSULT-III: GO TO 11.
YES-2 >> Without CONSULT-III: GO TO 12.
NO >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-III screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

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

12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

Is the inspection result normal?

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

13. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-74, "System Description".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair or reconnect the hose.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-293, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace EVAP canister purge volume control solenoid valve.

15. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-244, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace fuel level sensor unit.

16. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-314, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Replace EVAP control system pressure sensor.

17. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to EC-74, "System Description".

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair or reconnect the hose.

18. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 19.

19. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-450, "Description".

Is the inspection result normal?

YES >> GO TO 20.
NO >> Repair or replace hoses and tubes.

20. CHECK RECIRCULATION LINE

Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 21.
NO >> Repair or replace hose, tube or fuel filler tube.

21. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-453, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> GO TO 22.
NO >> Replace refueling EVAP vapor cut valve with fuel tank.

22. CHECK FUEL LEVEL SENSOR

Refer to DI-16, "Fuel Level Sensor Signal Inspection".

Is the inspection result normal?

YES >> GO TO 23.
NO >> Replace fuel level sensor unit.

23. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

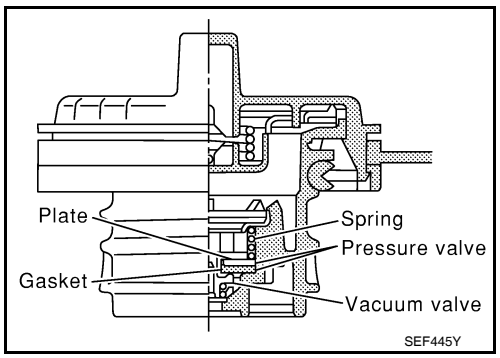
Component Inspection (Fuel filler cap)

INFOID:0000000004803118

1. CHECK FUEL FILLER CAP

1. Turn ignition switch OFF.
2. Remove fuel filler cap.

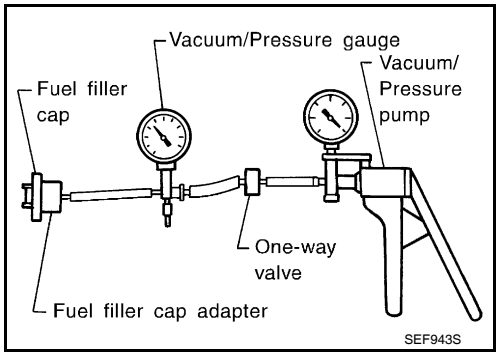
3. Wipe clean valve housing.



4. Install fuel filler cap adapter (commercial service tool) to fuel filler cap.
5. Check valve opening pressure and vacuum.

Pressure: **15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)**

Vacuum: **−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)**



Is the inspection result normal?

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

2.REPLACE FUEL FILLER CAP

Replace fuel filler cap.

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.

>> INSPECTION END

Component Inspection (Drain filter)

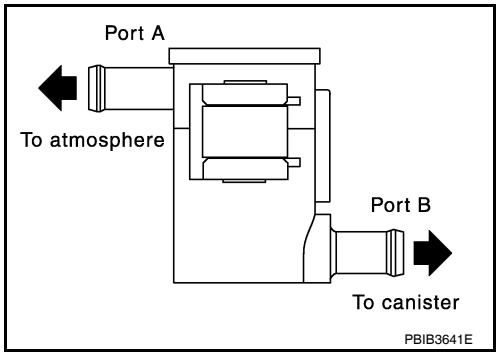
INFOID:0000000004803097

1.CHECK DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace drain filter.



P0460 FUEL LEVEL SENSOR

Description

INFOID:0000000004780210

The fuel level sensor is mounted in the fuel level sensor unit.
The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line.
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

INFOID:0000000004780211

DTC DETECTION LOGIC

NOTE:

- **If DTC P0460 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P0460 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-357, "DTC Logic".**

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The sensor circuit is open or shorted) • Combination meter • Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait maximum of 2 consecutive minutes.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-342, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000004780212

1.CHECK COMBINATION METER FUNCTION

Refer to DI-13, "Trouble Diagnosis".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Refer to DI-13, "Trouble Diagnosis"

2.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

P0461 FUEL LEVEL SENSOR

Description

INFOID:0000000004780213

The fuel level sensor is mounted in the fuel level sensor unit.
The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line.
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

INFOID:0000000004780214

DTC DETECTION LOGIC

NOTE:

- **If DTC P0461 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P0461 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-357, "DTC Logic".**

Driving long distances naturally affect fuel gauge level.
This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0461	Fuel level sensor circuit range/performance	The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The sensor circuit is open or shorted) • Combination meter • Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-343, "Component Function Check".
Use component function check to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-344, "Diagnosis Procedure".

Component Function Check

INFOID:0000000004780215

1.PRECONDITIONING

WARNING:
When performing following procedure, be sure to observe the handling of the fuel. Refer to FL-4, "General Precaution".
TESTING CONDITION:
Before starting component function check, preparation of draining fuel and refilling fuel is required.

Do you have CONSULT-III?

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

2.PERFORM COMPONENT FUNCTION CHECK

With CONSULT-III
NOTE:
Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 (7-7/8 US gal, 6-5/8 Imp gal) in advance.
1. Prepare a fuel container and a spare hose.

2. Release fuel pressure from fuel line, refer to EC-498, "Inspection".
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.
6. Select “FUEL LEVEL SE” in “DATA MONITOR” mode with CONSULT-III.
7. Check “FUEL LEVEL SE” output voltage and note it.
8. Select “FUEL PUMP RELAY” in “ACTIVE TEST” mode with CONSULT-III.
9. Touch “ON” and drain fuel approximately 30 ■ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10. Check “FUEL LEVEL SE” output voltage and note it.
11. Fill fuel into the fuel tank for 30 ■ (7-7/8 US gal, 6-5/8 Imp gal).
12. Check “FUEL LEVEL SE” output voltage and note it.
13. Confirm whether the voltage changes more than 0.03 V during step 7 to 10 and 10 to 12.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-344, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

■Without CONSULT-III
NOTE:
Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 ■ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line. Refer to EC-498, "Inspection".
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch ON.
6. Drain fuel by 30 ■ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
7. Confirm that the fuel gauge indication varies.
8. Fill fuel into the fuel tank for 30 ■ (7-7/8 US gal, 6-5/8 Imp gal).
9. Confirm that the fuel gauge indication varies.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-344, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004780216

1.CHECK COMBINATION METER FUNCTION

Refer to DI-13, "Trouble Diagnosis".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Refer to DI-13, "Trouble Diagnosis"

2.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

P0462, P0463 FUEL LEVEL SENSOR

Description

INFOID:0000000004780217

The fuel level sensor is mounted in the fuel level sensor unit.
The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line.
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

DTC Logic

INFOID:0000000004780218

DTC DETECTION LOGIC

NOTE:

- **If DTC P0462 or P0463 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P0462 or P0463 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-357, "DTC Logic".**

This diagnosis indicates the former, to detect open or short circuit malfunction.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0462	Fuel level sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The sensor circuit is open or shorted) • Combination meter • Fuel level sensor
P0463	Fuel level 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 between 11 V and 16 V at ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Go to EC-345, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000004780219

1.CHECK COMBINATION METER FUNCTION

Refer to DI-13, "Trouble Diagnosis".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Refer to DI-13, "Trouble Diagnosis"

2.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

P0500 VSS

Description

INFOID:0000000004780220

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:0000000004780221

DTC DETECTION LOGIC

NOTE:

- **If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-357, "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 • Combination meter • ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

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

2.PRECONDITIONING

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

>> GO TO 3.

3.CHECK VEHICLE SPEED 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 2.
NO >> Go to EC-348, "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	A/T: 1,900 - 6,000 rpm M/T: 2,500 - 6,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	A/T: 4.8 - 31.8 msec M/T: 3.8 - 31.8 msec
Selector lever	Except P or N position (A/T) Except Neutral position (M/T)
PW/ST SIGNAL	OFF

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-348, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-348, "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-348, "Diagnosis Procedure".

Component Function Check

INFOID:0000000004780222

1.PERFORM COMPONENT FUNCTION CHECK

With GST

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-348, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004780223

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

Refer to BRC-18, "CONSULT-III Function (ABS)".

Is the inspection result normal?

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

2.CHECK COMBINATION METER

Refer to DI-12, "CONSULT-III Function (METER/M&A)".

>> INSPECTION END

P0506 ISC SYSTEM

Description

INFOID:0000000004780224

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

INFOID:0000000004780225

DTC DETECTION LOGIC

NOTE:
If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0506	Idle speed control system RPM lower than expected	The idle speed is less than the target idle speed by 100 rpm or more.	• Electric throttle control actuator • Intake air leak

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
If the target idle speed is out of the specified value, perform EC-32, "IDLE AIR VOLUME LEARNING : Special Repair Requirement", before conducting DTC Confirmation Procedure.
TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.**
- **Always perform the test at a temperature above −10°C(14°F).**

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Go to EC-349, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000004780226

1.CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Discover air leak location and repair.
NO >> GO TO 2.

2.REPLACE ECM

1. Stop engine.
2. Replace ECM.

3. Perform EC-29, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

P0507 ISC SYSTEM

Description

INFOID:0000000004780227

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

INFOID:0000000004780228

DTC DETECTION LOGIC

NOTE:
If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0507	Idle speed control system RPM higher than expected	The idle speed is more than the target idle speed by 200 rpm or more.	• Electric throttle control actuator • Intake air leak • PCV system

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
If the target idle speed is out of the specified value, perform EC-32, "IDLE AIR VOLUME LEARNING : Special Repair Requirement", before conducting DTC Confirmation Procedure.
TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.**
- **Always perform the test at a temperature above −10°C(14°F).**

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Go to EC-351, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000004780229

1.CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

Is the inspection result normal?

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

2.CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Discover air leak location and repair.
NO >> GO TO 3.

3. REPLACE ECM

1. Stop engine.
2. Replace ECM.
3. Perform EC-29, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

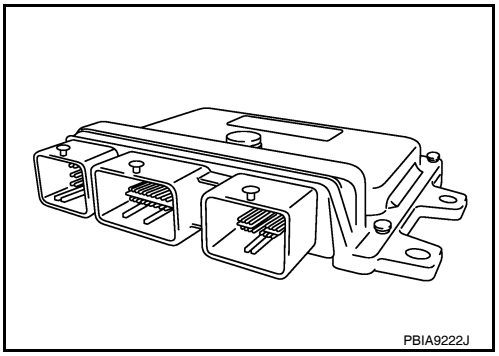
>> INSPECTION END

P0603 ECM POWER SUPPLY

Description

INFOID:0000000004780234

ECM has the memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc. even when the ignition switch is turned ON.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DTC Logic

INFOID:0000000004780235

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0603	Engine control module	ECM back-up RAM system does not function properly.	• ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Start engine and let it idle for 1 second.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Repeat steps 2 and 3 for four times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-353, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000004780236

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC. Refer to “How to Erase DTC and 1st Trip DTC” in EC-90, "Diagnosis Description".
3. Perform DTC CONFIRMATION PROCEDURE. Refer to EC-353, "DTC Logic".

Is the 1st trip DTC P0603 displayed again?

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

2.REPLACE ECM

1. Replace ECM.
2. Perform EC-29, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

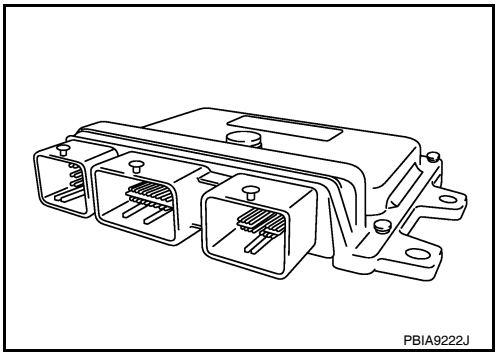
>> INSPECTION END

P0605 ECM

Description

INFOID:0000000004780237

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

INFOID:0000000004780238

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-356, "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-356, "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-356, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000004780239

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase 1st trip DTC. Refer to “How to Erase DTC and 1st Trip DTC” in EC-90, "Diagnosis Description".
3. Perform DTC CONFIRMATION PROCEDURE. Refer to EC-355, "DTC Logic".

Is the 1st trip DTC P0605 displayed again?

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

2.REPLACE ECM

1. Replace ECM.
2. Perform EC-29, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

P0607 ECM

Description

INFOID:0000000004780240

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:0000000004780241

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-357, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000004780242

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC. Refer to “How to Erase DTC and 1st Trip DTC” in .EC-90, "Diagnosis Description"
3. Perform DTC CONFIRMATION PROCEDURE. Refer to EC-357, "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. Perform EC-29, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

P0643 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000004780243

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

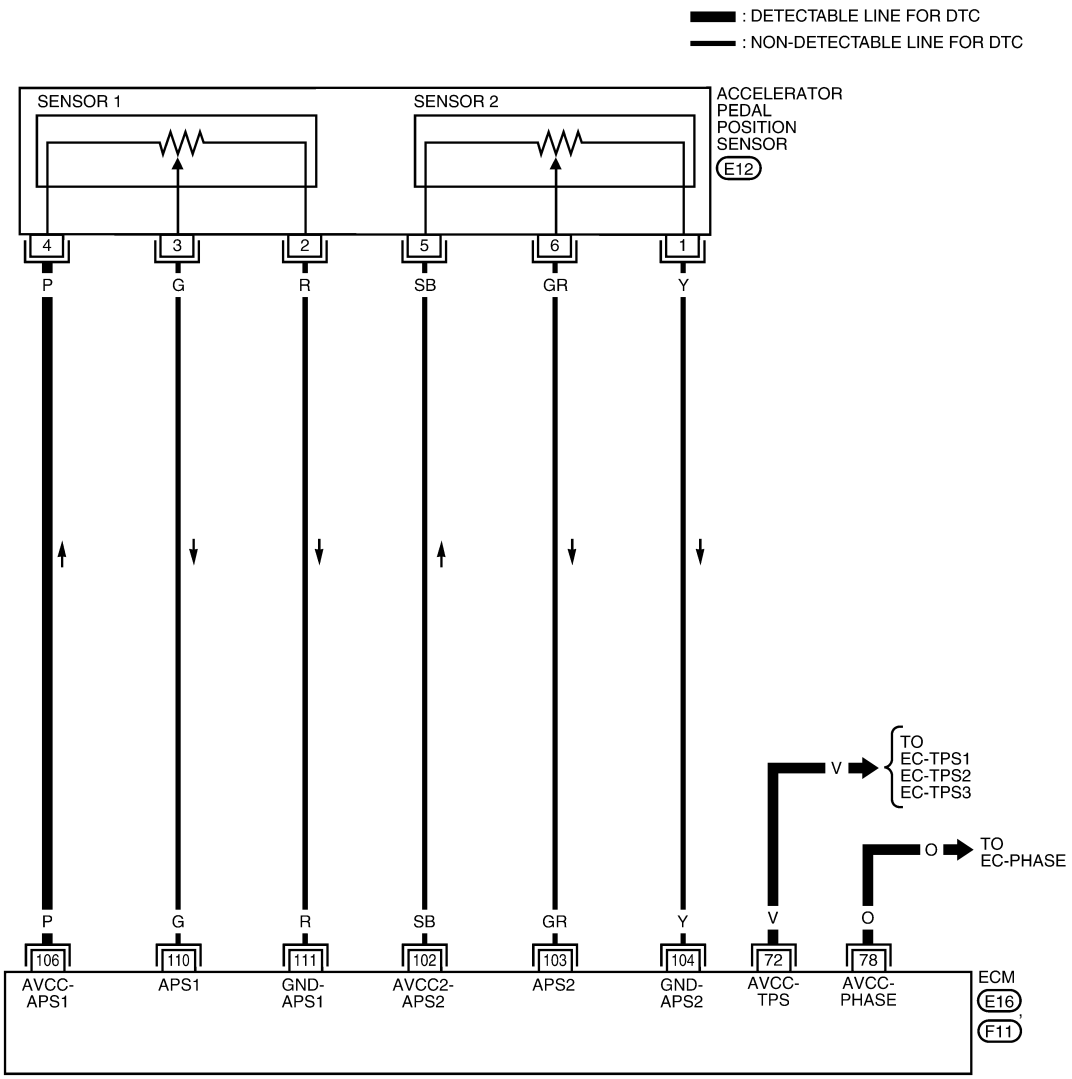
Is DTC detected?

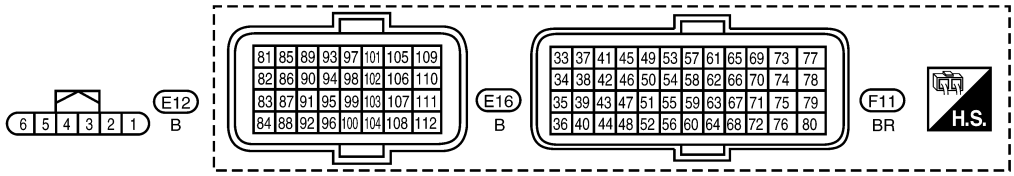
YES >> Go to EC-359, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780693

EC-SEN/PW-01





BBWA2649E

Diagnosis Procedure

INFOID:0000000004780244

1. CHECK GROUND CONNECTION

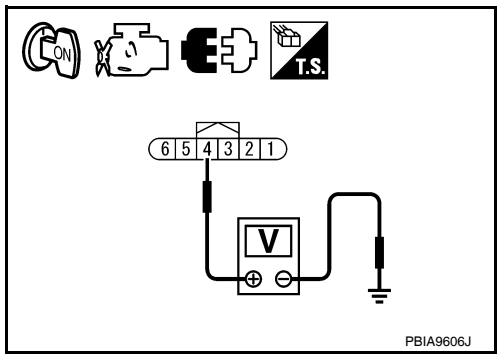
1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

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

2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.



APP sensor		Ground	Voltage
Connector	Terminal		
E12	4	Ground	Approx. 5 V

Is the inspection result normal?

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

3.CHECK SENSOR POWER SUPPLY CIRCUITS

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F11	72	Electric throttle control actuator	F7	2
	78	CMP sensor (PHASE)	F21	1
E16	106	APP sensor	E12	4

Is the inspection result normal?

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

4.CHECK COMPONENTS

Check the following.
• Camshaft position sensor (PHASE) (Refer to EC-272, "Component Inspection".)

Is the inspection result normal?

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

5.CHECK TP SENSOR

Refer to EC-174, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 6.

6.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-31, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> INSPECTION END

7.CHECK APP SENSOR

Refer to EC-402, "Component Inspection".

Is the inspection result normal?

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

8.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-402, "Special Repair Requirement".

>> INSPECTION END

9.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

P0850 PNP SWITCH

Description

INFOID:0000000004780245

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

DTC Logic

INFOID:0000000004780246

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) switch is not changed in the process of engine starting and driving.	• Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] • Park/neutral position (PNP) switch

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

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

2.PRECONDITIONING

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

>> GO TO 3.

3.CHECK PNP SWITCH FUNCTION

With CONSULT-III

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

Selector lever position	Known-good signal
N or P position (A/T) Neutral position (M/T)	ON
Except above position	OFF

Is the inspection result normal?

YES >> GO TO 4.
NO >> Go to EC-364, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

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

ENG SPEED	A/T: 1,650 - 6,375 rpm M/T: 1,930 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)

B/FUEL SCHDL	A/T: 3.5 - 31.8 msec M/T: 2.5 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 mph)
Selector lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-364, "Diagnosis Procedure".
NO >> INSPECTION END

5. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-363, "Component Function Check".

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

Is the inspection result normal?

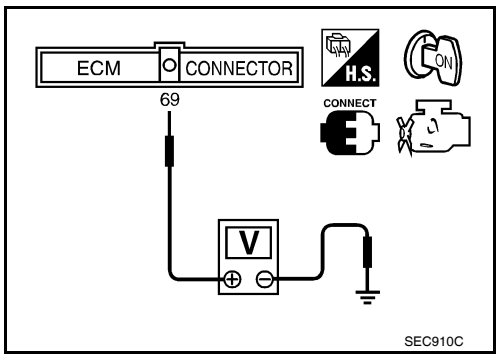
YES >> INSPECTION END
NO >> Go to EC-364, "Diagnosis Procedure".

Component Function Check

INFOID:0000000004780247

1. PERFORM COMPONENT FUNCTION CHECK

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



ECM		Ground	Condition		Voltage
Connector	Terminal				
F11	69 (PNP switch signal)	Ground	Selector lever	P or N (A/T) Neutral (M/T)	Approx. 0 V
				Except above	Battery voltage

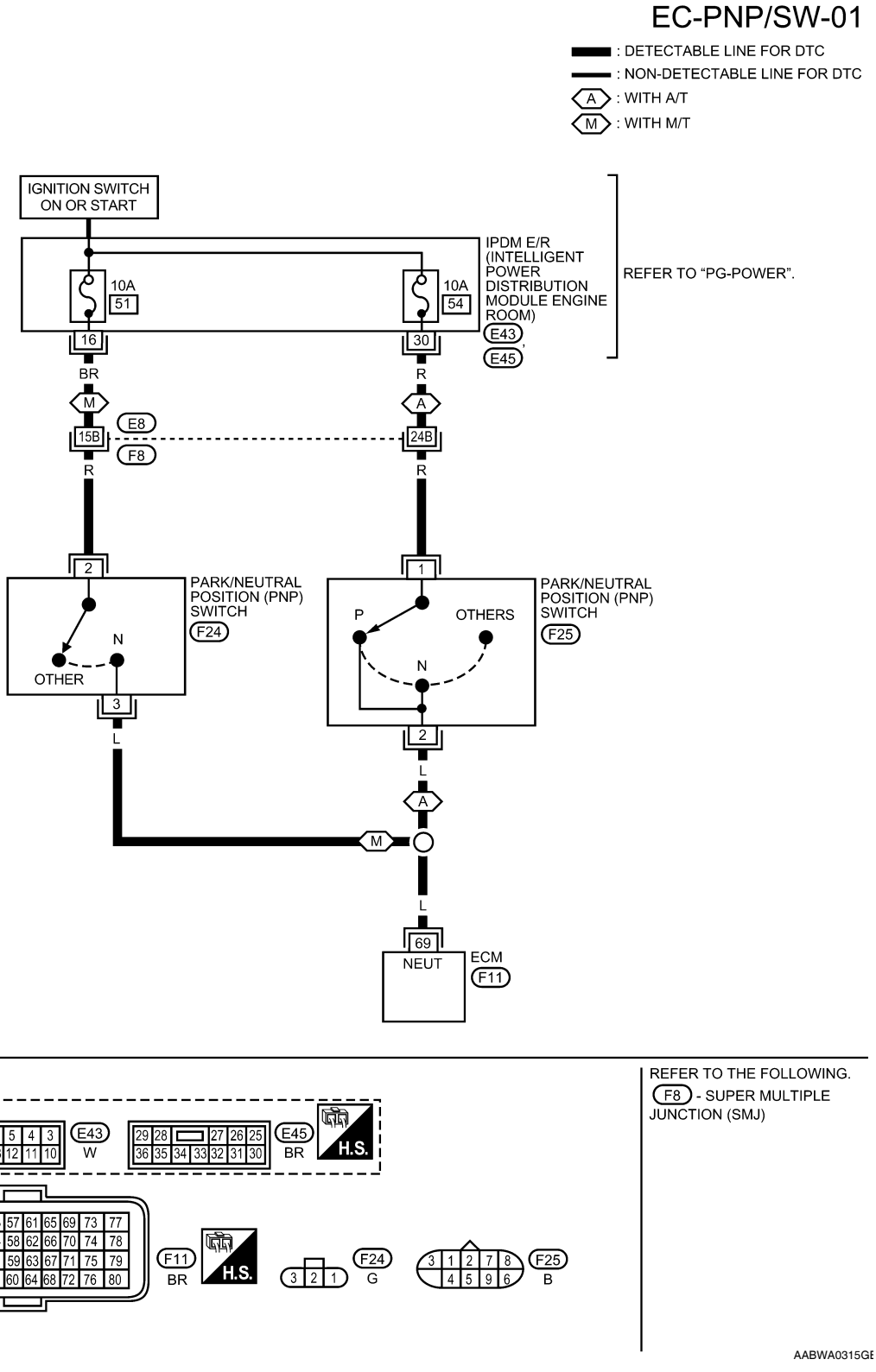
Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-364, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004780694

EC-PNP/SW-01



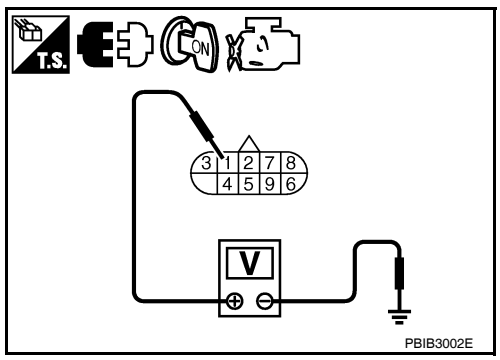
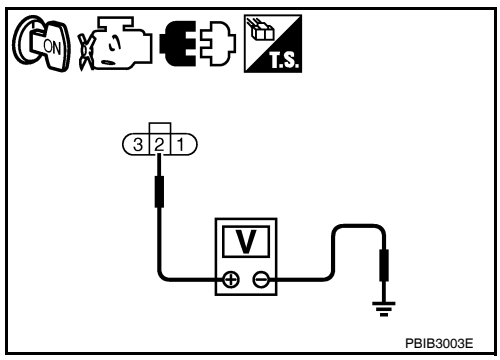
Diagnosis Procedure

INFOID:0000000004780248

1. CHECK PNP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.
3. Turn ignition switch ON.

4. Check the voltage between PNP switch harness connector and ground.

A/T	M/T
	
PBIB3002E	PBIB3003E

PNP switch		Ground	Voltage
Connector	Terminal		
F25 (A/T)	1	Ground	Battery voltage
F24 (M/T)	2		

Is the inspection result normal?

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

2. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- IPDM E/R harness connector E43 (M/T)
- IPDM E/R harness connector E45 (A/T)
- 10 A fuse (No. 51) (M/T)
- 10 A fuse (No. 54) (A/T)
- Harness for open or short between PNP switch and fuse

Is the inspection result normal?

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

3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

PNP switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F25 (A/T)	2	F11	69	Existed
F24 (M/T)	3			

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 PNP SWITCH

Refer to AT-95, "Component Inspection" (A/T) or MT-12, "Checking" (M/T).

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace PNP switch.

5.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

>> INSPECTION END

P1148 CLOSED LOOP CONTROL

DTC Logic

INFOID:0000000004780249

DTC DETECTION LOGIC

NOTE:
DTC P1148 is displayed with another DTC for A/F sensor 1.
Perform the trouble diagnosis for the corresponding DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1148	Closed loop control function	The closed loop control function for bank 1 does not operate even when vehicle is driving in the specified condition.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • A/F sensor 1 • A/F sensor 1 heater
		The closed loop control function for bank 2 does not operate even when vehicle is driving in the specified condition.	

P1217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000004780250

DTC DETECTION LOGIC

NOTE:

- **If DTC P1217 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P1217 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-357, "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-11, "Changing Engine Coolant". Also, replace the engine oil. Refer to LU-8, "Draining" and LU-8, "Refilling".

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-15, "Anti-freeze Coolant Mixture Ratio".**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-368, "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-369, "Diagnosis Procedure".

Component Function Check

INFOID:0000000004780251

1.PERFORM COMPONENT FUNCTION CHECK-I

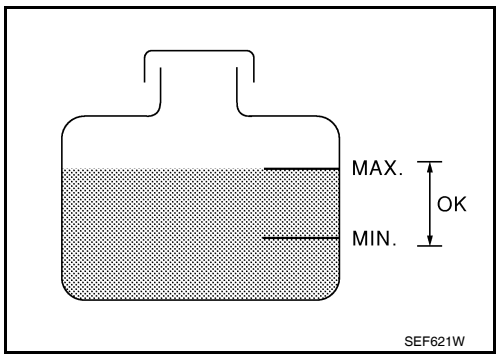
WARNING:

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-369, "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-369, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

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

Without CONSULT-III
Perform IPDM E/R auto active test and check cooling fan motor operation. Refer to PG-19, "Auto Active Test".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-369, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004780252

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 motor operates at each speed (LOW/HI).

Without CONSULT-III
1. Perform IPDM E/R auto active test and check cooling fan motor operation. Refer to PG-19, "Auto Active Test".
2. Make sure that cooling fan motor operates at each speed (Low/High).

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-424, "Diagnosis Procedure".

2.CHECK COOLING SYSTEM FOR LEAK-I

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

Is leakage detected?

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

3.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak.
- Hose (Refer to CO-11, "Inspection".)
- Radiator (Refer to CO-14, "Checking Radiator".)
- Water pump (Refer to CO-21, "Inspection".)

>> Repair or replace malfunctioning part.

4.CHECK RADIATOR CAP

Check radiator cap. Refer to CO-14, "Checking Radiator Cap".

Is the inspection result normal?

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

5.CHECK THERMOSTAT

Check thermostat. Refer to CO-23, "Inspection".

Is the inspection result normal?

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

6.CHECK WATER CONTROL VALVE

Check water control valve. Refer to CO-23, "Inspection".

Is the inspection result normal?

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

7.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-169, "Component Inspection".

Is the inspection result normal?

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

8.CHECK MAIN 12 CAUSES

If the cause cannot be isolated, check the following.

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	MA-15, "Anti-freeze Coolant Mixture Ratio"	
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-11, "Inspection"
	4	• Radiator cap	• Pressure tester	CO-14, "Checking Radiator Cap"	
ON*2	5	• Coolant leaks	• Visual	No leaks	CO-11, "Inspection"
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	CO-23, "Inspection"
ON*1	7	• Cooling fan motor	• CONSULT-III	Operating	EC-422, "Component Function Check"
OFF	8	• Combustion gas leak	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	CO-11, "Inspection"
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	CO-25, "Inspection"
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-82, "Disassembly and Assembly"
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	EM-103, "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-7, "Troubleshooting Chart".

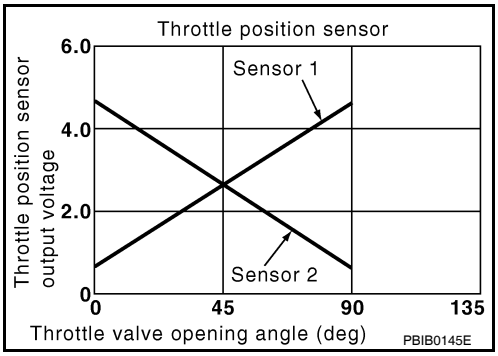
>> INSPECTION END

P1225 TP SENSOR

Description

INFOID:0000000004780253

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



DTC Logic

INFOID:0000000004780254

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-372, "Diagnosis Procedure".
NO >> INSPECTION END

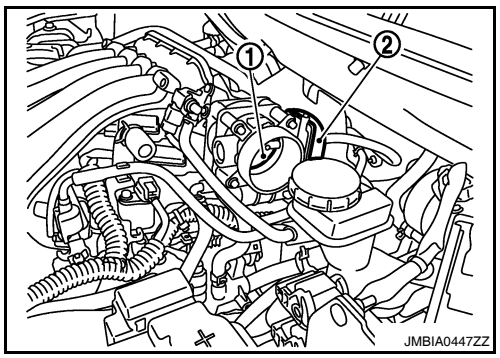
Diagnosis Procedure

INFOID:0000000004780255

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.
- Electric throttle control actuator (2)



Is the inspection result normal?

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

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-373, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000004780256

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-32, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

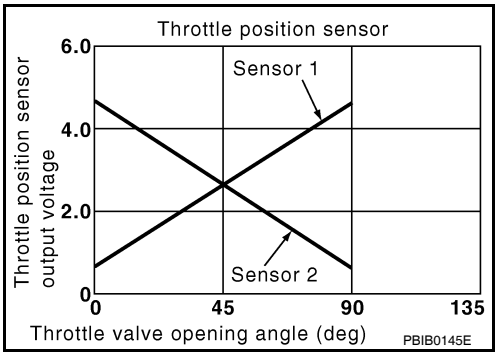
>> END

P1226 TP SENSOR

Description

INFOID:0000000004780257

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



DTC Logic

INFOID:0000000004780258

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF, wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 2 and 3 for 32 times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-374, "Diagnosis Procedure".
NO >> INSPECTION END

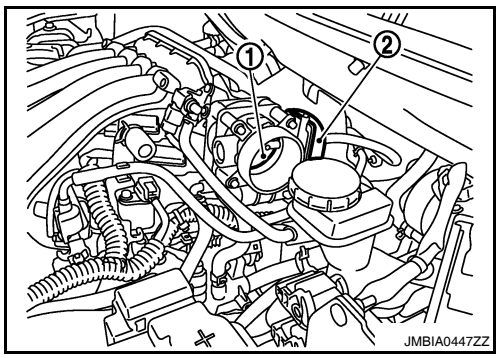
Diagnosis Procedure

INFOID:0000000004780259

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.
- Electric throttle control actuator (2)



Is the inspection result normal?

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

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-375, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000004780260

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-32, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

P1421 COLD START CONTROL

Description

INFOID:0000000004780261

ECM controls ignition timing and engine idle speed when engine is started with pre-warming up condition. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

DTC Logic

INFOID:0000000004780262

DTC DETECTION LOGIC

NOTE:
If DTC P1421 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1421	Cold start emission reduction strategy monitoring	ECM does not control ignition timing and engine idle speed properly when engine is started with pre-warming up condition.	• Lack of intake air volume • Fuel injection system • 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 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-III
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Check that the “COOLAN TEMP/S” indication is between 4°C (39°F) and 36°C (97°F).
   If “COOLAN TEMP/S” indication is within the specified value, go to the following step.
   If “COOLAN TEMP/S” indication is out of the specified value, cool engine down or warm engine up and go to step 1.
5. Start engine and let it idle for 5 minutes.
6. Check 1st trip DTC.

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

Is 1st trip DTC detected?

YES >> Go to EC-376, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000004780263

1.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-32, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 2.
NO >> Follow the instruction of Idle Air Volume Learning.

2.CHECK INTAKE SYSTEM

Check for the cause of intake air volume lacking. Refer to the following.
- Crushed intake air passage
- Intake air passage clogging

Is the inspection result normal?

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

3. CHECK FUEL INJECTION SYSTEM FUNCTION

Perform DTC CONFIRMATION PROCEDURE for DTC P0171. Refer to EC-229, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Go to EC-231, "Diagnosis Procedure" for DTC P0171.

4. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase 1st trip DTC. Refer to “How to Erase DTC and 1st Trip DTC” in EC-90, "Diagnosis Description".
3. Perform DTC CONFIRMATION PROCEDURE. Refer to EC-376, "DTC Logic".

Is the 1st trip DTC P1421 displayed again?

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

5. REPLACE ECM

1. Replace ECM.
2. Perform EC-29, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> INSPECTION END

P1715 INPUT SPEED SENSOR (PRIMARY SPEED SENSOR)

Description

INFOID:0000000004780294

ECM receives primary speed sensor signal from TCM via the CAN communication line. ECM uses this signal for engine control.

DTC Logic

INFOID:0000000004780295

DTC DETECTION LOGIC

NOTE:

- **If DTC P1715 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC U1000,XXXX.**
- **If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to EC-263, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0340, first perform the trouble diagnosis for DTC P0340. Refer to EC-268, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-355, "DTC Logic".**
- **If DTC P1715 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-357, "DTC Logic".**

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and drive the vehicle at more than 50 km/h (31 MPH) for at least 5 seconds.
   CAUTION:
   Always drive vehicle at a safe speed.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-378, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000004780296

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-39, "OBD-II Diagnostic Trouble Code (DTC)".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM.

>> INSPECTION END

P1805 BRAKE SWITCH

Description

INFOID:0000000004780297

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:0000000004780298

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.

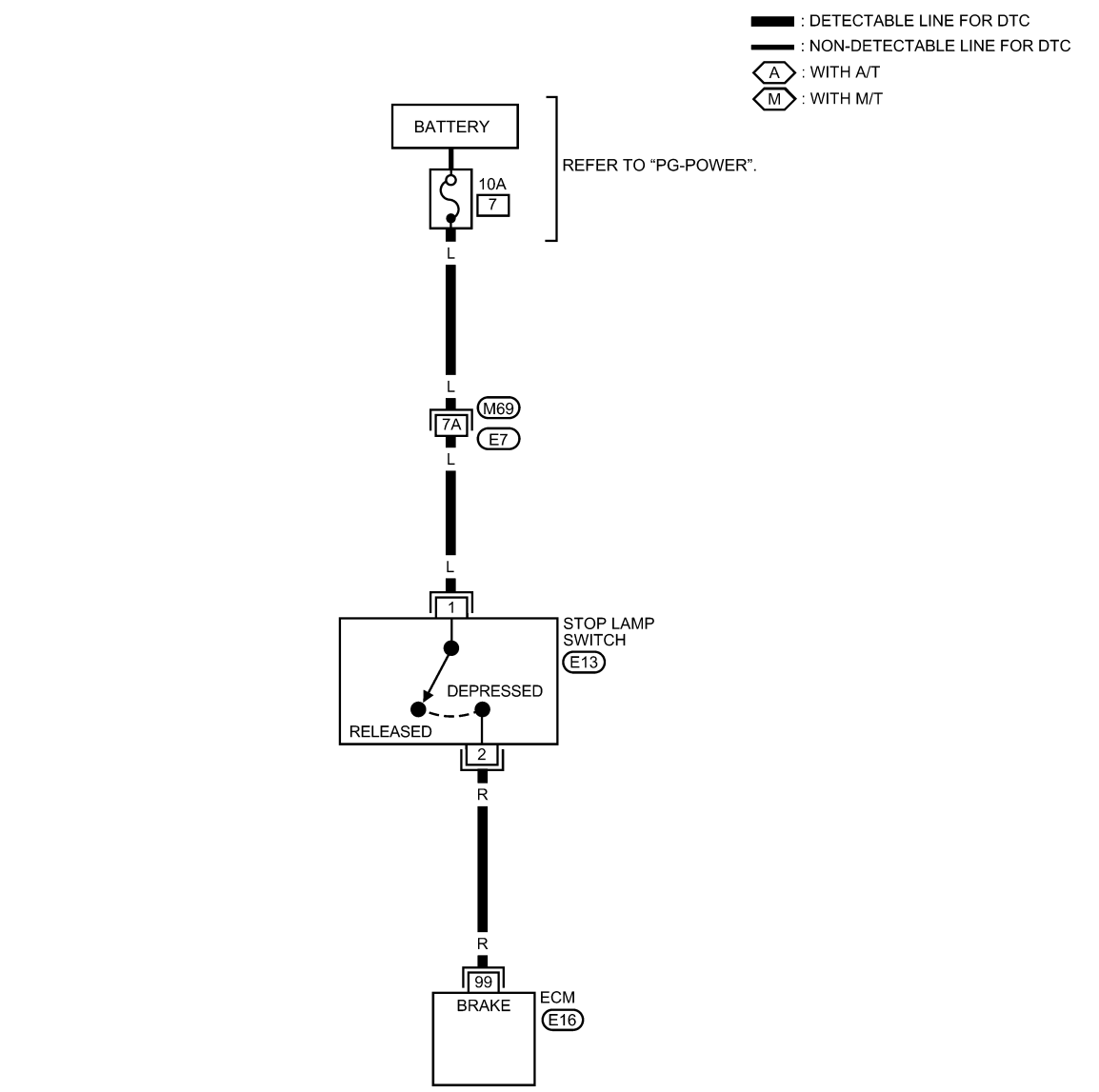
Is 1st trip DTC detected?

YES >> Go to EC-381, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780697

EC-BRK/SW-01



AABWA0316GE

Diagnosis Procedure

INFOID:0000000004780299

1. CHECK STOP LAMP SWITCH CIRCUIT

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

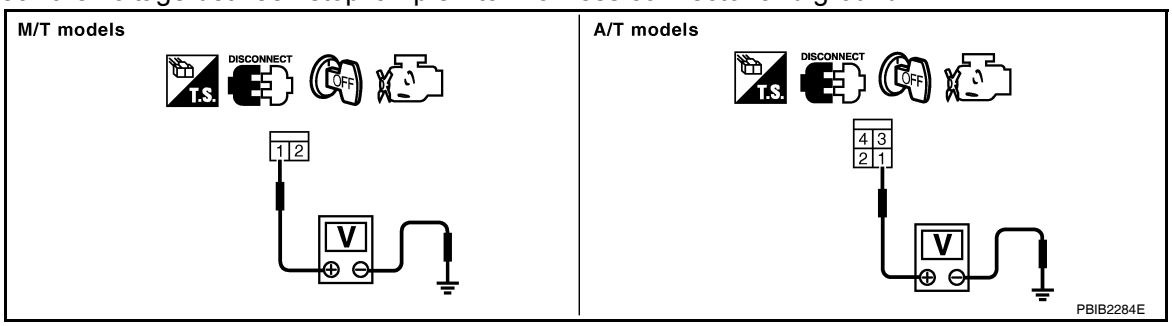
Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

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

2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

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



Stop lamp switch		Ground	Voltage
Connector	Terminal		
E13	1	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, M69
- 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	
E16	99	E13	2	Existed

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

Is the inspection result normal?

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

5.CHECK STOP LAMP SWITCH

Refer to EC-383, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace stop lamp switch.

6.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

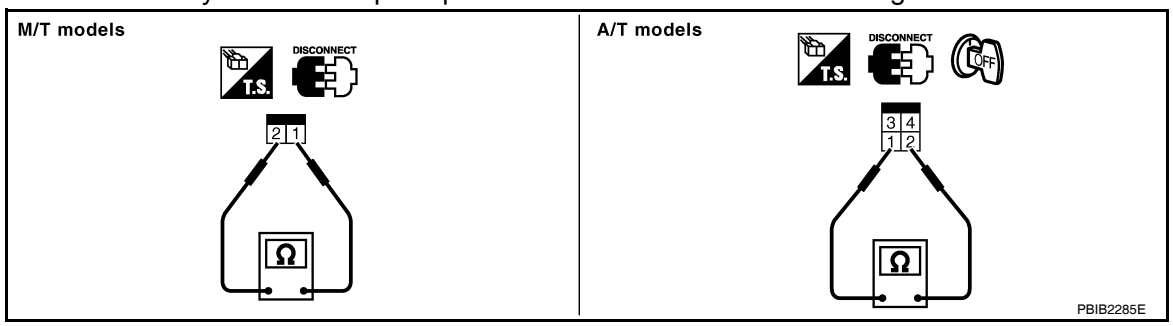
>> INSPECTION END

Component Inspection (Stop Lamp Switch)

INFOID:0000000004780300

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals under the following conditions.



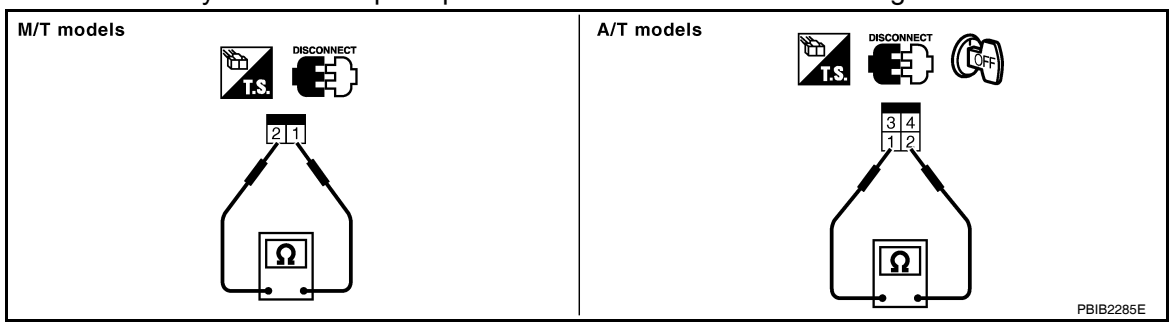
Terminals	Condition		Continuity
1 and 2	Brake pedal	Fully released	Not existed
		Slightly depressed	Existed

Is the inspection result normal?

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

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to BR-6, "Inspection and Adjustment".
2. Check the continuity between stop lamp switch terminals under the following conditions.



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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch.

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

Description

INFOID:0000000004780301

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:0000000004780302

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-385, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

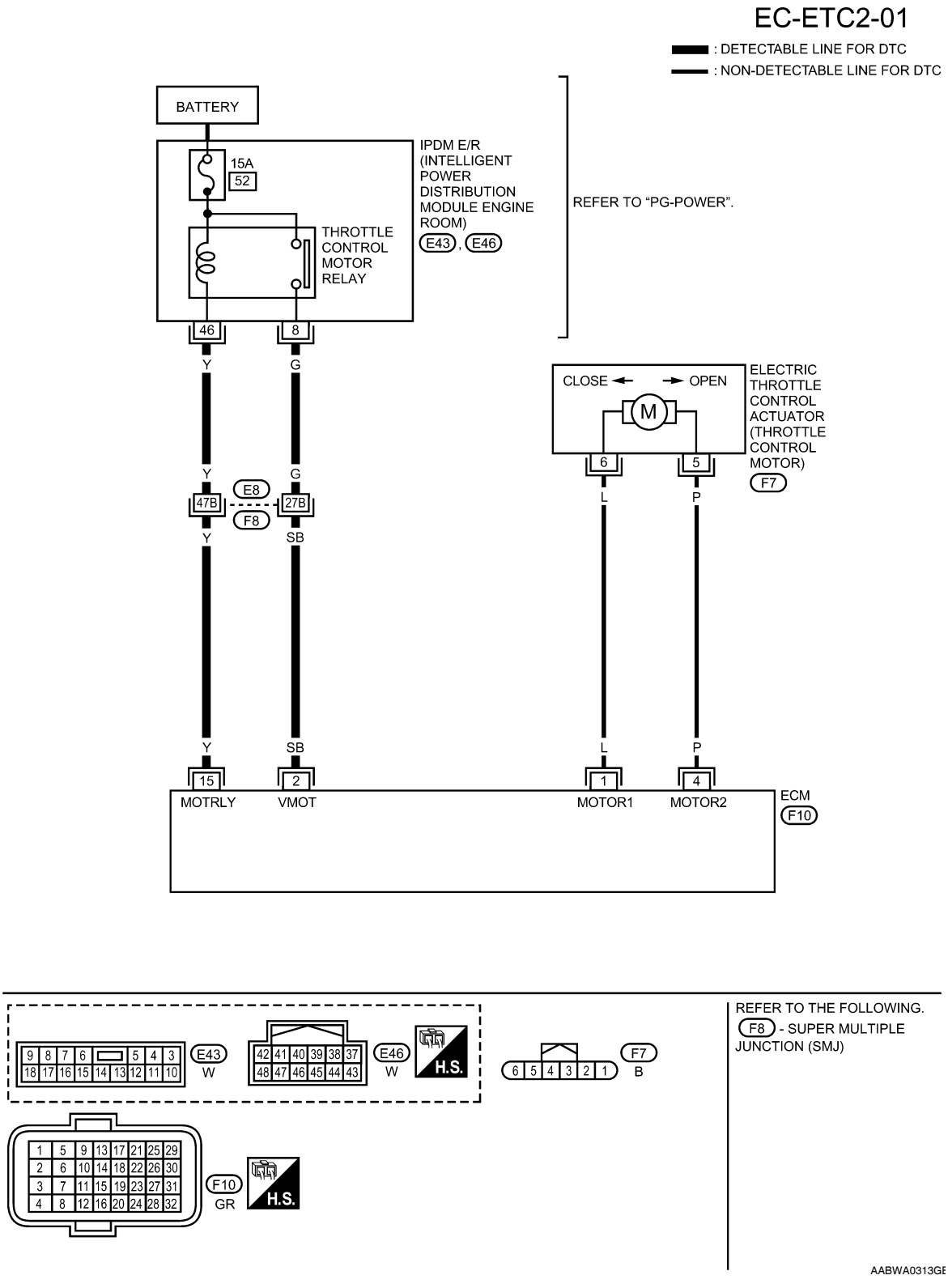
1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

YES >> Go to EC-385, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780698



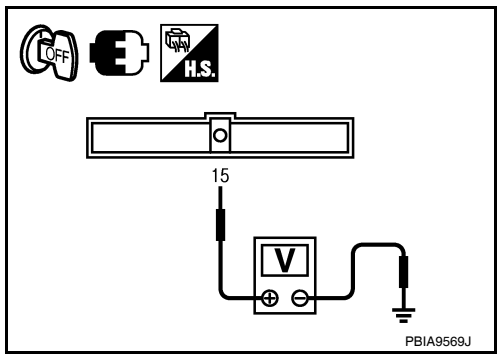
Diagnosis Procedure

INFOID:0000000004780303

1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.

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



ECM		Ground	Voltage
Connector	Terminal		
F10	15	Ground	Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 2.

2.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

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

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

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

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

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

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

4.CHECK FUSE

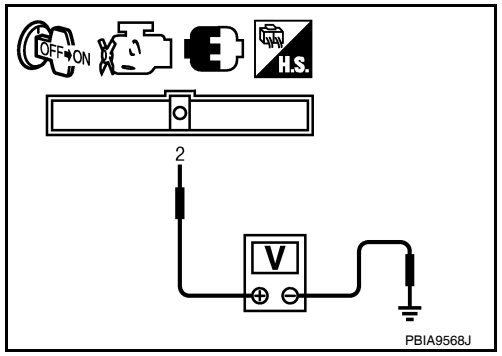
1. Disconnect 15 A fuse (No. 52) from IPDM E/R.
2. Check 15 A fuse for blown.

Is the inspection result normal?

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

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

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



ECM		Ground	Condition	Voltage
Connector	Terminal			
F10	2	Ground	Ignition switch: OFF	Approximately 0 V
			Ignition switch: ON	Battery voltage

OK or NG

OK >> GO TO 8.
NG >> GO TO 6.

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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector.

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

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

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

Is the inspection result normal?

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

7. DETECT MALFUNCTIONING PART

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

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

8. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

Is the inspection result normal?

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

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:0000000004780304

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM. ECM controls the throttle valve opening angle in response to driving condition via the throttle control motor.

DTC Logic

INFOID:0000000004780305

DTC DETECTION LOGIC

NOTE:

- **If DTC P2101 is displayed with DTC P2100, first perform the trouble diagnosis for DTC P2100. Refer to EC-384, "DTC Logic".**
- **If DTC P2101 is displayed with DTC P2119, first perform the trouble diagnosis for DTC P2119. Refer to EC-397, "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

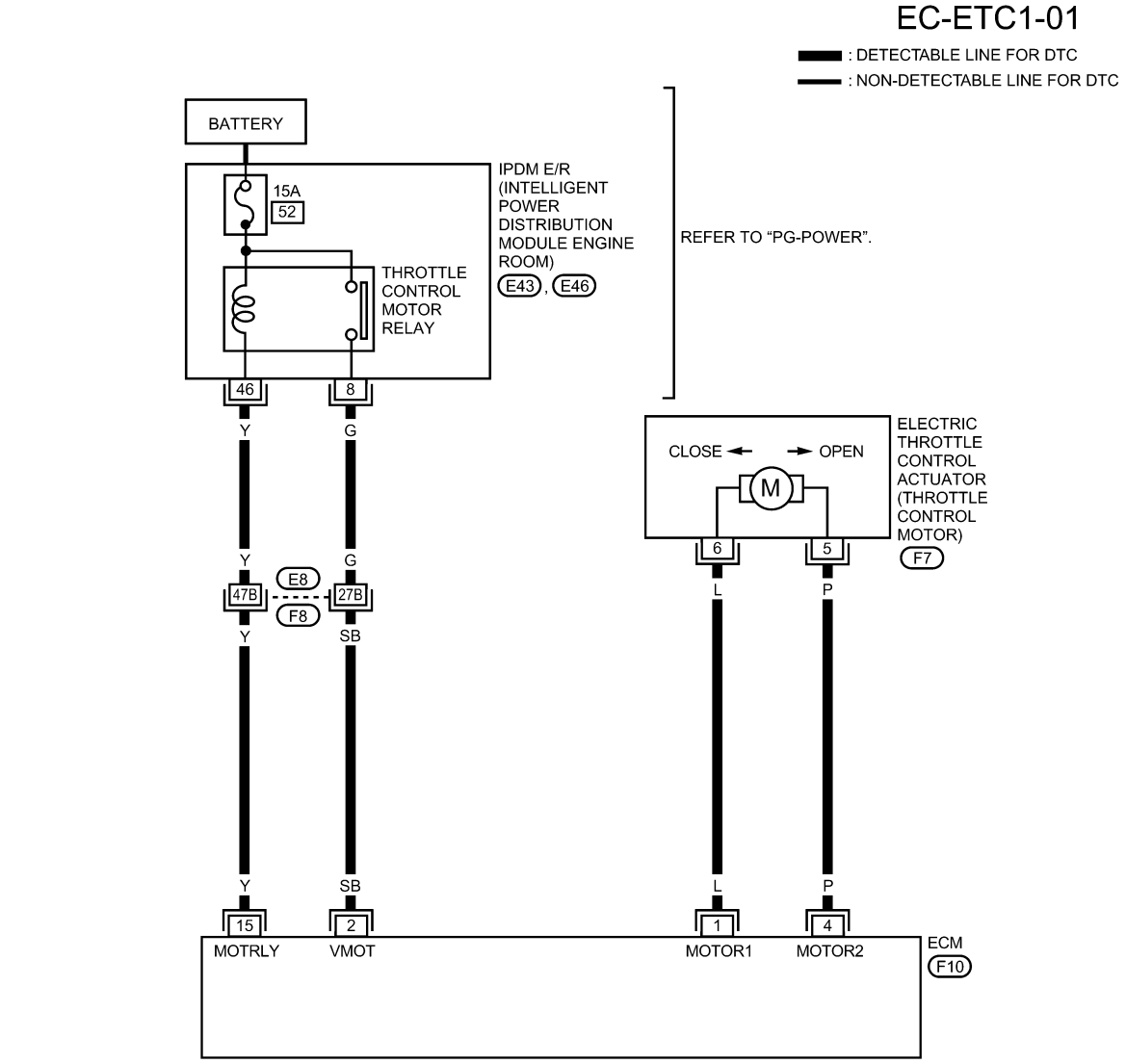
1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

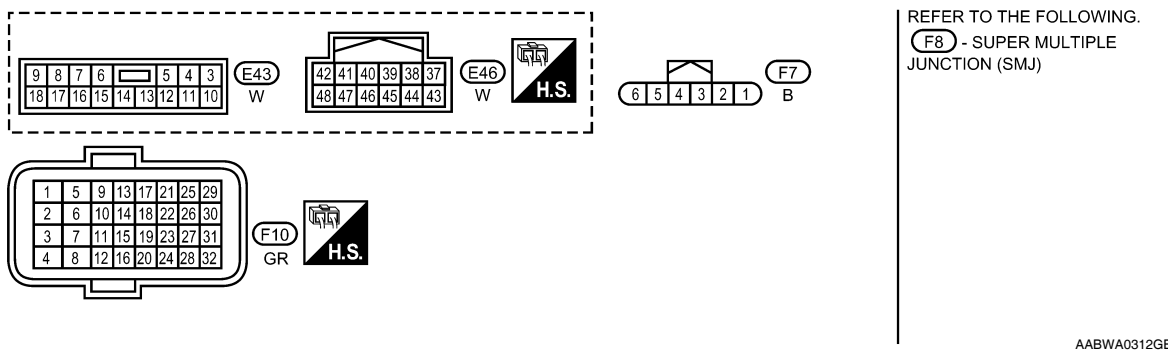
Is DTC detected?

YES >> Go to EC-389, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780699





Diagnosis Procedure

INFOID:0000000004780306

1. CHECK GROUND CONNECTION

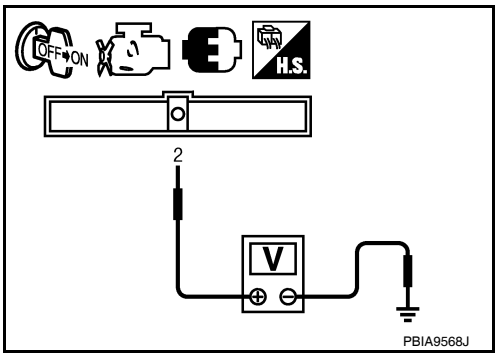
1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

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 under the following conditions.



ECM		Ground	Condition	Voltage
Connector	Terminal			
F10	2	Ground	Ignition switch: OFF	Approx. 0 V
			Ignition switch: ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 3.

3.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

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

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

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

Is the inspection result normal?

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

4.DETECT MALFUNCTIONING PART

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

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

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

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

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

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

Is the inspection result normal?

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

6.DETECT MALFUNCTIONING PART

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

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

7.CHECK FUSE

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

Is the inspection result normal?

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

8.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

Is the inspection result normal?

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

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

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

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	5	F10	1	Not existed
			4	Existed
	6		1	Existed
			4	Not existed

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

Is the inspection result normal?

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

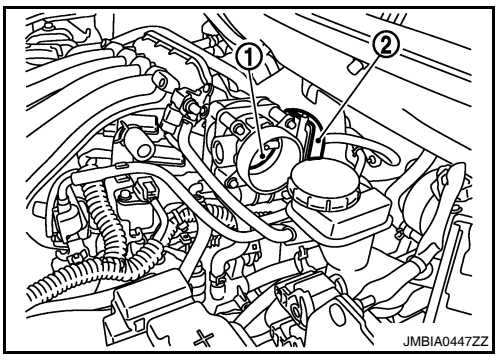
10.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

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

- Electric throttle control actuator (2)

Is the inspection result normal?

YES >> GO TO 11.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.



11.CHECK THROTTLE CONTROL MOTOR

Refer to EC-392, "Component Inspection".

Is the inspection result normal?

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

12.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 13.

NO >> Repair or replace harness or connectors.

13.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace malfunction electric throttle control actuator.
2. Perform EC-392, "Special Repair Requirement".

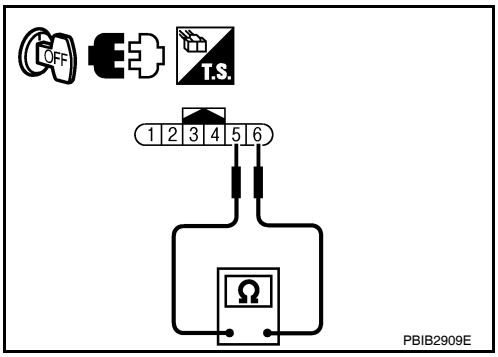
>> INSPECTION END

Component Inspection

INFOID:0000000004780307

1.CHECK THROTTLE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Check the resistance between electric throttle control actuator terminals as per the following.



Terminals	Resistance
5 and 6	Approx. 1 - 15 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-392, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000004780461

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-32, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

P2118 THROTTLE CONTROL MOTOR

Description

INFOID:0000000004780309

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM. ECM controls the throttle valve opening angle in response to driving conditions via the throttle control motor.

DTC Logic

INFOID:0000000004780310

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

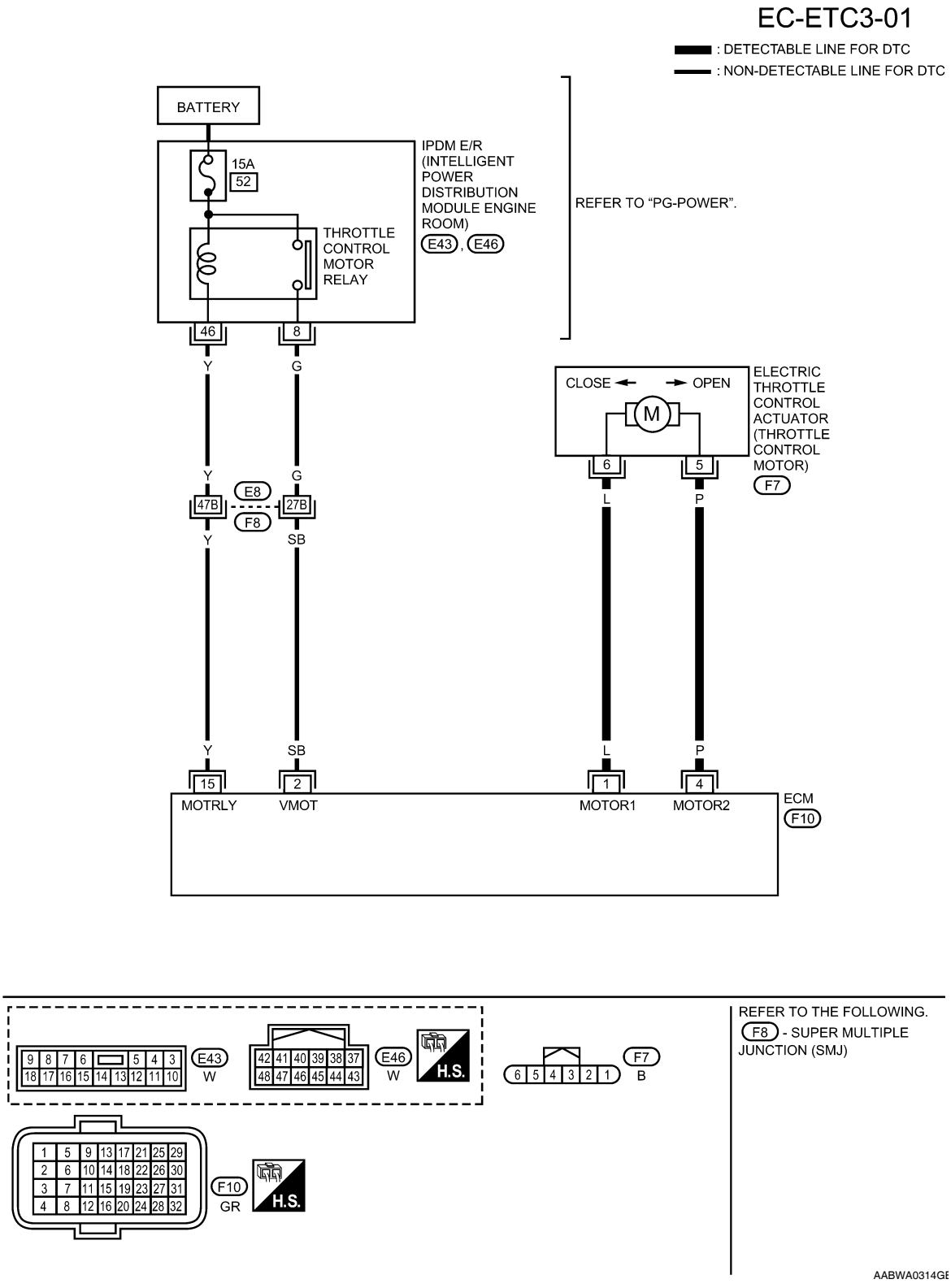
1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Go to EC-394, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780700



Diagnosis Procedure

INFOID:0000000004780311

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect electric throttle control actuator harness connector.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	5	F10	1	Not existed
			4	Existed
	6		1	Existed
			4	Not existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK THROTTLE CONTROL MOTOR

Refer to EC-395, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 5.

4.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

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. Perform EC-396, "Special Repair Requirement".

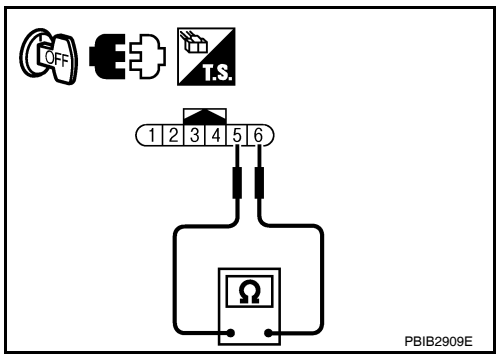
>> INSPECTION END

Component Inspection

INFOID:0000000004805949

1.CHECK THROTTLE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Check the resistance between electric throttle control actuator terminals as per the following.



Terminals	Resistance
5 and 6	Approx. 1 - 15 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-396, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000004780462

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-32, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

>> END

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

Description

INFOID:0000000004780314

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The throttle position sensor detects the throttle valve position, and feeds the voltage signal to the ECM. The ECM judges the current opening angle of the throttle valve and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.

DTC Logic

INFOID:0000000004780315

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 selector lever to D (A/T) or 1st (M/T) position and wait at least 3 seconds.
3. Set selector lever to P (A/T) 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 selector lever to D (A/T) or 1st (M/T) position and wait at least 3 seconds.
7. Set selector lever to P (A/T) 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-397, "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 selector lever to D (A/T) or 1st (M/T) position and wait at least 3 seconds.
3. Set selector lever to P (A/T) 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-397, "Diagnosis Procedure".
NO >> INSPECTION END

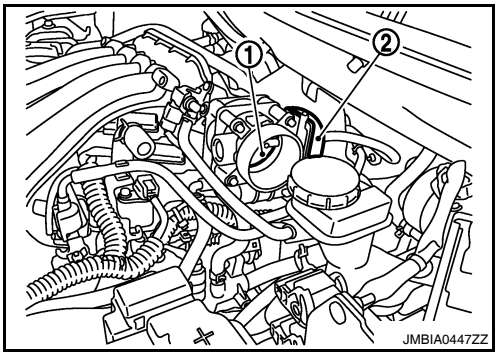
Diagnosis Procedure

INFOID:0000000004780316

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.
- Electric throttle control actuator (2)



Is the inspection result normal?

YES >> GO TO 2.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-398, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000004780463

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-32, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

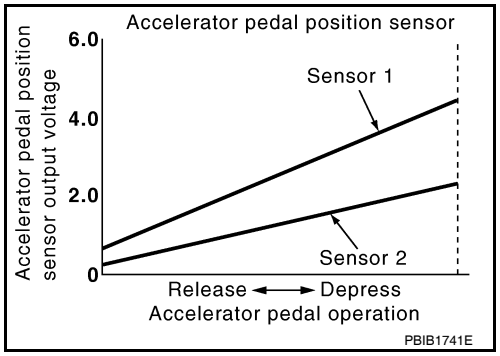
>> END

P2122, P2123 APP SENSOR

Description

INFOID:0000000004780318

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:0000000004780319

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-358, "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.

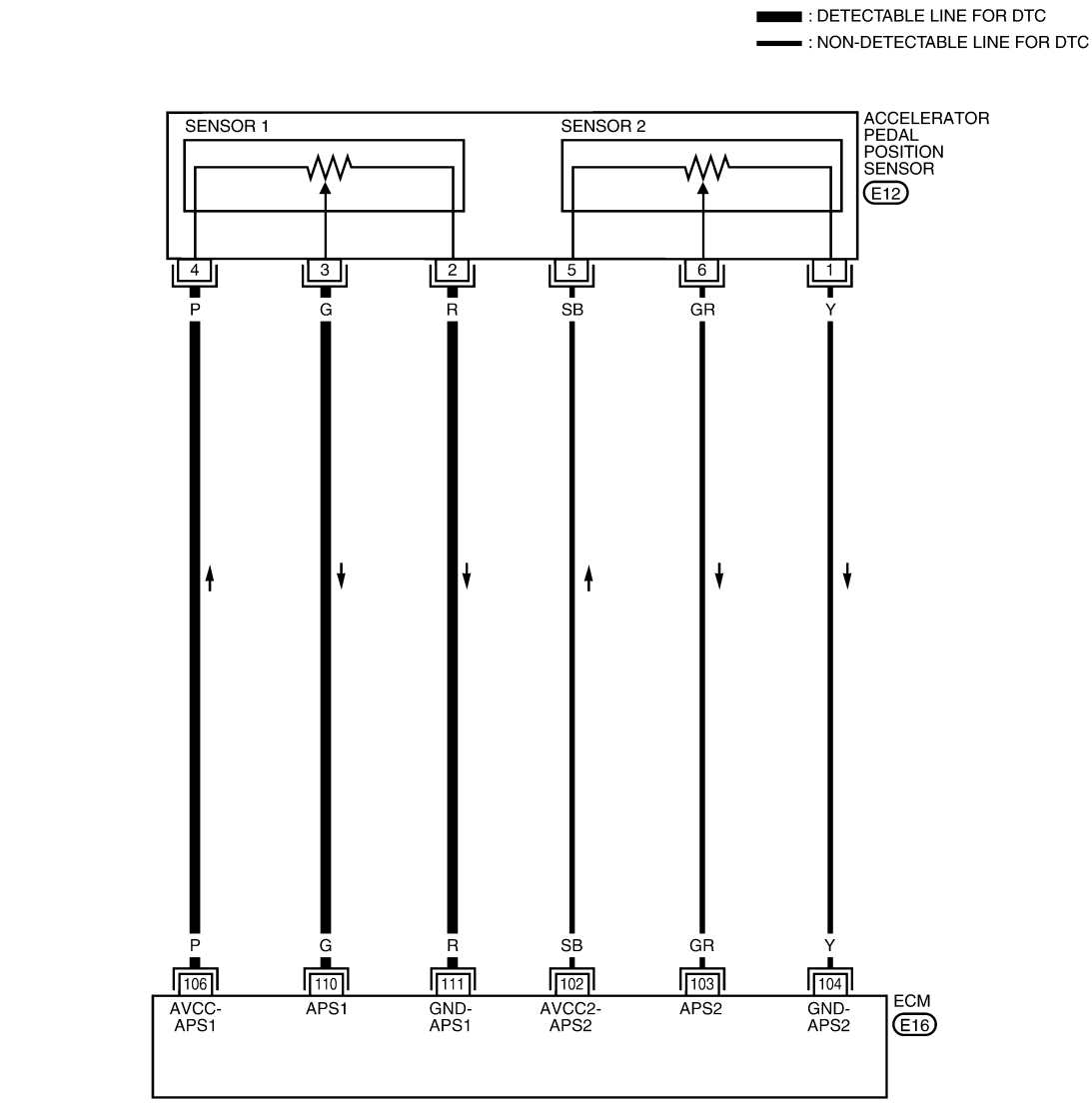
Is DTC detected?

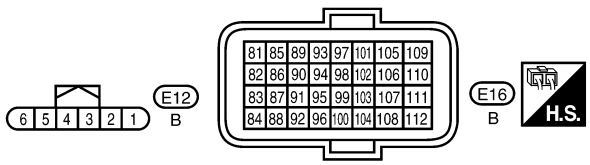
YES >> Go to EC-400, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780701

EC-APPS1-01





BBWA2652E

Diagnosis Procedure

INFOID:0000000004780320

1. CHECK GROUND CONNECTION

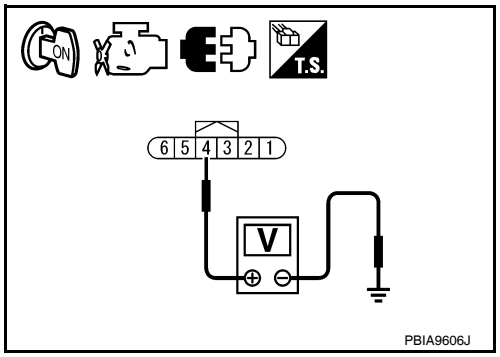
1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.



APP sensor		Ground	Voltage
Connector	Terminal		
E12	4	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	2	E16	111	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	3	E16	110	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-402, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-402, "Special Repair Requirement".

>> INSPECTION END

7. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

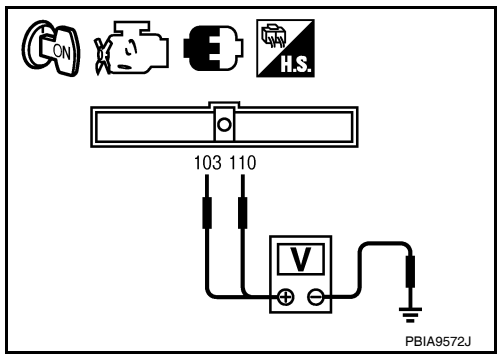
>> INSPECTION END

Component Inspection

INFOID:0000000004780321

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				
E16	110 (APP sensor 1 signal)	Ground	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	103 (APP sensor 2 signal)			Fully released	0.3 - 0.6 V
				Fully depressed	1.95 - 2.4 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-402, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000004780322

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-31, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-32, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

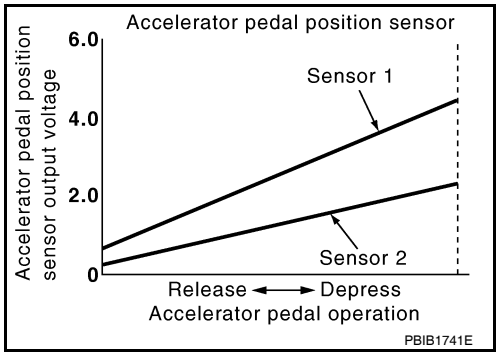
>> END

P2127, P2128 APP SENSOR

Description

INFOID:0000000004780323

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:0000000004780324

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.) (EVAP control system pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor • EVAP control system 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.

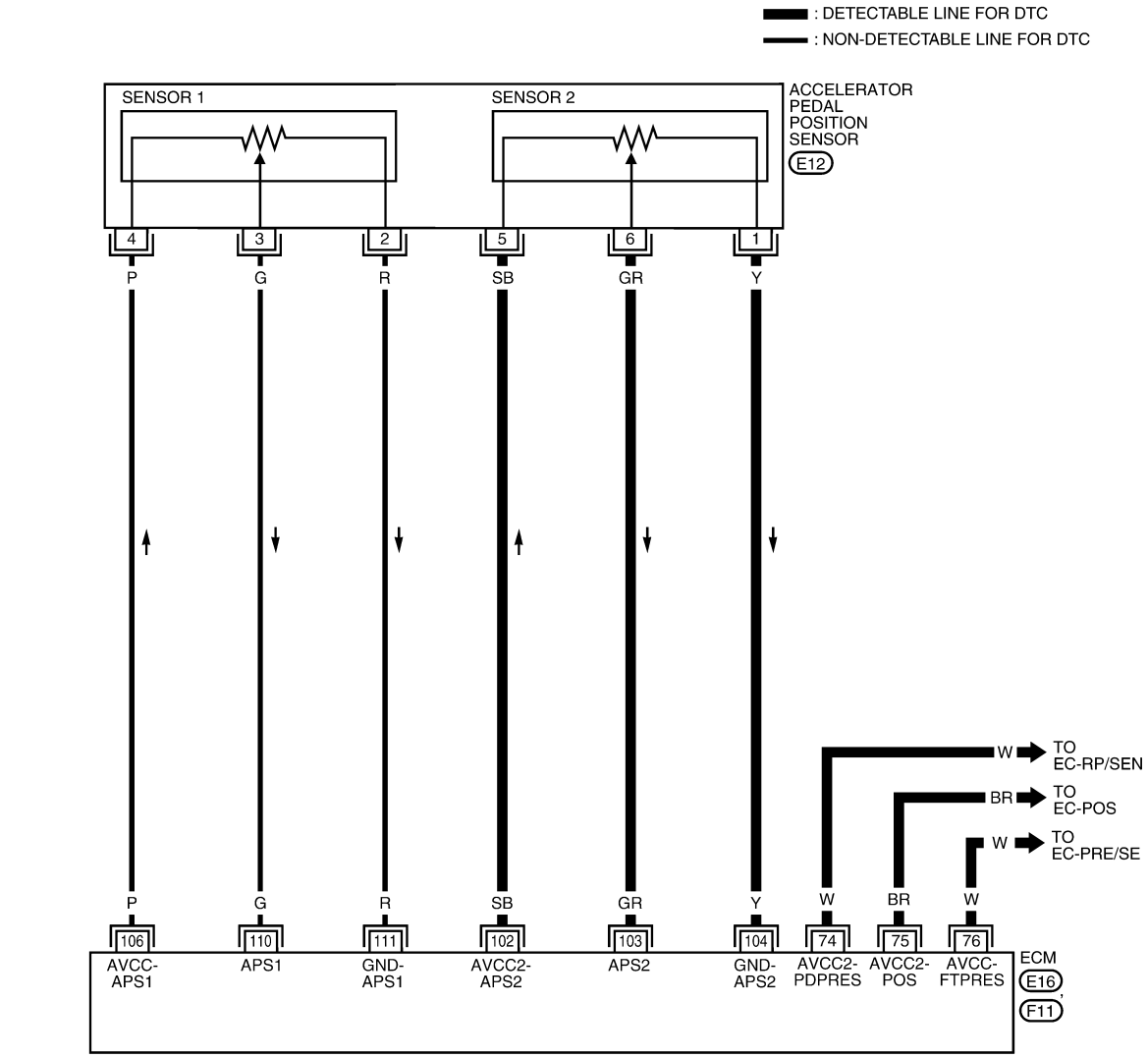
Is DTC detected?

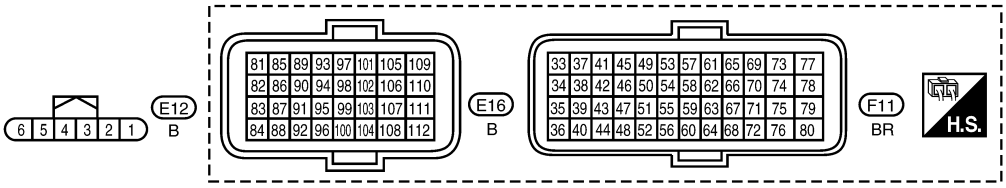
YES >> Go to EC-404, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780702

EC-APPS2-01





BBWA3074E

Diagnosis Procedure

INFOID:0000000004780325

1. CHECK GROUND CONNECTION

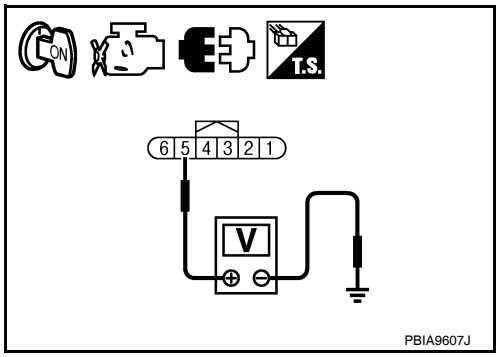
1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.



APP sensor		Ground	Voltage
Connector	Terminal		
E12	5	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	5	E16	102	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
	76	EVAP control system pressure sensor	B104	3
E16	102	APP sensor	E12	5

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair short to ground or short to power in harness or connectors.

5. CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-267, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-314, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-458, "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	
E12	1	E16	104	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	
E12	6	E16	103	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK APP SENSOR

Refer to EC-406, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 9.

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-407, "Special Repair Requirement".

>> INSPECTION END

10.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

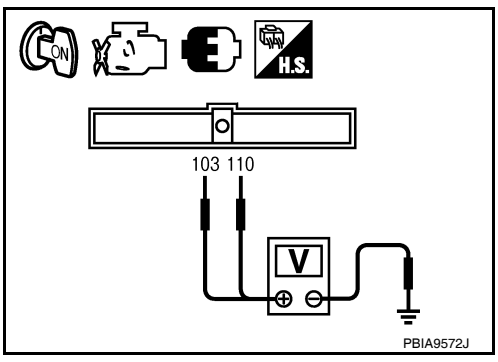
>> INSPECTION END

Component Inspection

INFOID:0000000004780326

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				
E16	110 (APP sensor 1 signal)	Ground	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	103 (APP sensor 2 signal)			Fully released	0.3 - 0.6 V
				Fully depressed	1.95 - 2.4 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-407, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000004780327

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-31, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-32, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

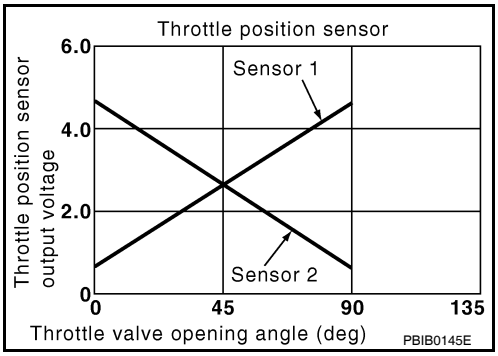
>> END

P2135 TP SENSOR

Description

INFOID:0000000004780448

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometer which transform the throttle valve position into output voltage, and emit the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle valve opening angle in response to driving conditions via the throttle control motor.



DTC Logic

INFOID:0000000004780329

DTC DETECTION LOGIC

NOTE:
If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-358, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135	Throttle position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	• Harness or connector (TP sensor 1 or 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1 or 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

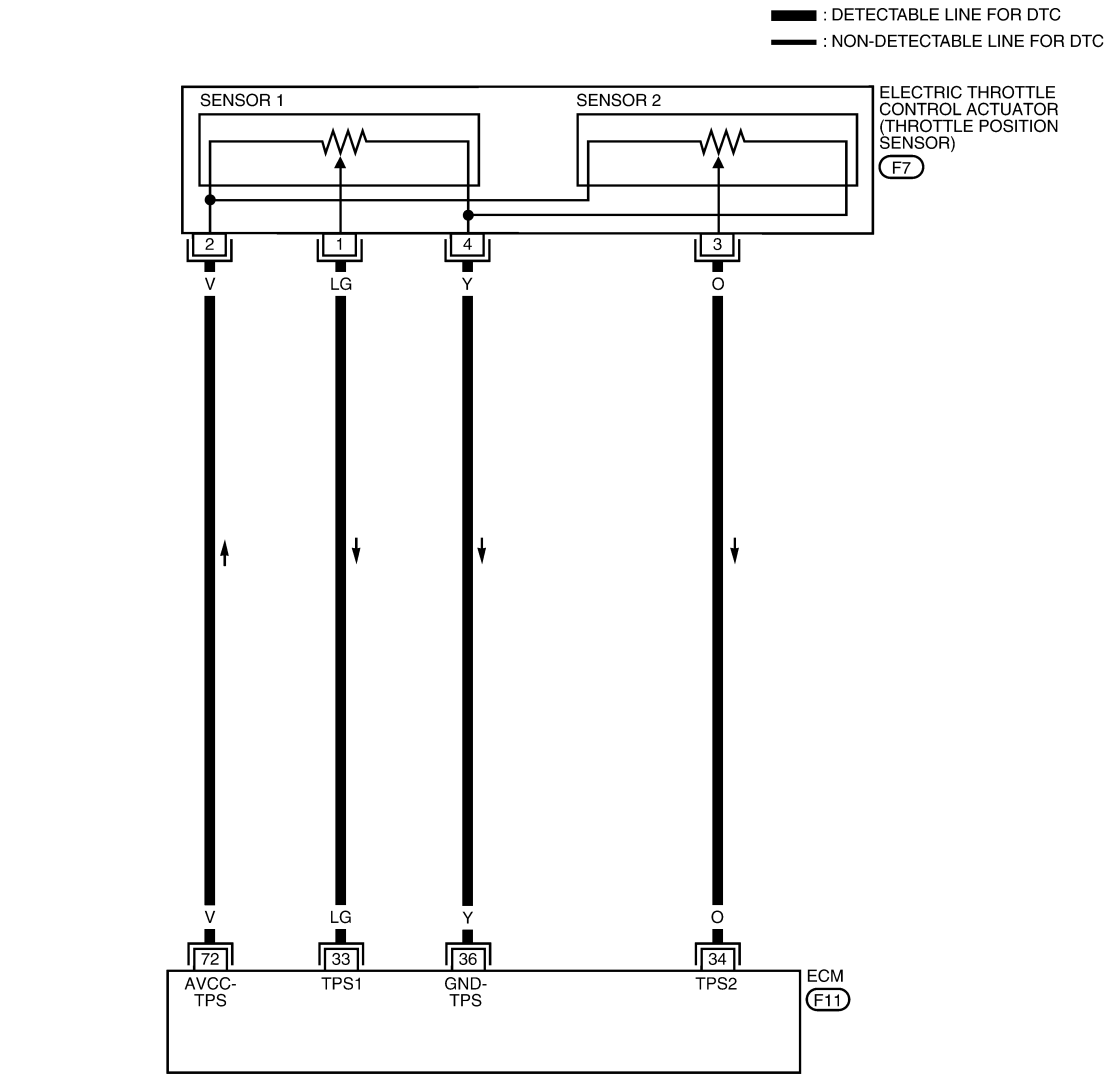
Is DTC detected?

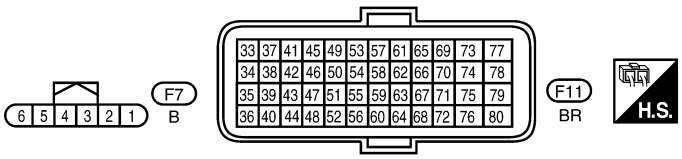
YES >> Go to EC-409, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780703

EC-TPS3-01





BBWA2657E

Diagnosis Procedure

INFOID:0000000004780330

1.CHECK GROUND CONNECTION

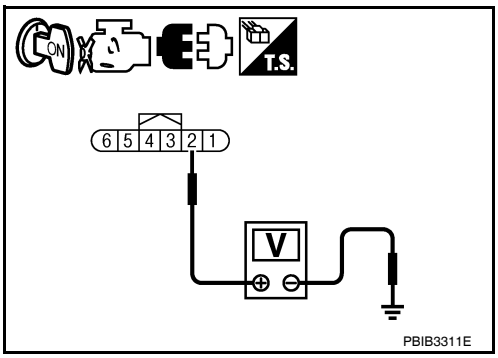
1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

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		
F7	2	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ground.

Electric throttle control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F7	4	F11	36	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 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	
F7	1	F11	33	Existed
	3		34	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 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-411, "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. Perform EC-411, "Special Repair Requirement".

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

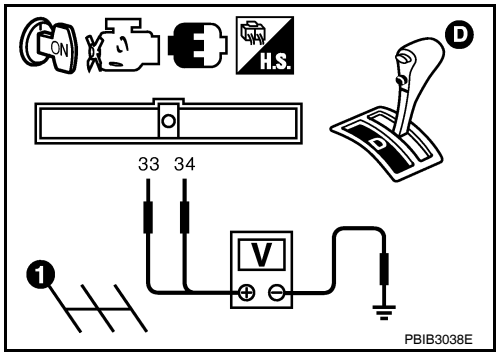
>> INSPECTION END

Component Inspection

INFOID:0000000004780449

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform EC-411, "Special Repair Requirement".
4. Turn ignition switch ON.
5. Set selector lever to D (A/T) or 1st (M/T) position.
6. Check the voltage between ECM harness connector and ground.



ECM		Ground	Condition		Voltage
Connector	Terminal				
F11	33 (TP sensor 1 signal)	Ground	Accelerator pedal	Fully released	More than 0.36V
				Fully de-pressed	Less than 4.75V
	34 (TP sensor 2 signal)			Fully released	Less than 4.75V
				Fully de-pressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-411, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000004780450

1.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement"

>> GO TO 2.

2.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-32, "IDLE AIR VOLUME LEARNING : Special Repair Requirement"

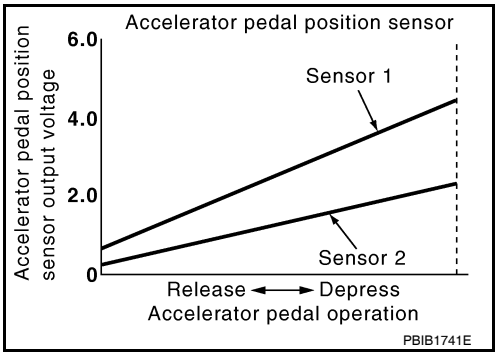
>> END

P2138 APP SENSOR

Description

INFOID:0000000004780333

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:0000000004780334

DTC DETECTION LOGIC

NOTE:
If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-358, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138	Accelerator pedal position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	• Harness or connector (APP sensor 1 or 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1 or 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor • EVAP control system 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.

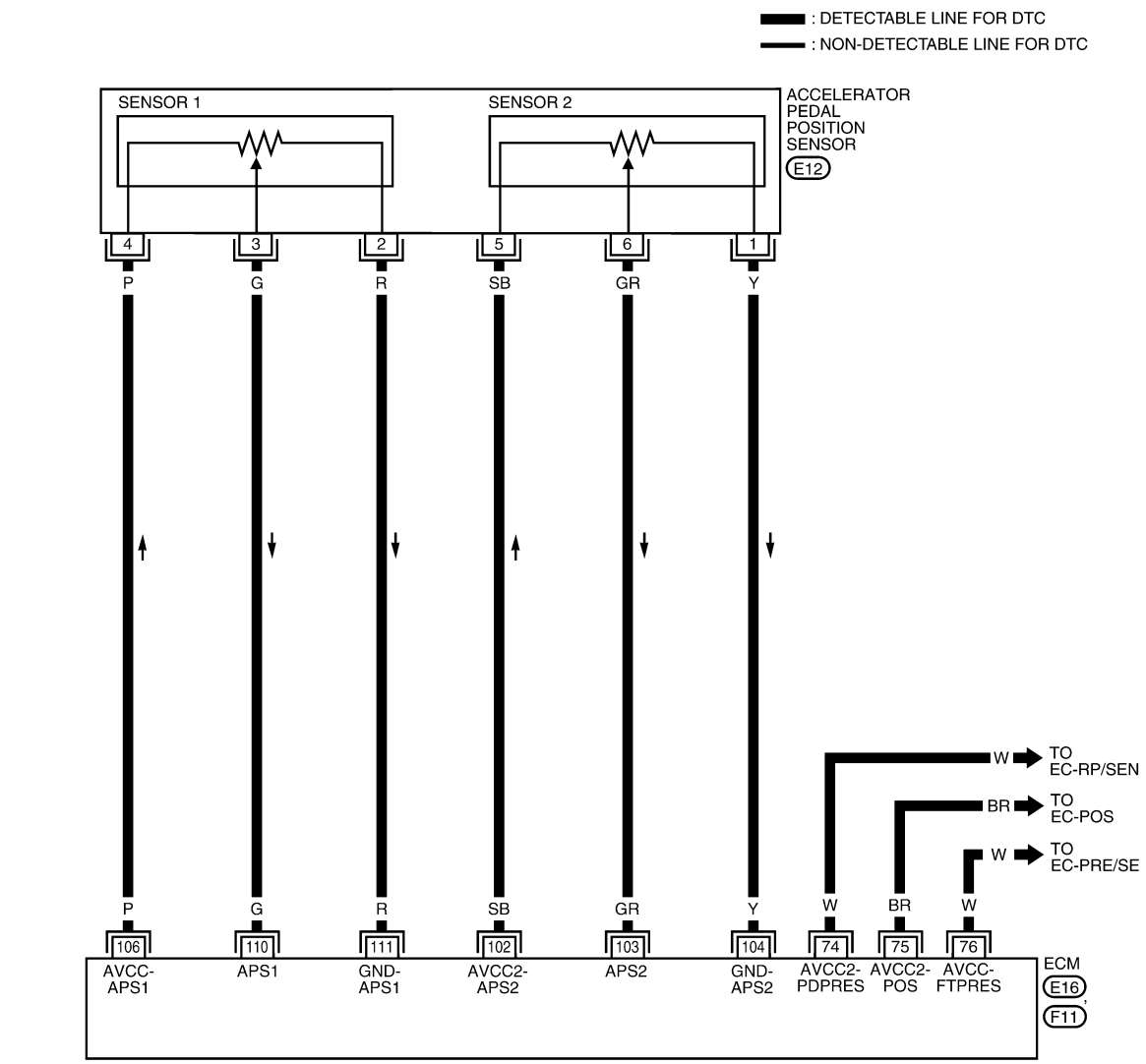
Is DTC detected?

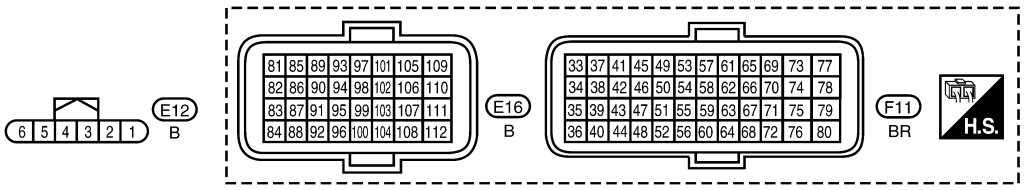
YES >> Go to EC-413, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780704

EC-APPS3-01





BBWA3075E

Diagnosis Procedure

INFOID:0000000004780335

1. CHECK GROUND CONNECTION

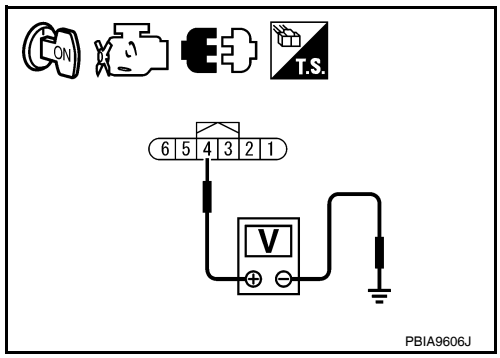
1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.



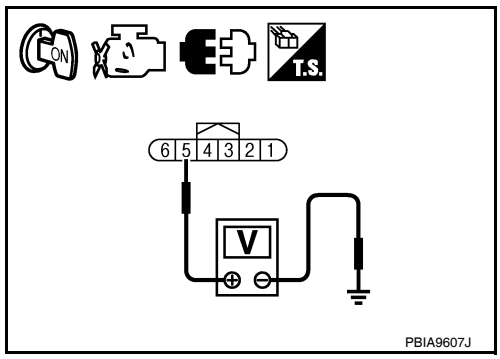
APP sensor		Ground	Voltage
Connector	Terminal		
E12	4	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Check the voltage between APP sensor harness connector and ground.



APP sensor		Ground	Voltage
Connector	Terminal		
E12	5	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 4.

4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	4	E16	106	Existed

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

5.CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F11	74	Refrigerant pressure sensor	E17	3
	75	CKP sensor (POS)	F15	1
	76	EVAP control system pressure sensor	B104	3
E16	102	APP sensor	E12	5

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair short to ground or short to power in harness or connectors.

6.CHECK COMPONENTS

Check the following.
- Crankshaft position sensor (POS) (Refer to EC-267, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-314, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-458, "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 per the following.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	2	E16	111	Existed
	1		104	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 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 per the following.

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E12	3	E16	110	Existed
	6		103	

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or shot to power in harness or connectors.

9.CHECK APP SENSOR

Refer to EC-416, "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. Perform EC-416, "Special Repair Requirement".

>> INSPECTION END

11.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

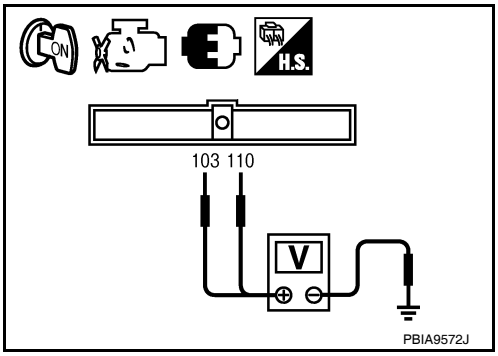
>> INSPECTION END

Component Inspection

INFOID:0000000004780336

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				
E16	110 (APP sensor 1 signal)	Ground	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	103 (APP sensor 2 signal)			Fully released	0.3 - 0.6 V
				Fully depressed	1.95 - 2.4 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-416, "Special Repair Requirement".

>> INSPECTION END

Special Repair Requirement

INFOID:0000000004780337

1.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-31, "ACCELERATOR PEDAL RELEASED POSITION LEARNING : Special Repair Requirement".

>> GO TO 2.

2.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-31, "THROTTLE VALVE CLOSED POSITION LEARNING : Special Repair Requirement".

>> GO TO 3.

3.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-32, "IDLE AIR VOLUME LEARNING : Special Repair Requirement".

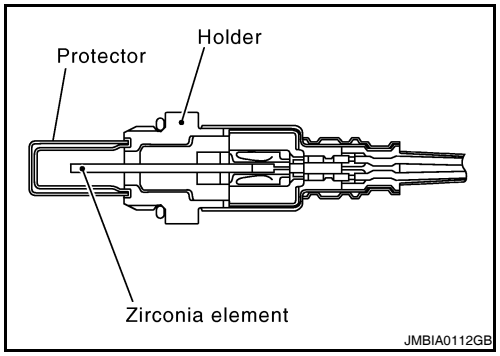
>> END

P2A00 A/F SENSOR 1

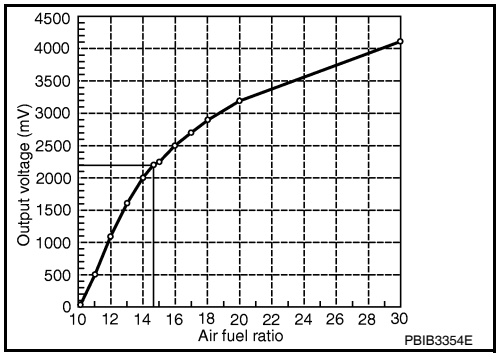
Description

INFOID:0000000004780338

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 = 1, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide range.
The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of about 800°C (1,472°F).



DTC Logic

INFOID:0000000004780339

DTC DETECTION LOGIC

To judge the malfunction, the A/F signal computed by ECM from the A/F sensor 1 signal is monitored not to be shifted to LEAN side or RICH side.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P2A00	Air fuel ratio (A/F) sensor 1 circuit range/performance	• The output voltage computed by ECM from the A/F sensor 1 signal is shifted to the lean side for a specified period. • The A/F signal computed by ECM from the A/F sensor 1 signal is shifted to the rich side for a specified period.	• A/F sensor 1 • A/F sensor 1 heater • Fuel pressure • Fuel injector • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Clear the mixture ratio self-learning value. Refer to EC-33, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
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 1 minute under no load.
4. Let engine idle for 1 minute.
5. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.

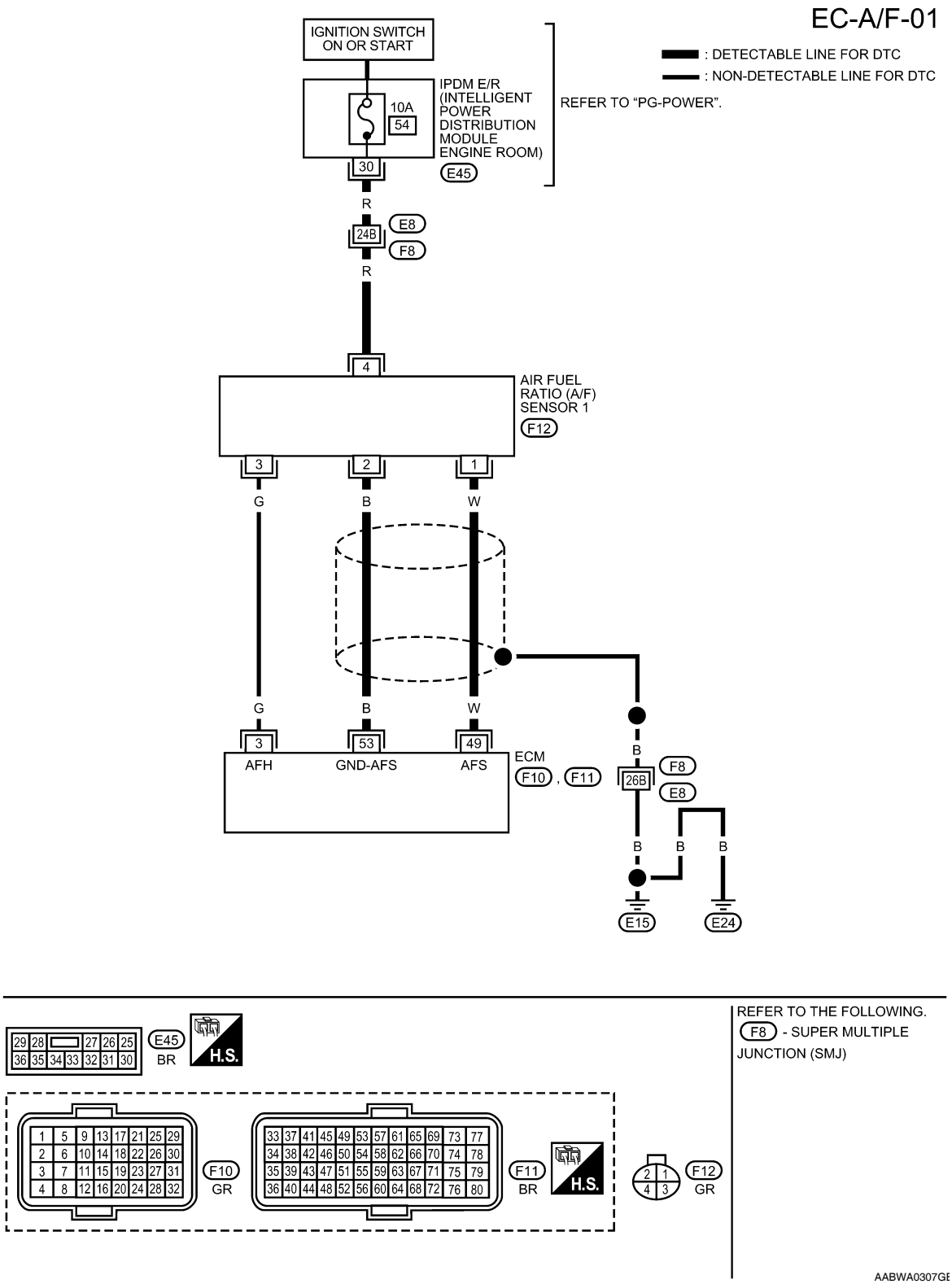
6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-419, "Diagnosis Procedure".
NO >> INSPECTION END

Wiring Diagram

INFOID:0000000004780722



Diagnosis Procedure

INFOID:0000000004780340

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK HARNESS CONNECTOR

1. Disconnect A/F sensor 1 harness connector.
2. Check harness connector for water.

Water should not exit.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace harness connector.

3.RETIGHTEN A/F SENSOR 1

1. Loosen and retighten the A/F sensor 1. Refer to EM-31, "Exploded View".

>> GO TO 4.

4.CHECK FOR INTAKE AIR LEAK

1. Reconnect A/F sensor 1 harness connector.
2. Start engine and run it at idle.
3. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> GO TO 5.
NO >> Repair or replace.

5.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-33, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".
2. Run engine for at least 10 minutes at idle speed.

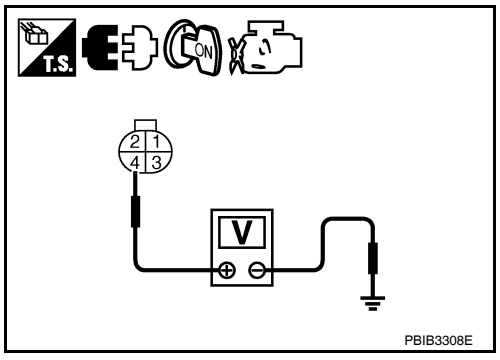
Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171or P0172. Refer to EC-229, "DTC Logic" or EC-235, "DTC Logic".
NO >> GO TO 6.

6.CHECK 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		
F12	4	Ground	Battery voltage



PBIB3308E

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E8, F8
- IPDM E/R harness connector E45
- 10 A fuse (No. 54)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F12	1	F11	49	Existed
	2		53	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F12	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F11	49	Ground	Not existed
	53		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK A/F SENSOR 1 HEATER

Refer to EC-139, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 11.

10. CHECK INTERMITTENT INCIDENT

Perform EC-120, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

Do you have CONSULT-III?

YES >> GO TO 12.
NO >> GO TO 13.

12. CONFIRM A/F ADJUSTMENT DATA

With CONSULT-III

1. Turn ignition switch ON.
2. Select “A/F ADJ-B1” in “DATA MONITOR” mode with CONSULT-III.
3. Make sure that “0.000” is displayed on CONSULT-III screen.

Is “0.000” displayed?

YES >> INSPECTION END
NO >> GO TO 13.

13. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Clear the mixture ratio self-learning value. Refer to EC-33, "MIXTURE RATIO SELF-LEARNING VALUE CLEAR : Special Repair Requirement".

Do you have CONSULT-III?

YES >> GO TO 14.
NO >> INSPECTION END

14. CONFIRM A/F ADJUSTMENT DATA

With CONSULT-III

1. Turn ignition switch ON.
2. Select “A/F ADJ-B1” in “DATA MONITOR” mode with CONSULT-III.
3. Make sure that “0.000” is displayed on CONSULT-III screen.

>> INSPECTION END

COOLING FAN

Description

INFOID:0000000004780349

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

COOLING FAN MOTOR

Models without A/C
The cooling fan operates at each speed when the current flows in the cooling fan motor as prt the following.

Cooling fan Speed	Cooling fan motor terminals	
	(+)	(–)
Low (LOW)	1	3 and 4
	2	3 and 4
	1 and 2	3
	1 and 2	4
High (HI)	1 and 2	3 and 4

Models with A/C
The cooling fan operates at high (HI) speed when the current flows, and operates at low (LOW) speed when cooling fan motor and the resistor are circuited in series.

Component Function Check

INFOID:0000000004780350

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. Touch “LOW” and “Hi” on the CONSULT-III screen.
4. Check that cooling fan operates at each speed.

Without CONSULT-III

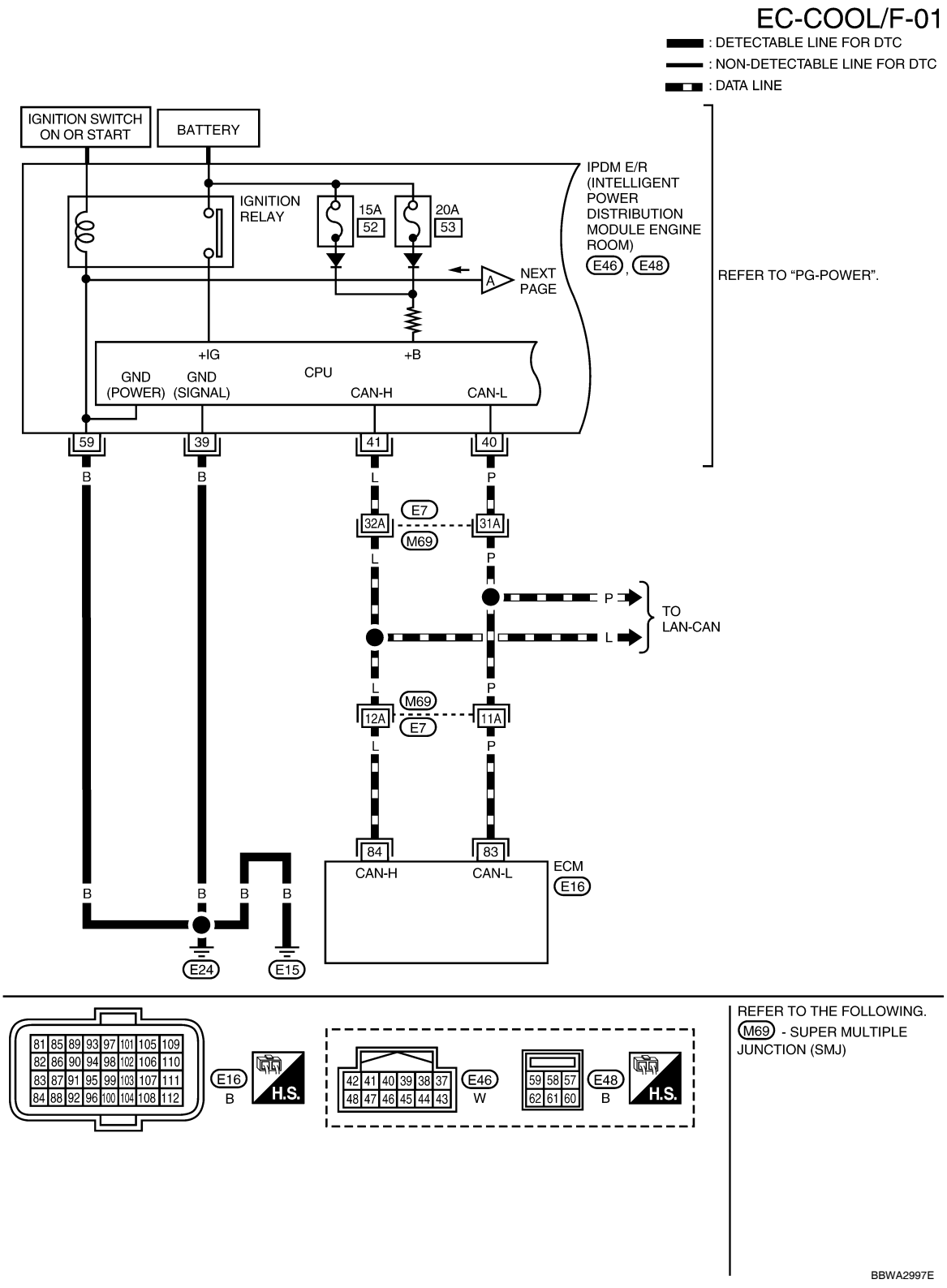
1. Perform IPDM E/R auto active test and check cooling fan motor operation. Refer to PG-19, "Auto Active Test".
2. Check that cooling fan operates at each speed.

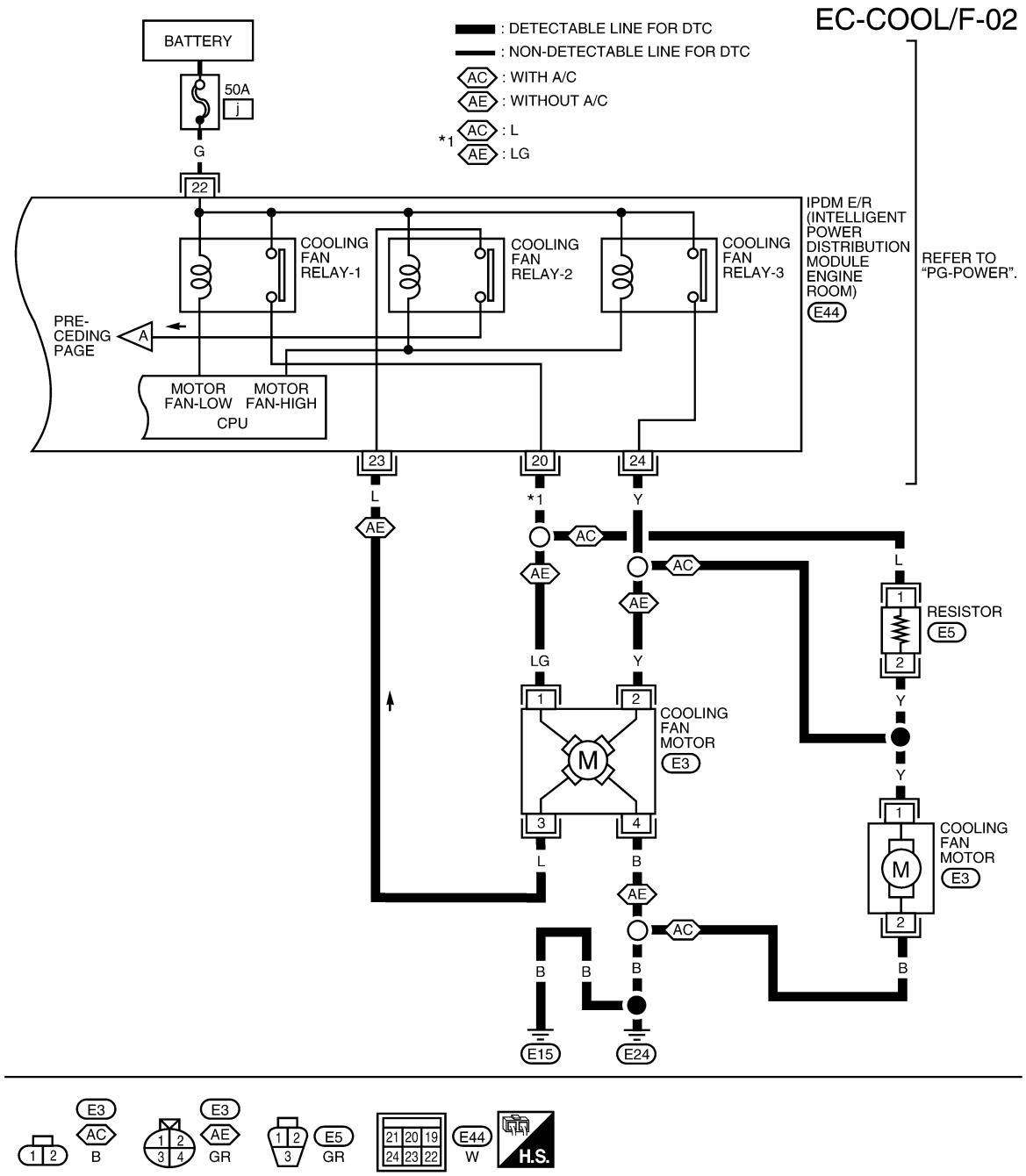
Is the inspection result normal?

YES >> INSPECTION END
NO >> Refer to EC-424, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004780695





BBWA3001E

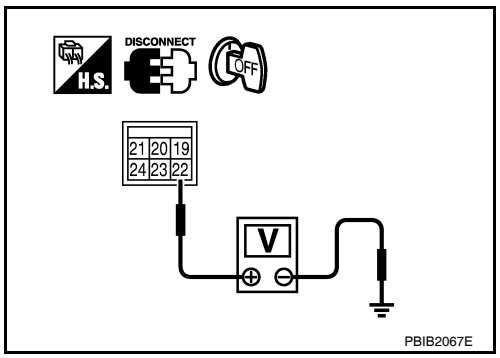
Diagnosis Procedure

INFOID:0000000004780351

1.CHECK IPDM E/R POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E44.

3. Check the voltage between IPDM E/R harness connector and ground.



IPDM E/R		Ground	Voltage
Connector	Terminal		
E44	22	Ground	Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.
- 50 A fusible link (letter J)
- Harness for open or short between IPDM E/R and battery

>> Repair open circuit or short to ground in harness or connectors.

3. CHECK IPDM E/R GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connectors E46 and E48.
3. Check the continuity between IPDM E/R harness connector and ground.

IPDM E/R		Ground	Continuity
Connector	Terminal		
E46	39	Ground	Existed
E48	59		

4. Also check harness for short to power.

OK or NG

OK (Models with A/C)>>GO TO 4.
OK (Models without A/C)>>GO TO 6.
NG >> Repair open circuit or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR CIRCUIT

1. Disconnect cooling fan motor harness connector.
2. Check the continuity between IPDM E/R harness connector and cooling fan motor harness connector.

IPDM E/R		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E44	20	E3	1	Existed
	24			

3. Check the continuity between cooling fan motor harness connector and ground.

Cooling fan motor		Ground	Continuity
Connector	Terminal		
E3	2	Ground	Existed

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground
- Resistor E5

>> Repair open circuit or short to ground or short to power in harness or connectors.

6.CHECK COOLING FAN MOTOR CIRCUIT

1. Disconnect cooling fan motor harness connector.
2. Check the continuity between IPDM E/R harness connector and cooling fan motor harness connector.

IPDM E/R		Cooling fan motor		Continuity
Connector	Terminal	Connector	Terminal	
E44	20	E3	1	Existed
	23		3	
	24		2	

3. Check the continuity between cooling fan motor harness connector and ground.

Cooling fan motor		Ground	Continuity
Connector	Terminal		
E3	4	Ground	Existed

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground

>> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK COOLING FAN MOTOR

Refer to EC-426, "Component Inspection".

OK or NG

OK >> GO TO 9.
NG >> Replace cooling fan motor.

9.CHECK INTERMITTENT INCIDENT

Perform EC-120, "Diagnosis Procedure".

OK or NG

OK >> Replace IPDM E/R. Refer to PG-27, "Removal and Installation of IPDM E/R".
NG >> Repair or replace harness or connector.

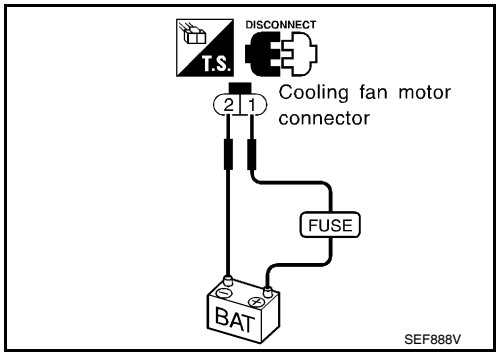
Component Inspection

INFOID:0000000004780696

COOLING FAN MOTOR

Model with A/C

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

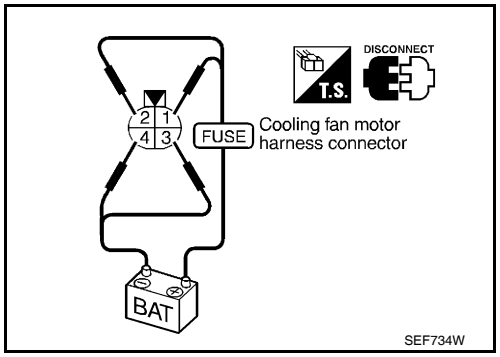


	Terminals	
	(+)	(-)
Cooling fan motor	1	2

Cooling fan motor should operate.
If NG, replace cooling fan motor.

Models without A/C

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.



	Speed	terminals	
		(+)	(–)
Cooling fan motor	Low	1	4
		2	3
	High	1 and 2	3 and 4

Cooling fan motor should operate.
If NG, replace cooling fan motor.

ELECTRICAL LOAD SIGNAL

Description

INFOID:0000000004780354

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred via the CAN communication line.

Component Function Check

INFOID:0000000004780355

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-428, "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-428, "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-428, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004780356

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to EC-428, "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 GW-55, "Work Flow".

>> INSPECTION END

3. CHECK HEADLAMP SYSTEM

Refer to LT-11, "How to Perform Trouble Diagnosis" (For USA) or LT-33, "How to Perform Trouble Diagnosis" (For Canada).

>> INSPECTION END

4. CHECK HEATER FAN CONTROL SYSTEM

Refer to MTC-22, "How to Perform Trouble Diagnosis for Quick and Accurate Repair".

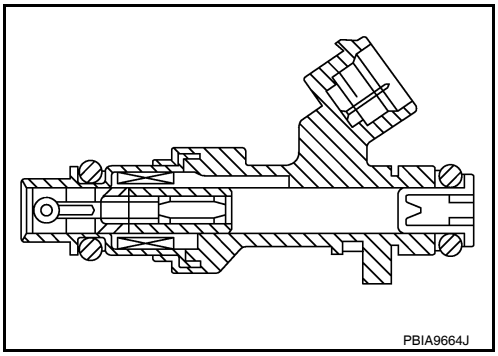
>> INSPECTION END

FUEL INJECTOR

Description

INFOID:0000000004780357

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the fuel injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.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Component Function Check

INFOID:0000000004780358

1.INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

YES >> GO TO 2.
NO >> Go to EC-431, "Diagnosis Procedure".

2.CHECK FUEL INJECTOR FUNCTION

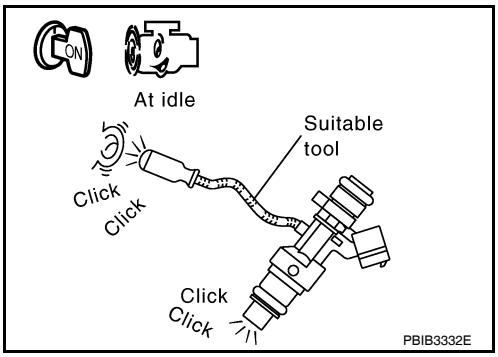
With CONSULT-III

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.



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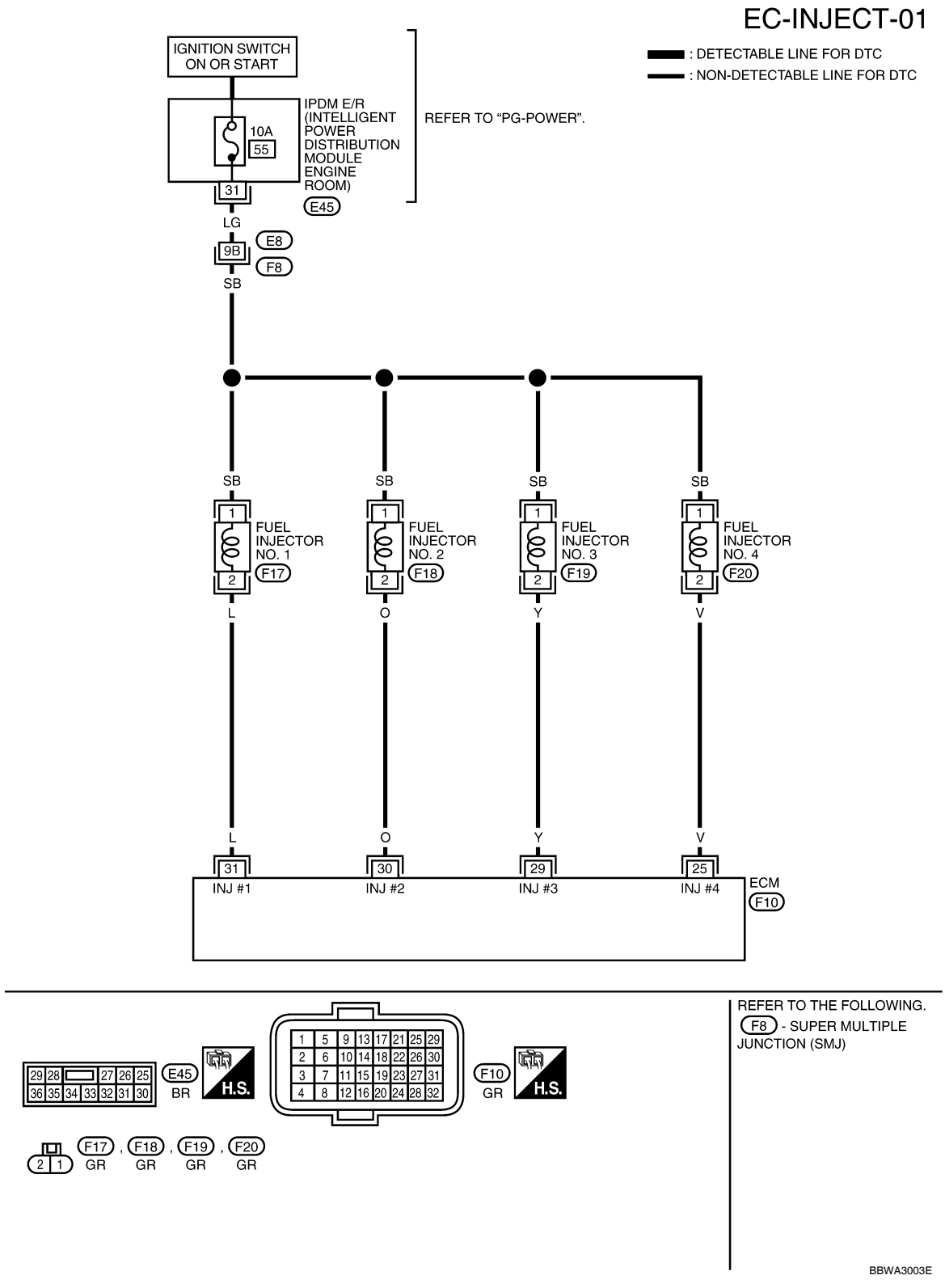
Is the inspection result normal?

YES >> INSPECTION END
NO >> Go to EC-431, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004780705



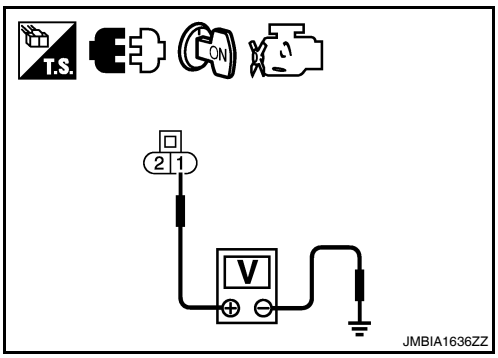
Diagnosis Procedure

INFOID:0000000004780359

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 E45
- 10 A fuse (No. 55)
- Harness for open or short between fuel injector and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F17	2	F10	31	Existed
2	F18	2		30	
3	F19	2		29	
4	F20	2		25	

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUEL INJECTOR

Refer to EC-432, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace malfunctioning fuel injector.

5.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

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.

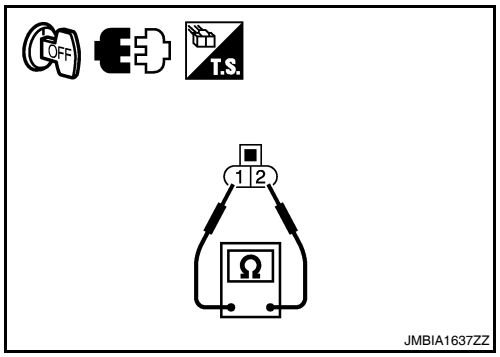
Component Inspection

INFOID:0000000004780360

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.

FUEL PUMP

Description

INFOID:0000000004780361

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.

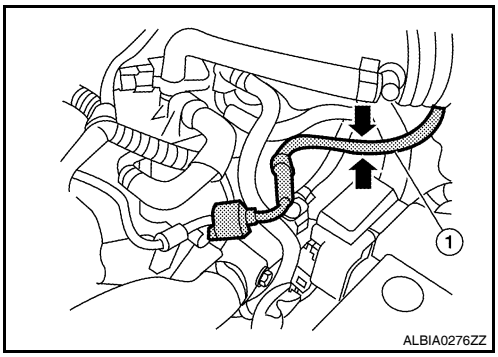
Component Function Check

INFOID:0000000004780362

1.CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose (1) with two fingers.

Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

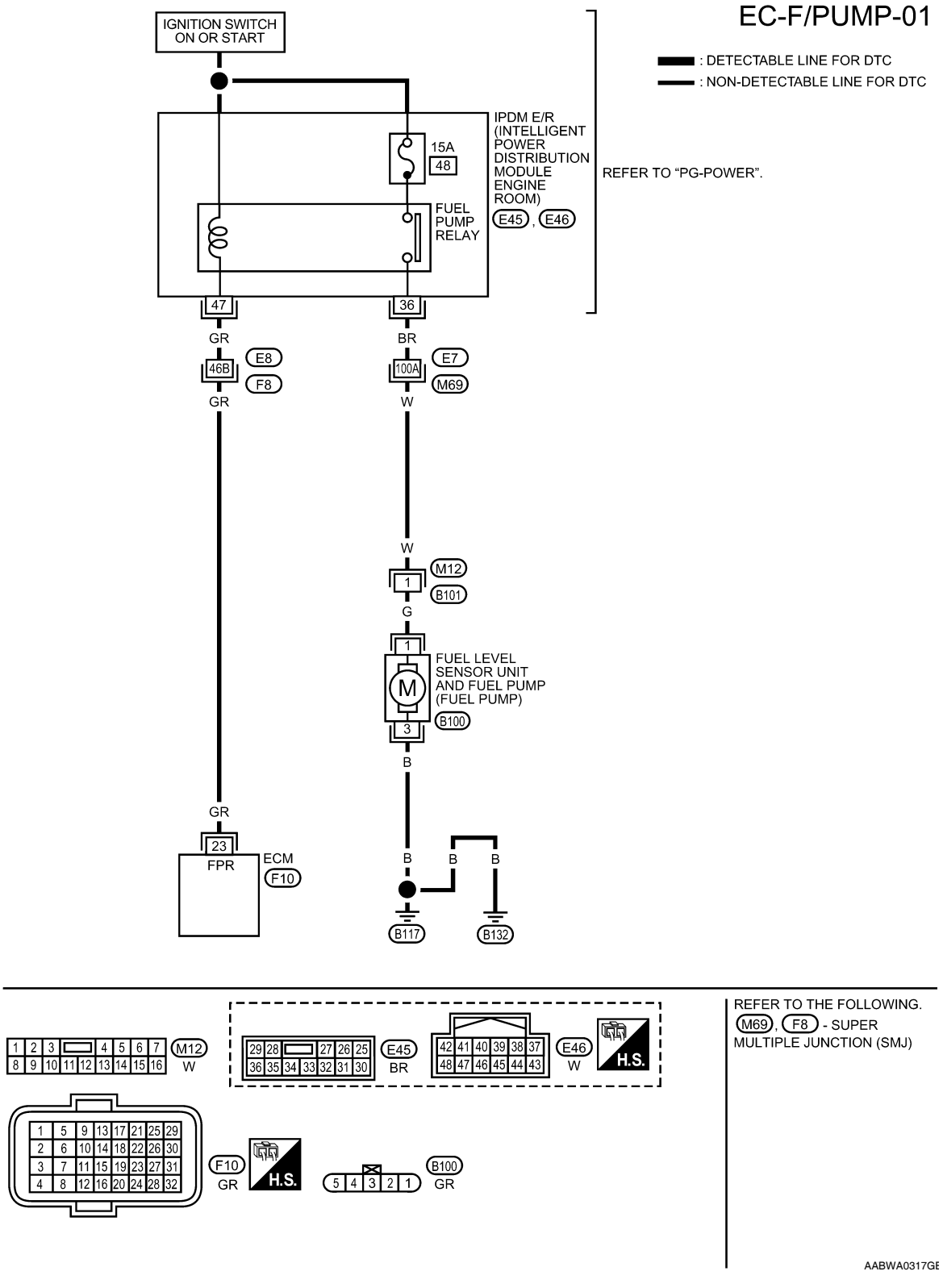


Is the inspection result normal?

YES >> INSPECTION END
NO >> EC-435, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004780706



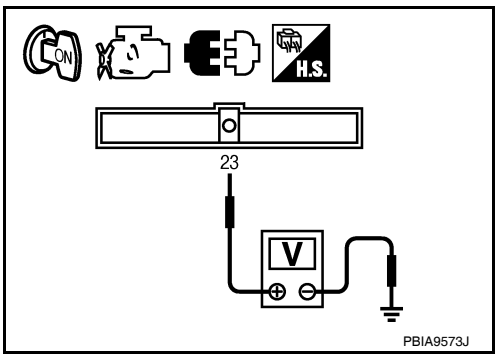
Diagnosis Procedure

INFOID:0000000004780363

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.



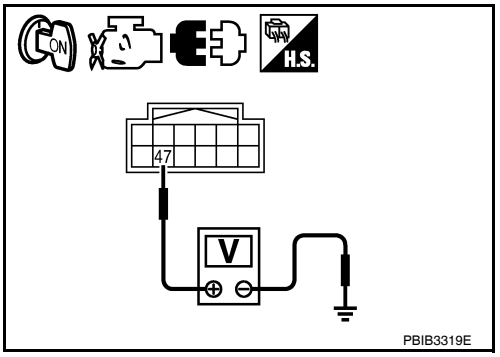
ECM		Ground	Voltage
Connector	Terminal		
F10	23	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect IDPDM E/R harness connector E46.
3. Turn ignition switch ON.
4. Check the voltage between IPDM E/R harness connector and ground.



IPDM E/R		Ground	Voltage
Connector	Terminal		
E46	47	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 10.

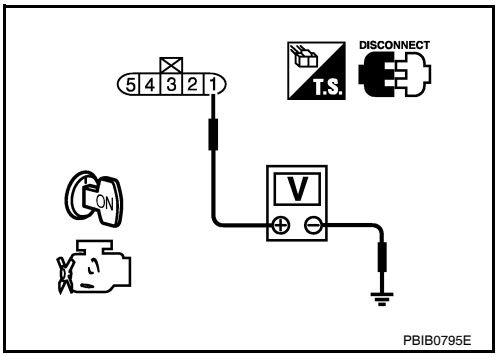
3.DETECT MALFUNCTIONING PART

Check the following.
- Harness or connectors E8, F8.
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

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		
B100	1	Ground	Battery voltage should exist 1 second after ignition switch is turn ON.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 5.

5.CHECK FUSE

1. Turn ignition switch OFF.
2. Disconnect 15 A fuse (No. 48) 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 E45.
2. Check the continuity between IPDM E/R harness connector and “fuel level sensor unit and fuel pump” harness connector.

IPDM E/R		Fuel level sensor unit and fuel pump		Continuity
Connector	Terminal	Connector	Terminal	
E45	36	B100	1	Existed

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E7, M69
- Harness connectors M12, B101
- Harness for open or short between IPDM E/R and “fuel level sensor unit and fuel pump”

>> Repair open circuit or short to power in harness or connectors.

8.CHECK FUEL PUMP GROUND CIRCUIT

1. Check the continuity between “fuel level sensor unit and fuel pump” and ground.

Fuel level sensor unit and fuel pump		Ground	Continuity
Connector	Terminal		
B100	3	Ground	Existed

2. Also heck harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit or short to power in harness or connectors.

9.CHECK FUEL PUMP

Refer to EC-437, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace “fuel level sensor unit and fuel pump”.

10.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace IPDM E/R.
NO >> Repair or replace harness or connectors.

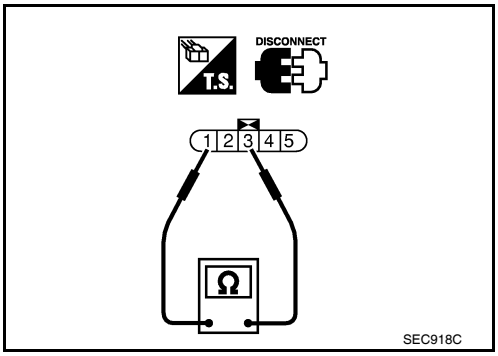
Component Inspection

INFOID:0000000004780364

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”.

IGNITION SIGNAL

Description

INFOID:0000000004780366

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:0000000004780367

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-441, "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.

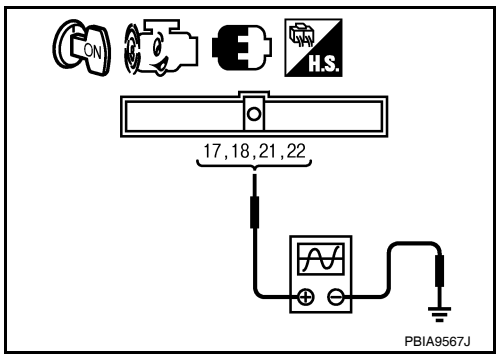
Is the inspection result normal?

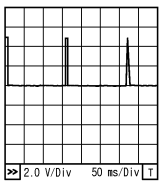
YES >> INSPECTION END
NO >> Go to EC-441, "Diagnosis Procedure".

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		
F10	17	Ground	
	18		
	21		
	22		

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NOTE:
The pulse cycle changes depending on rpm at idle.

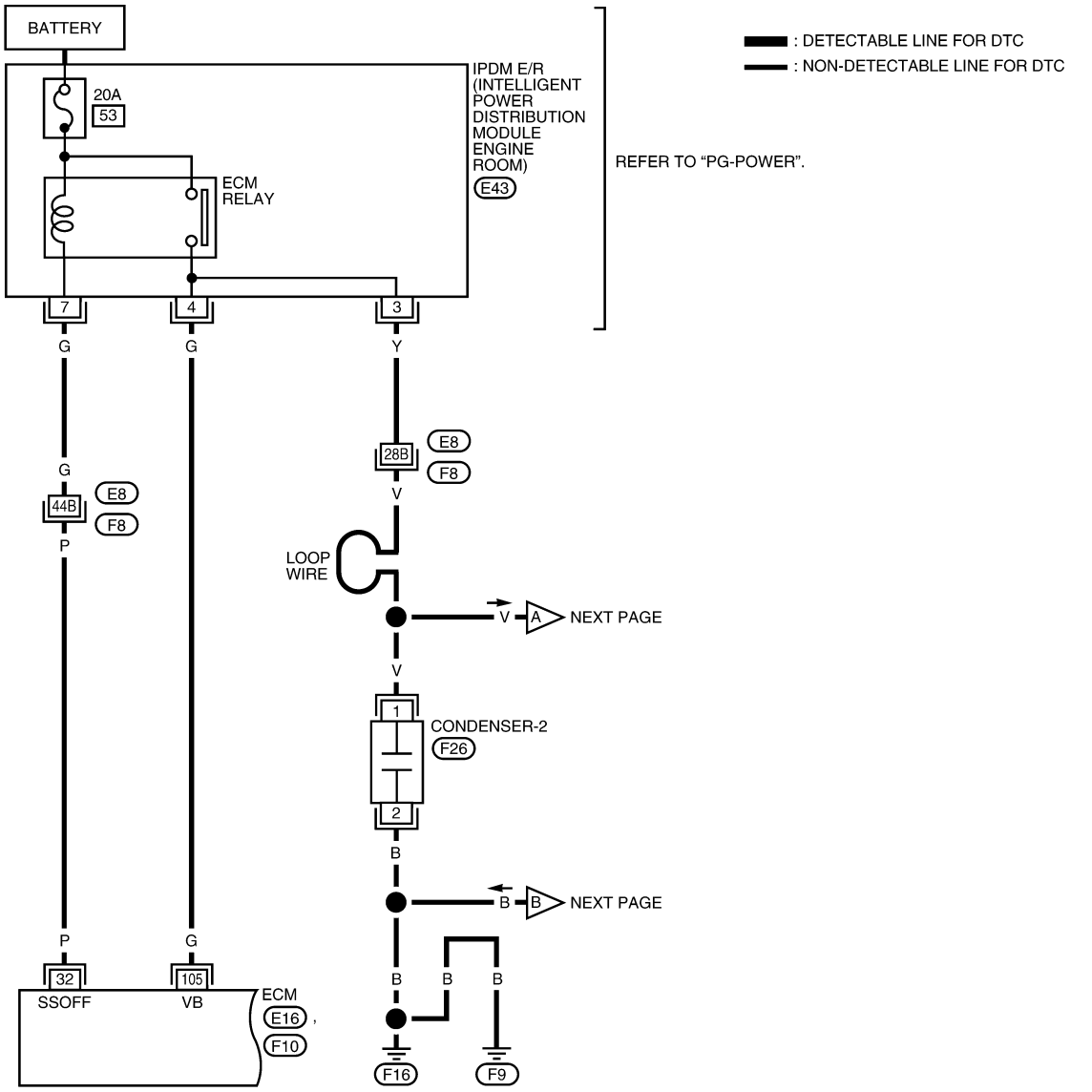
Is the inspection result normal?

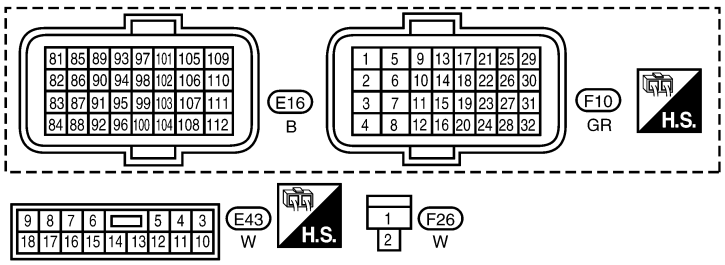
YES >> INSPECTION END
NO >> Go to EC-441, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004780707

EC-IGNSYS-01

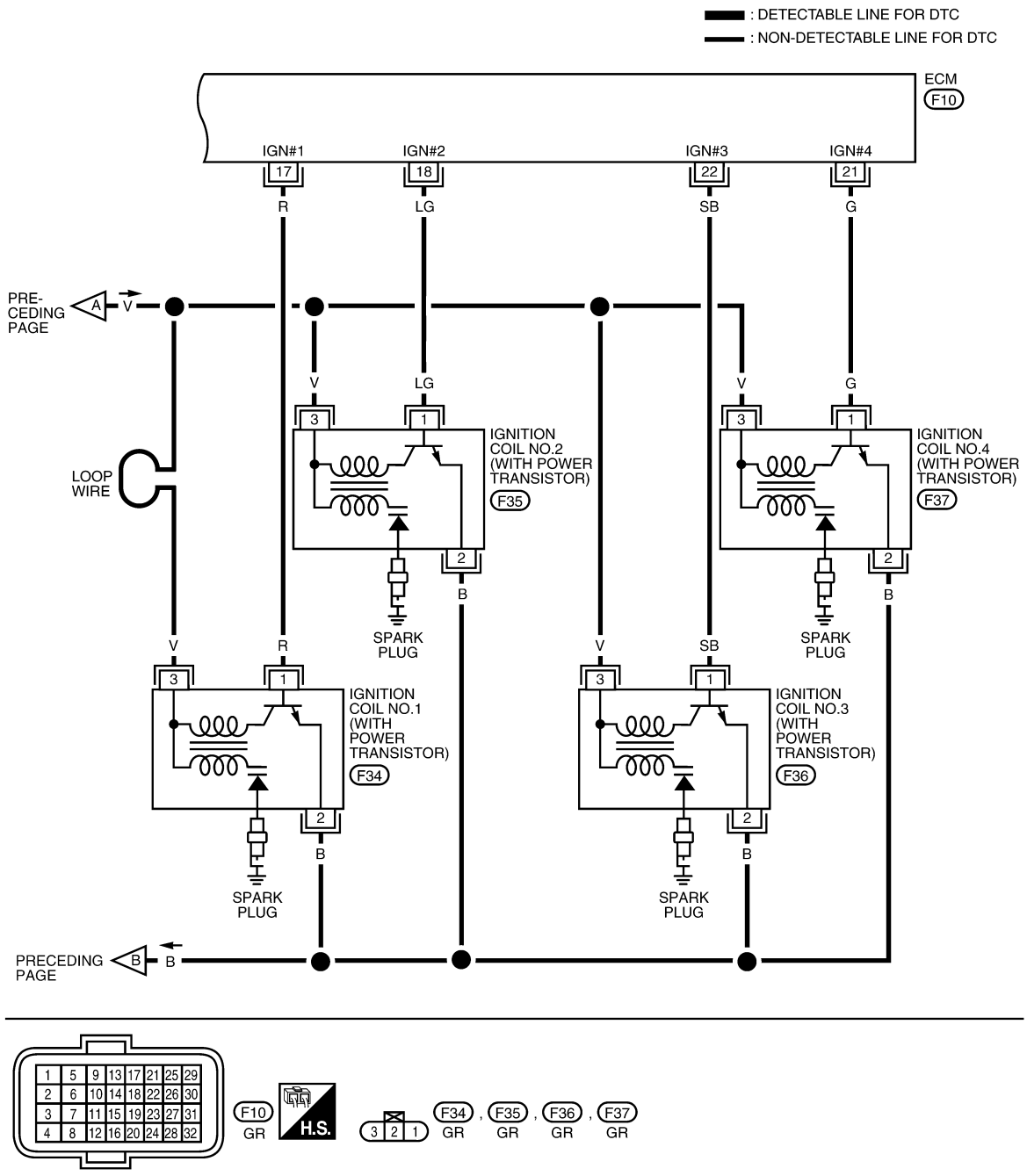




REFER TO THE FOLLOWING.
F8 - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2658E

EC-IGNSYS-02



BBWA2659E

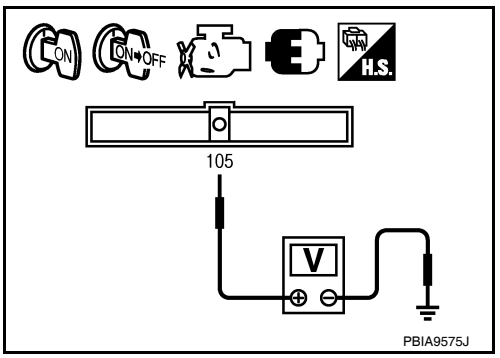
Diagnosis Procedure

INFOID:0000000004780368

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.



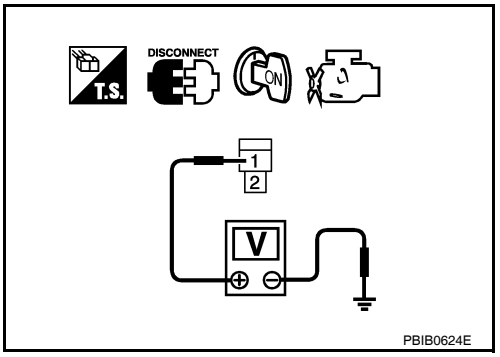
ECM		Ground	Voltage
Connector	Terminal		
E16	105	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Go to EC-121, "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 5.
NO >> GO TO 3.

3. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E43.
3. Check the continuity between IPDM E/R harness connector and condenser-2 harness connector.

IPDM E/R		Condenser-2		Continuity
Connector	Terminal	Connector	Terminal	
E43	3	F26	1	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Go to EC-121, "Diagnosis Procedure".
NO >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- IPDM E/R harness connector E43
- Harness for open or short between IPDM E/R and condenser-2

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. 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 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CONDENSER

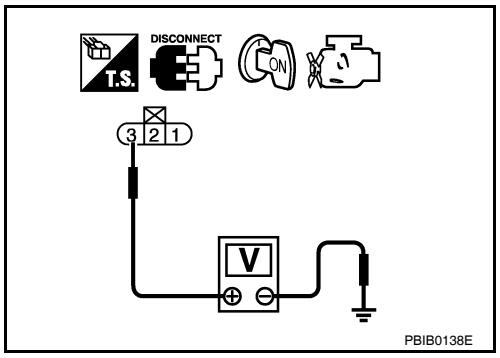
Refer to EC-445, "Component Inspection (Condenser-2)".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace condenser.

7. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Reconnect all harness connectors disconnected.
2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ignition coil harness connector and ground.



Ignition coil			Ground	Voltage
Cylinder	Connector	Terminal		
1	F34	3	Ground	Battery voltage
2	F35	3		
3	F36	3		
4	F37	3		

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

Ignition coil			Ground	Continuity
Cylinder	Connector	Terminal		
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 9.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ignition coil harness connector.

Ignition coil			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F34	1	F14	17	Existed
2	F35	1		18	
3	F36	1		22	
4	F37	1		21	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-444, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace malfunctioning ignition coil with power transistor.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

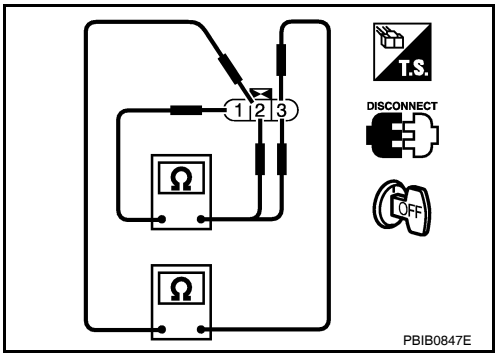
>> INSPECTION END

Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000004780369

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.



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?

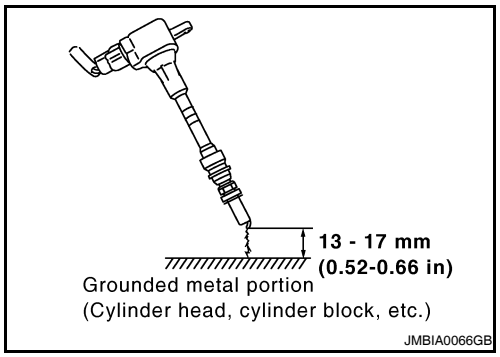
YES >> GO TO 2.
NO >> Replace malfunctioning ignition coil with power transistor.

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:

- **During the operation, always stay 0.5 cm (19.7 in) away from the spark plug and the ignition coil. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.**
- **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?

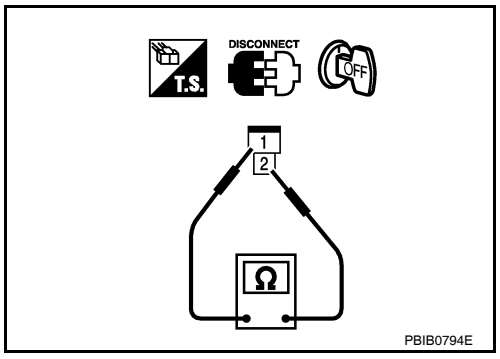
YES >> INSPECTION END
NO >> Replace malfunctioning ignition coil with power transistor.

Component Inspection (Condenser-2)

INFOID:0000000004780370

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 25°C (77°F)]

Is the inspection result normal?

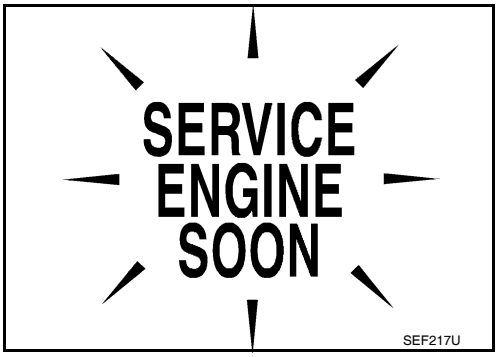
YES >> INSPECTION END
NO >> Replace condenser-2.

MALFUNCTION INDICATOR LAMP

Description

INFOID:0000000004780371

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-90, "Diagnosis Description".



Component Function Check

INFOID:0000000004780372

1.CHECK MIL FUNCTION

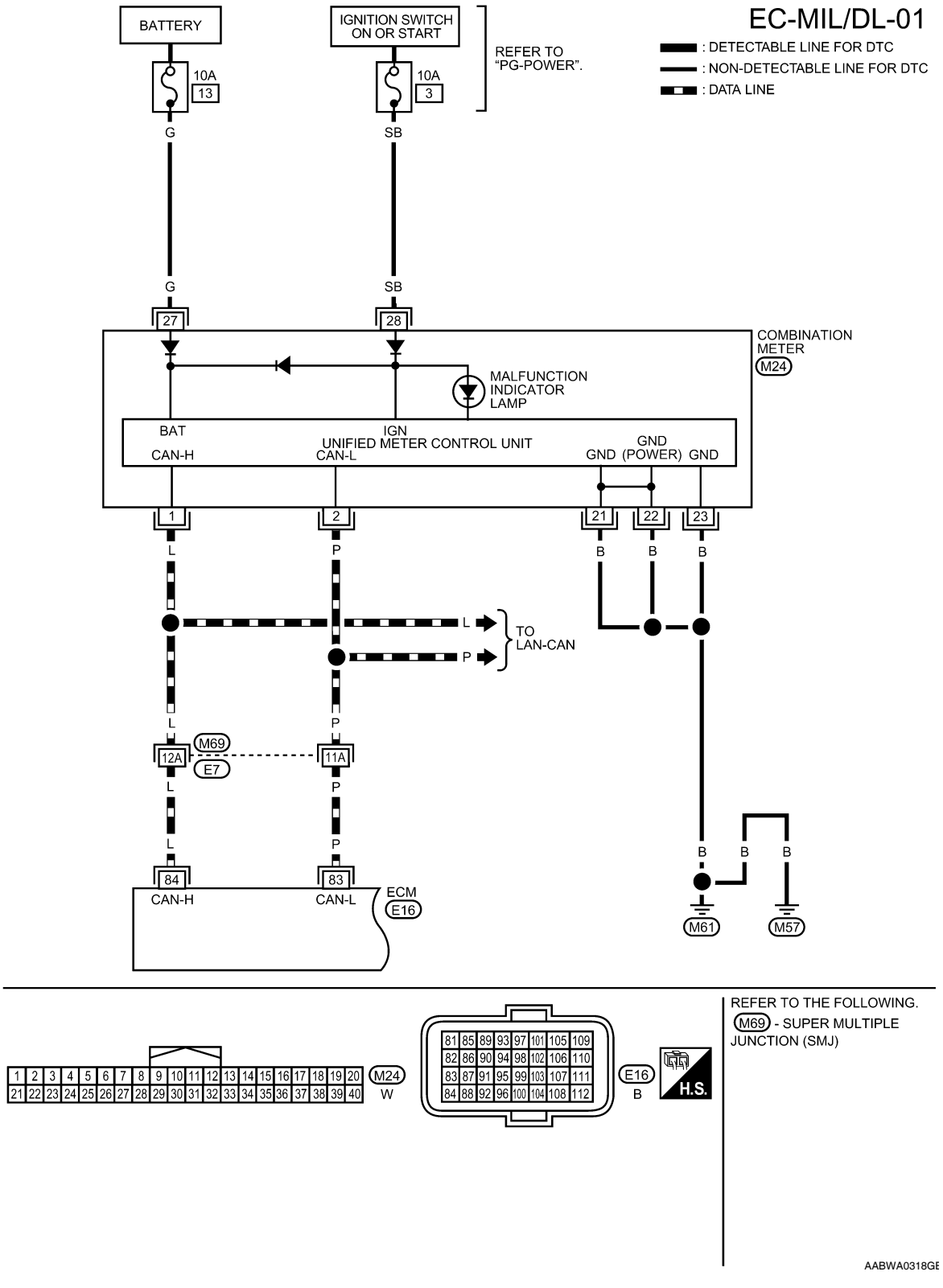
1. Turn ignition switch ON.
2. Make sure that MIL lights up.

Is the inspection result normal?

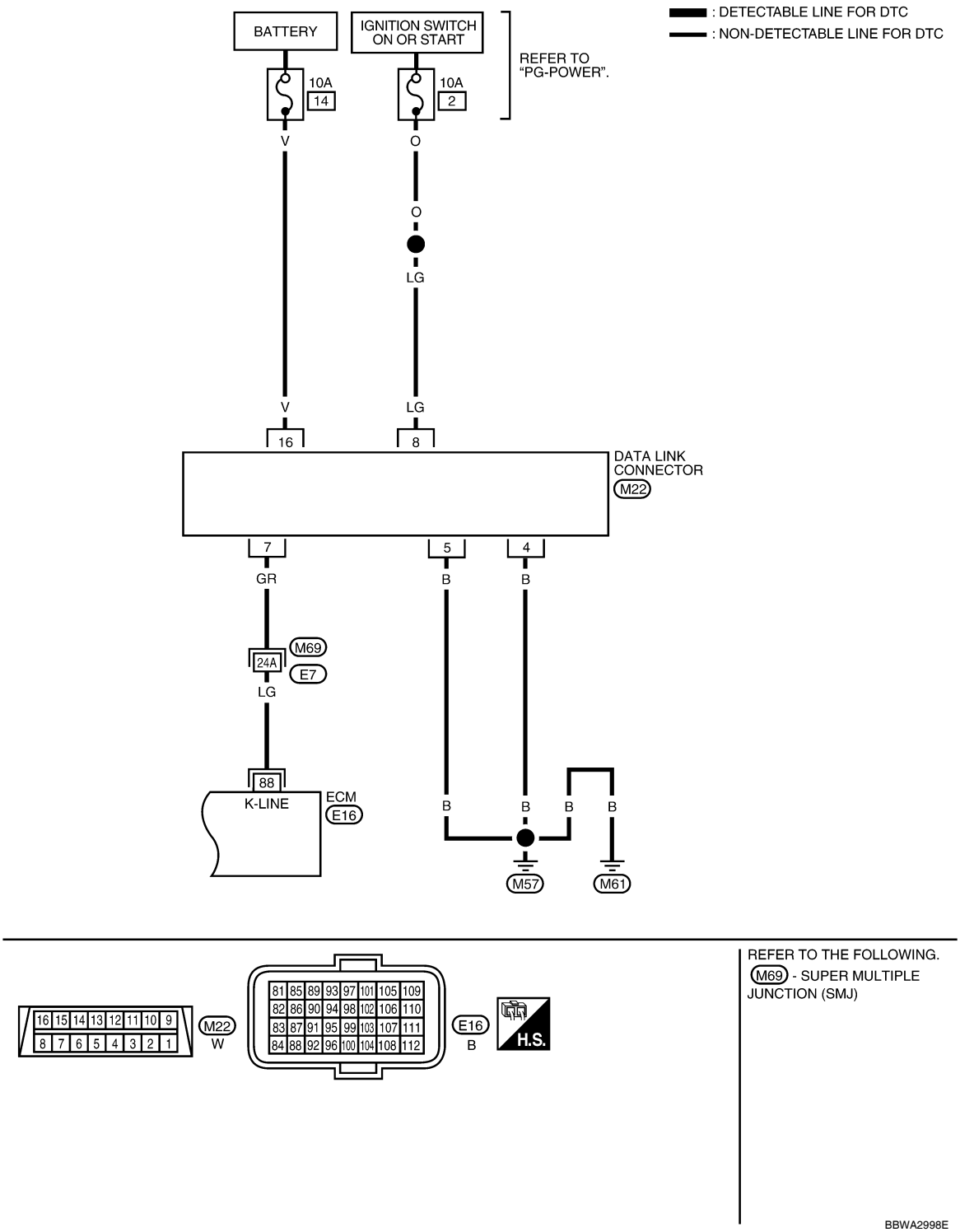
YES >> INSPECTION END
NO >> Go to EC-448, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004780708



EC-MIL/DL-02



Diagnosis Procedure

INFOID:0000000004780373

1.CHECK DTC

Check that DTC UXXXX is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for DTC UXXXX.

2.CHECK DTC WITH METER

Refer to DI-12, "CONSULT-III Function (METER/M&A)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

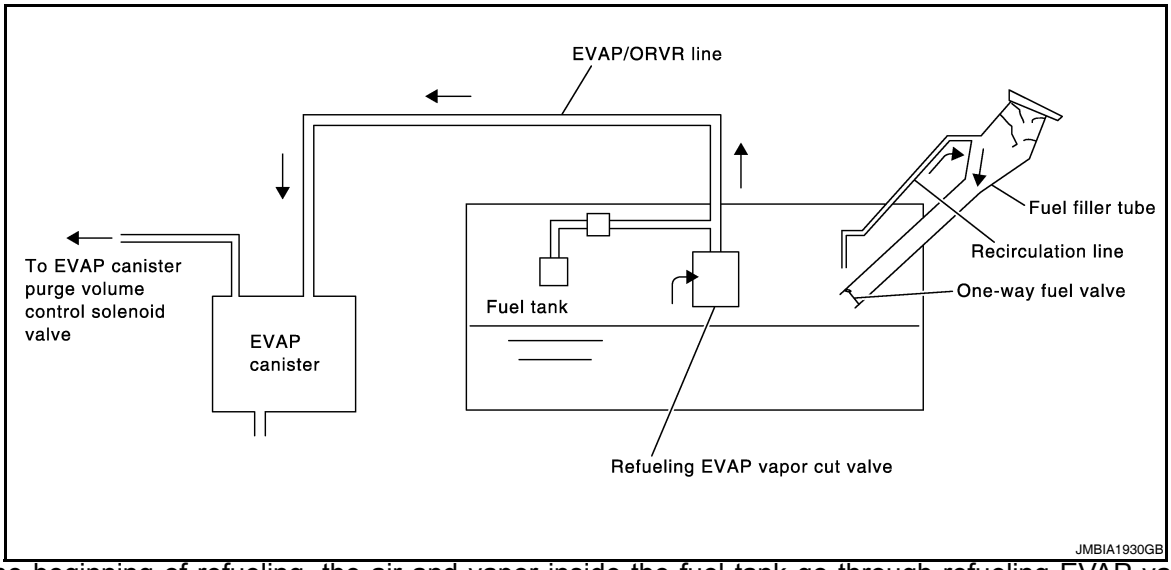
Is the inspection result normal?

YES >> Replace combination meter.
NO >> Repair or replace.

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

Description

INFOID:0000000004780374



From the beginning of refueling, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve and EVAP/ORVR line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.
When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

WARNING:
When conducting inspections below, be sure to observe the following:
- **Put a "CAUTION: FLAMMABLE" sign in workshop.**
- **Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.**
- **Be sure to furnish the workshop with a CO_2 fire extinguisher.**

CAUTION:
- **Before removing fuel line parts, carry out the following procedures:**
- **Put drained fuel in an explosion-proof container and put lid on securely.**
- **Release fuel pressure from fuel line. Refer to FL-4, "Checking Fuel Line".**
- **Disconnect battery ground cable.**
- **Always replace O-ring when the fuel gauge retainer is removed.**
- **Do not kink or twist hose and tube when they are installed.**
- **Do not tighten hose and clamps excessively to avoid damaging hoses.**
- **After installation, run engine and check for fuel leaks at connection.**
- **Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.**

Component Function Check

INFOID:0000000004780375

1. CHECK ORVR FUNCTION

Check whether the following symptoms are present.
- Fuel odor from EVAP canister is strong.
- Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

Is any symptom present?

YES >> Go to EC-450, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000004780376

1. INSPECTION START

Check whether the following symptoms are present.
A: Fuel odor from EVAP canister is strong.

B: Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

Which symptom is present?

A >> GO TO 2.
B >> GO TO 8.

2. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
   The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

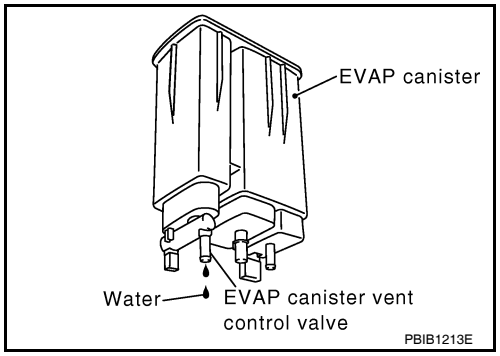
YES >> GO TO 3.
NO >> GO TO 4.

3. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 4.
NO >> GO TO 7.



4. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 5.

5. CHECK DRAIN FILTER

Refer to EC-455, "Component Inspection (Drain filter)".

Is the inspection result normal?

OK >> GO TO 6.
NO >> Replace drain filter.

6. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

7. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-453, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace refueling EVAP vapor cut valve with fuel tank.

8. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
   The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

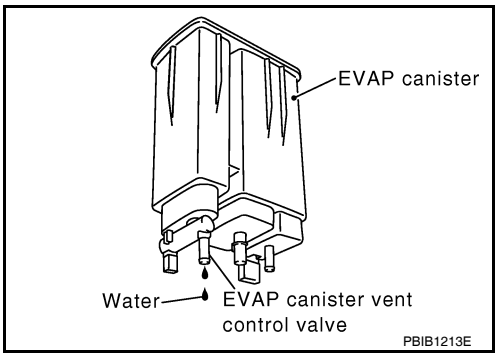
YES >> GO TO 9.
NO >> GO TO 10.

9. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 10.
NO >> GO TO 13.



10. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 11.

11. CHECK DRAIN FILTER

Refer to EC-455, "Component Inspection (Drain filter)".

Is the inspection result normal?

OK >> GO TO 12.
NO >> Replace drain filter.

12. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

13. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair or replace hoses and tubes.

14. CHECK RECIRCULATION LINE

Check recirculation line for clogging, dents and cracks.

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace fuel filler tube.

15. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-453, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace refueling EVAP vapor cut valve with fuel tank.

16. CHECK FUEL FILLER TUBE

Check fuel filler tube and hose connected to the fuel tank for clogging, dents and cracks.

Is the inspection result normal?

YES >> GO TO 17.
NO >> Replace fuel filler tube.

17. CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

Is the inspection result normal?

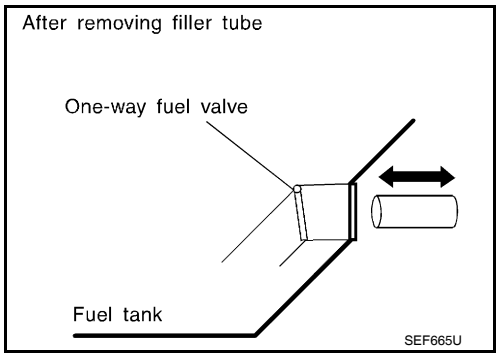
YES >> GO TO 18.
NO >> Repair or replace one-way fuel valve with fuel tank.

18. CHECK ONE-WAY FUEL VALVE-II

1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as per the following.
   When a stick is inserted, the valve should open, when removing stick it should close.
   Do not drop any material into the tank.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.



Component Inspection (Refueling EVAP vapor cut valve)

INFOID:0000000004780377

1. INSPECTION START

Do you have CONSULT-III?

Do you have CONSULT-III?

YES >> GO TO 2.
NO >> GO TO 3.

2. CHECK REFUELING EVAP VAPOR CUT VALVE

With CONSULT-III

1. Remove fuel tank. Refer to FL-9, "Removal and Installation".
2. Drain fuel from the tank as per the following:

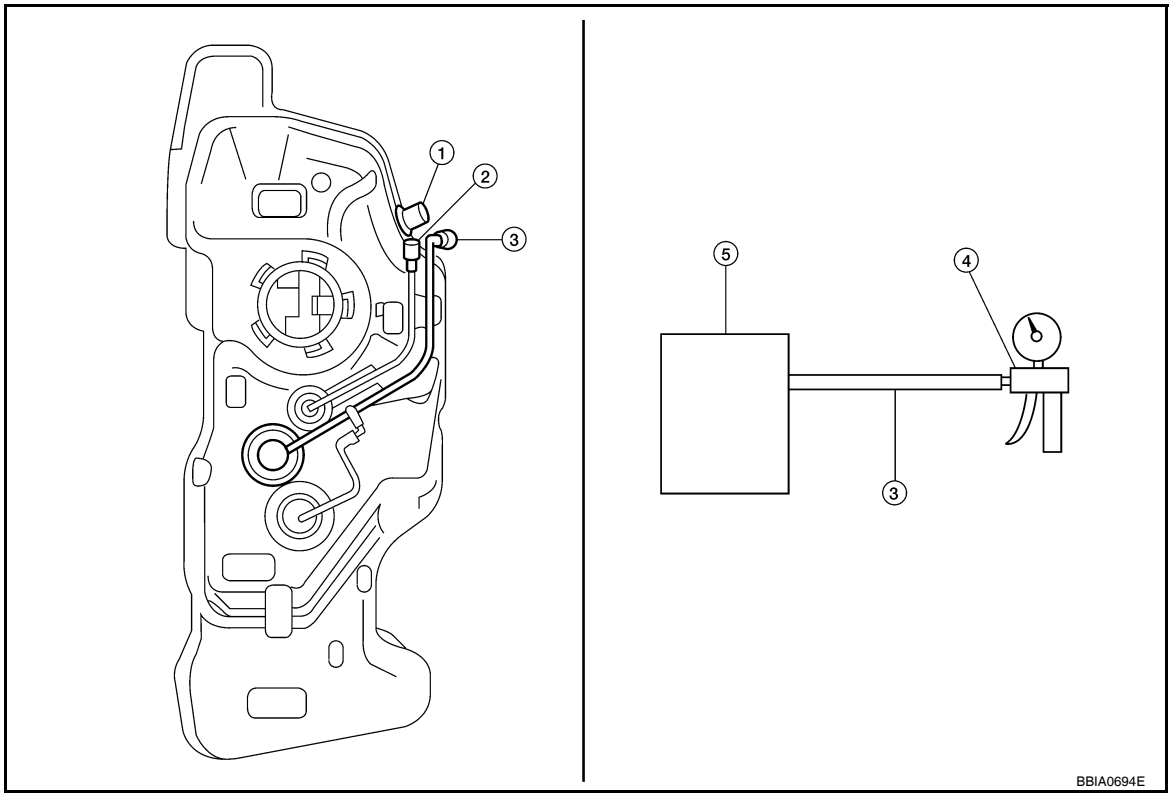
- Remove fuel feed hose located on the fuel gauge retainer.
- Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
- Drain fuel using “FUEL PUMP RELAY” in “ACTIVE TEST” mode with CONSULT-III.

3. Check refueling EVAP vapor cut valve for being stuck to close as per the following.
   Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
4. Check refueling EVAP vapor cut valve for being stuck to open as per the following.

- Connect vacuum pump to hose end.
- Remove fuel gauge retainer with fuel gauge unit.

Always replace O-ring with new one.

- Put fuel tank upside down.
- Apply vacuum pressure to hose end [–13.3 kPa (–0.136 kg/cm^3, –1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.



1. Filler tube
2. Recirculation line
3. EVAP/ORVR line
4. Vacuum/pressure handy pump
5. Fuel tank

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace refueling EVAP vapor cut valve with fuel tank.

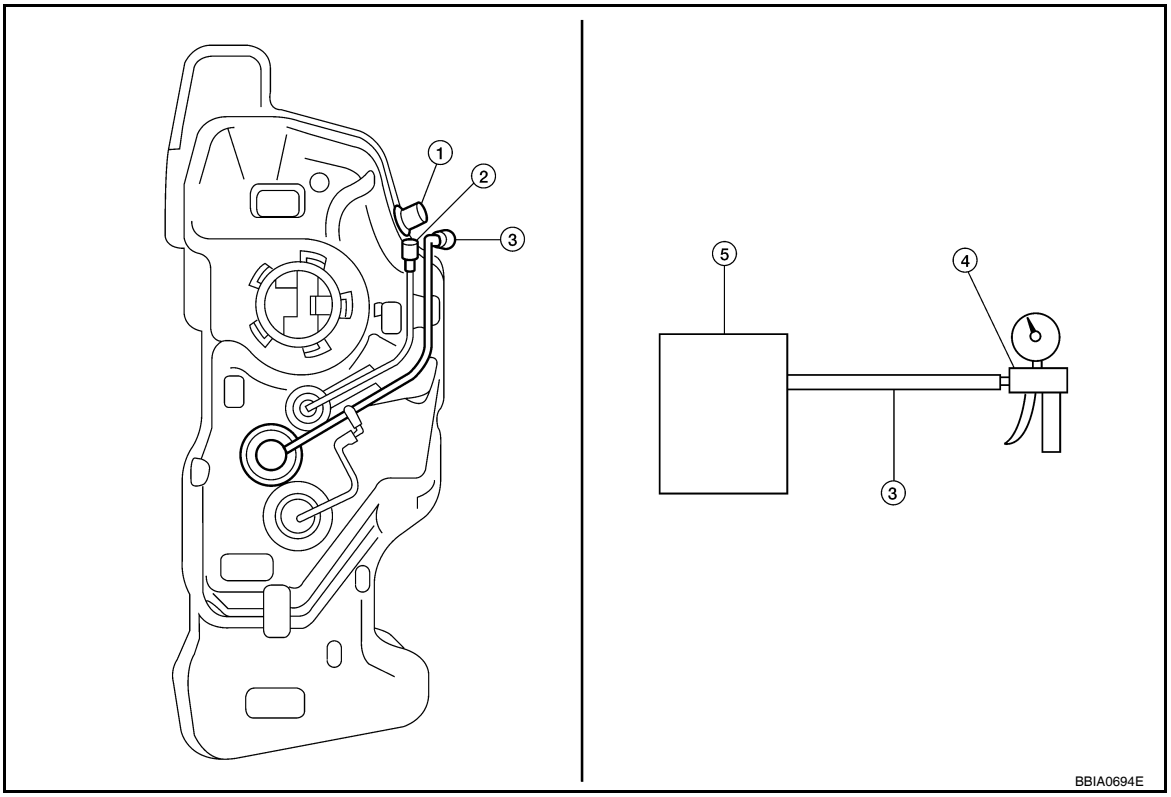
3. CHECK REFUELING EVAP VAPOR CUT VALVE

Without CONSULT-III

1. Remove fuel tank. Refer to FL-9, "Removal and Installation".
2. Drain fuel from the tank as per the following:
- Remove fuel gauge retainer.
- Drain fuel from the tank using a handy pump into a fuel container.
3. Check refueling EVAP vapor cut valve for being stuck to close as per the following.
   Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
4. Check refueling EVAP vapor cut valve for being stuck to open as per the following.
- Connect vacuum pump to hose end.
- Remove fuel gauge retainer with fuel gauge unit.

Always replace O-ring with new one.

- Put fuel tank upside down.
- Apply vacuum pressure to hose end [−13.3 kPa (−0.136 kg/cm^3, −1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.



1. Filler tube
2. Recirculation line
3. EVAP/ORVR line
4. Vacuum/pressure handy pump
5. Fuel tank

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace refueling EVAP vapor cut valve with fuel tank.

Component Inspection (Drain filter)

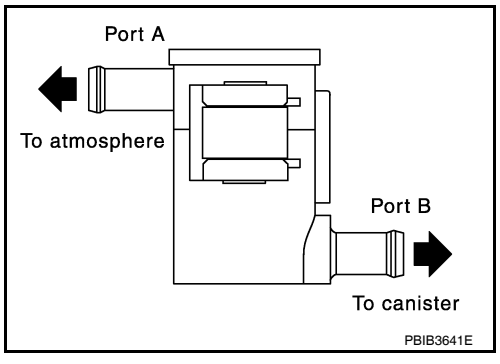
INFOID:0000000004806559

1. CHECK DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.

Is the inspection result normal?

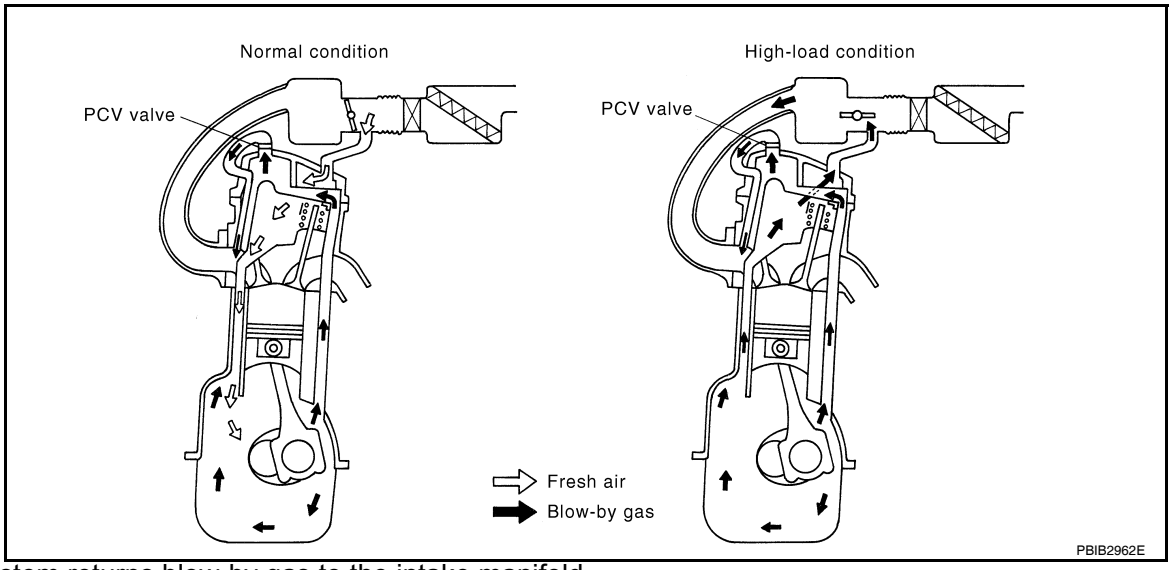
YES >> INSPECTION END
NO >> Replace drain filter.



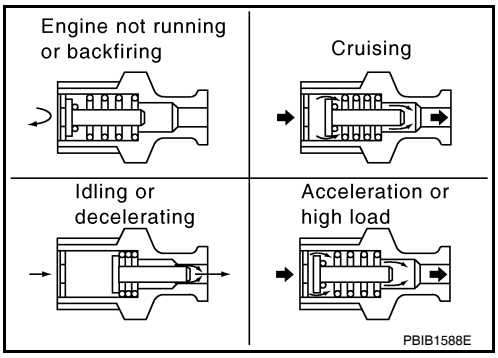
POSITIVE CRANKCASE VENTILATION

Description

INFOID:0000000004780378



This system returns blow-by gas to the intake manifold.
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.
The ventilating air is drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



Component Inspection

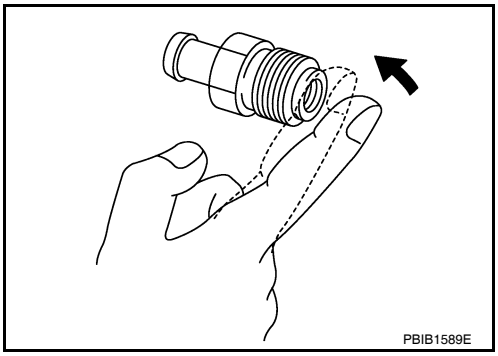
INFOID:0000000004780379

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.

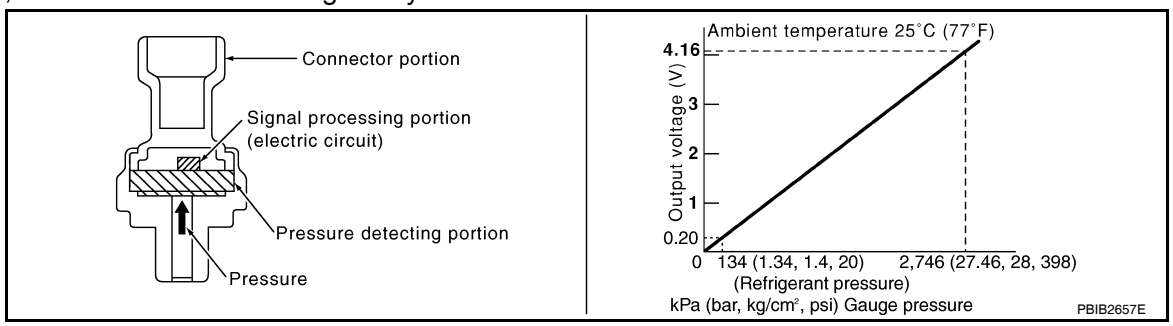


REFRIGERANT PRESSURE SENSOR

Description

INFOID:0000000004780380

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.

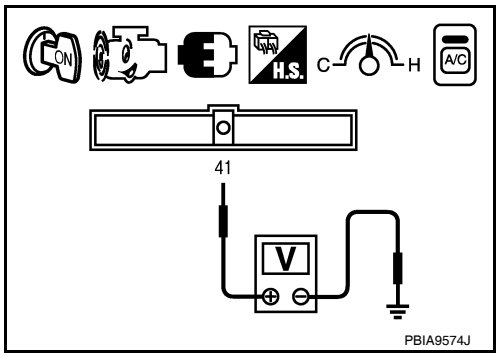


Component Function Check

INFOID:0000000004780381

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		
F11	41 (Refrigerant pressure sensor signal)	Ground	1.0 - 4.0V

Is the inspection result normal?

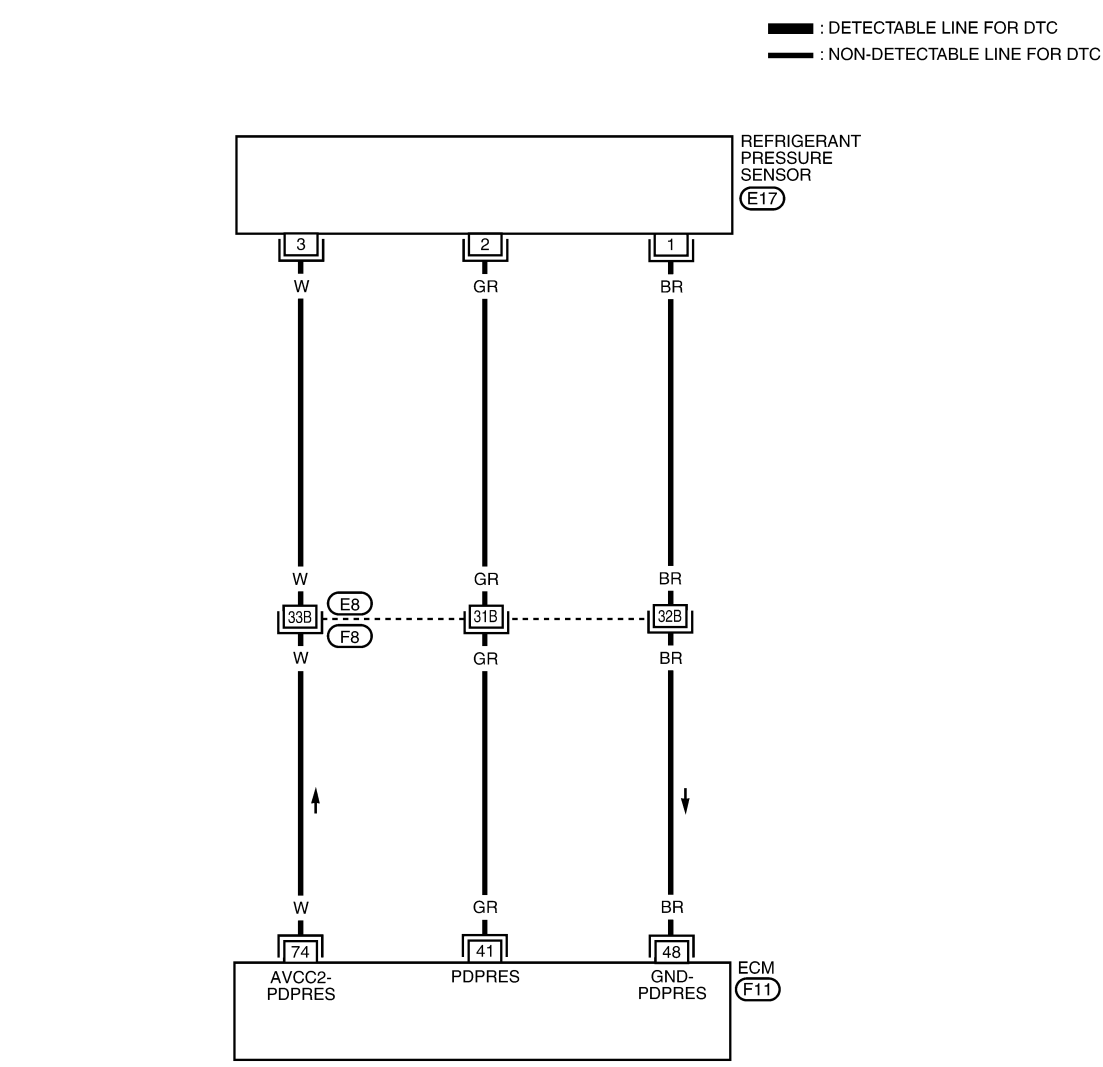
YES >> INSPECTION END

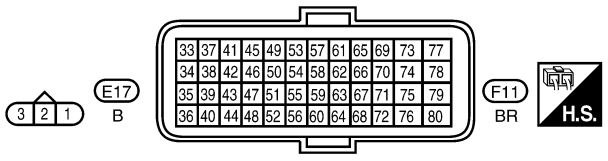
NO >> Go to EC-458, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004780709

EC-RP/SEN-01





REFER TO THE FOLLOWING.
F8 - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2662E

Diagnosis Procedure

INFOID:0000000004780382

1.CHECK GROUND CONNECTION

1. Turn A/C switch and blower fan switch OFF.
2. Stop engine.
3. Turn ignition switch OFF.

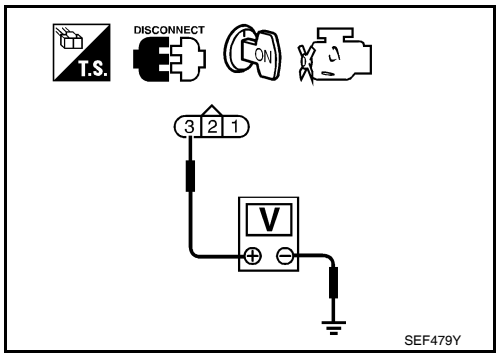
4. Check ground connections E15, E24. Refer to EC-125, "Ground Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between refrigerant pressure sensor harness connector and ground.



Refrigerant pressure sensor		Ground	Voltage
Connector	Terminal		
E17	3	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F8, E8
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E17	1	F11	48	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F8, E8
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between ECM harness connector and refrigerant pressure sensor harness connector.

Refrigerant pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E17	2	F11	41	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F8, E8
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-120, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor.
NO >> Repair or replace.

ECU DIAGNOSIS

ECM

Reference Value

INFOID:0000000004780383

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.

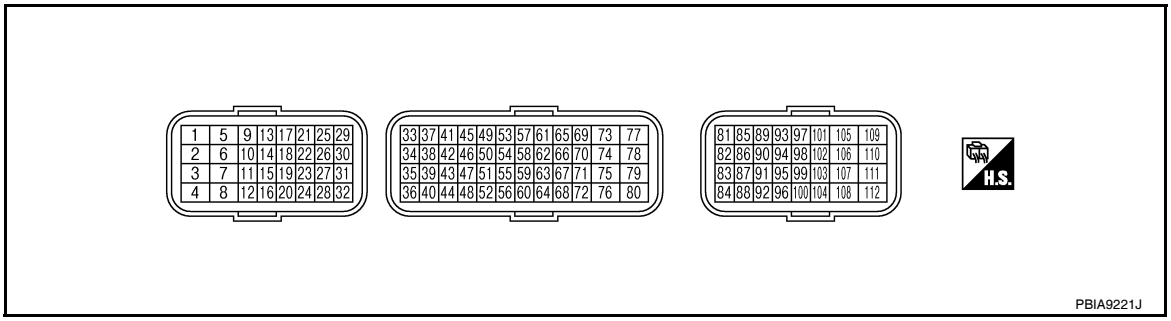
Monitor Item	Condition		Values/Status
ENG SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-113, "Diagnosis Procedure".		
B/FUEL SCHDL	See EC-113, "Diagnosis Procedure".		
A/F ALPHA-B1	See EC-113, "Diagnosis Procedure".		
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158F)
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
HO2S2 (B1)	• 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 - 0.3 V ←→ Approx. 0.6 - 1.0 V
HO2S2 MNTR (B1)			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	0.6 - 0.9 V
		Accelerator pedal: Fully depressed	4.0 - 4.8 V
ACCEL SEN 2	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9 V
		Accelerator pedal: Fully depressed	3.9 - 4.8 V
TP SEN 1-B1	• Ignition switch: ON (Engine stopped) • Selector lever position: D (A/T) or 1st (M/T)	Accelerator pedal: Fully released	More than 0.36 V
		Accelerator pedal: Fully depressed	Less than 4.75 V
TP SEN 2-B1	• Ignition switch: ON (Engine stopped) • Selector lever position: D (A/T) or 1st (M/T)	Accelerator pedal: Fully released	More than 0.36 V
		Accelerator pedal: Fully depressed	Less than 4.75 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 (A/T) or Neutral (M/T)	ON
		Selector lever position: Except above	OFF

Monitor Item	Condition		Values/Status
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 (A/T) or 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 • Selector lever position: P or N (A/T) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	10 - 20°BTDC
		2,000 rpm	25 - 45°BTDC
CAL/LD VALUE	• Engine: After warming up • Selector lever position: P or N (A/T) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	10 - 35%
		2,500 rpm	10 - 35%
MASS AIRFLOW	• Engine: After warming up • Selector lever position: P or N (A/T) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	2.0 - 10.0 g·m/s
PURG VOL C/V	• Engine: After warming up • Selector lever position: P or N (A/T) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0%
		2,000 rpm	0 - 50%
INT/V TIM (B1)	• Engine: After warming up • Selector lever position: P or N (A/T) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	−5 - 5°CA
		2,000 rpm	Approx. 0 - 40°CA
INT/V SOL (B1)	• Engine: After warming up • Selector lever position: P or N (A/T) or Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0 - 2%
		2,000 rpm	Approx. 0 - 90%
AIR COND RLY	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	• For 1 second after turning ignition switch: ON • Engine running or cranking		ON
	• Except above		OFF
THRTL RELAY	• Ignition switch: ON		ON

Monitor Item	Condition		Values/Status
COOLING FAN	• Engine: After warning up, idle the engine • Air conditioner switch: OFF	Engine coolant temperature is 98°C (208°F) or less	OFF
		Engine coolant temperature is between 98°C (208°F) and 99°C (210°F)	LOW
		Engine coolant temperature is 100°C (212°F) or more	HIGH
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
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		40 - 100%
AC PRESS SEN	• Engine: Idle • Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0 V

*: 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.

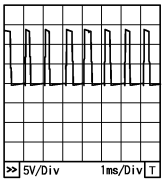
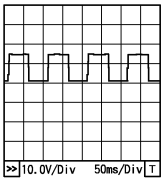
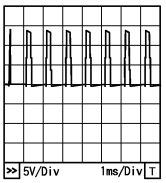
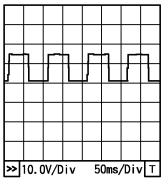
TERMINAL LAYOUT

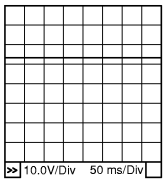
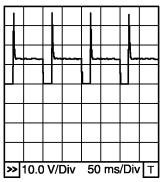
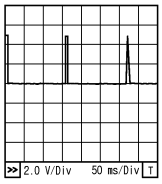
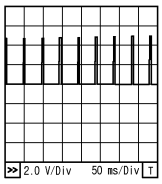


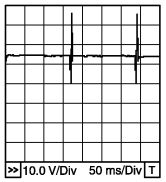
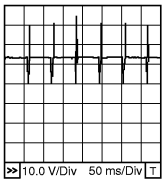
PHYSICAL VALUES

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.

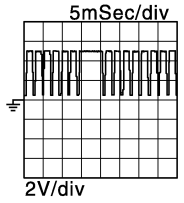
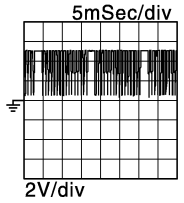
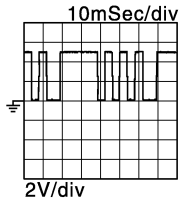
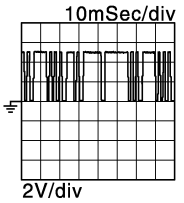
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

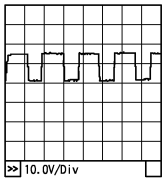
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L	Throttle control motor (Open)	**[Ignition switch: ON]** • Engine stopped • Selector lever position: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	Approximately 3.2 V  PBIA8150J
2	SB	Throttle control motor power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14 V)
3	G	A/F sensor 1 heater	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8 V  PBIA8148J
4	P	Throttle control motor (Close)	**[Ignition switch: ON]** • Engine stopped • Selector lever position: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	0 - 14 V  PBIA8149J
5	G	Heated oxygen sensor 2 heater	**[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.	Approximately 10 V  PBIA8148J
			[Ignition switch: ON] • Engine stopped **[Engine is running]** • Engine speed: Above 3,600 rpm.	BATTERY VOLTAGE (11 - 14 V)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
9	P	EVAP canister purge volume control solenoid valve	**[Engine is running]** • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting.	BATTERY VOLTAGE (11 - 14 V)  PBIB0050E
			[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14 V)  PBIB0520E
10 11	B B	ECM ground	**[Engine is running]** • Idle speed	Body ground
15	Y	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14 V)
			[Ignition switch: ON]	0 - 1.0 V
17 18 21 22	R LG G SB	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 4 Ignition signal No. 3	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 0.3 V  PBIA9265J
			[Engine is running] • **Warm-up condition** • Engine speed: 2,500 rpm.	0.2 - 0.5 V  PBIA9266J
23	GR	Fuel pump relay	**[Ignition switch: ON]** • For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.0 V
			[Ignition switch: ON] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14 V)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25 29 30 31	V Y O L	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 2 Fuel injector No. 1	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14 V)  PBIB0529E
			[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V)  PBIA4943J
28	W	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14 V)
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For a few seconds after turning ignition switch OFF	0 - 1.0 V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
33	LG	Throttle position sensor 1	**[Ignition switch: ON]** • Engine stopped • Selector lever position: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36 V
			[Ignition switch: ON] • Engine stopped • Selector lever position: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75 V
34	O	Throttle position sensor 2	**[Ignition switch: ON]** • Engine stopped • Selector lever position: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75 V
			[Ignition switch: ON] • Engine stopped • Selector lever position: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36 V
36	Y	Sensor ground (Throttle position sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0 V
37	W	Knock sensor	**[Engine is running]** • Idle speed	Approximately 2.5 V
38	P	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8 V Output voltage varies with engine coolant temperature.
40	—	Sensor ground (Knock sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0 V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
41	GR	Refrigerant pressure sensor	**[Engine is running]** • **Warm-up condition** • Both A/C switch and blower fan switch: ON (Compressor operates.)	1.0 - 4.0 V
42	V	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8 V
43	P	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8 V Output voltage varies with fuel tank temperature
44	B	Sensor ground (Engine coolant temperature sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0 V
45	G	Mass air flow sensor	**[Engine is running]** • **Warm-up condition** • Idle speed	0.9 - 1.3 V
			[Engine is running] • **Warm-up condition** • Engine speed: 2,500 rpm	1.4 - 1.9 V
46	V	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8 V Output voltage varies with intake air temperature.
48	BR	Sensor ground (Refrigerant pressure sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0 V
49	W	A/F sensor 1	**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.8 V Output voltage varies with air fuel ratio.
50	W	Heated oxygen sensor 2	**[Engine is running]** • Revving engine from idle to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 1.0 V
51	O	Sensor ground (EVAP control system pressure sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0 V
52	LG	Sensor ground (Mass air flow sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0 V
53	B	A/F sensor 1	**[Ignition switch: ON]**	Approximately 2.2 V
55	O	Sensor ground (Intake air temperature sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0 V
59	O	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0 V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
61	W	Crankshaft position sensor (POS)	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	Approximately 4.0 V  JMBIA2185GB
			[Engine is running] • Engine speed: 2,000 rpm	Approximately 4.0 V  JMBIA2186GB
62	R	Sensor ground [Crankshaft position sensor (POS)]	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0 V
63	BR	Sensor ground [Camshaft position sensor (PHASE)]	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0 V
65	G	Camshaft position sensor (PHASE)	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	Approximately 3.6  JMBIA2183GB
			[Engine is running] • Engine speed: 2,000 rpm.	Approximately 3.6 V  JMBIA2184GB
69	L	Park/neutral position (PNP) switch	**[Ignition switch: ON]** • Selector lever position: P or N (A/T), Neutral (M/T)	BATTERY VOLTAGE (11 - 14 V)
			[Ignition switch: ON] • Except above	Approximately 0 V
72	V	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5 V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
73	P	Intake valve timing control solenoid valve	**[Engine is running]** • **Warm-up condition** • Idle speed	BATTERY VOLTAGE (11 - 14 V)
			[Engine is running] • **Warm-up condition** • When revving engine up to 2,000 rpm quickly	7 - 10 V  PBIA4937J
74	W	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5 V
75	BR	Sensor power supply [Crankshaft position sensor (POS)]	**[Ignition switch: ON]**	Approximately 5 V
76	W	EVAP control system pressure sensor power supply	**[Ignition switch: ON]**	Approximately 5 V
78	O	Sensor power supply [Camshaft position sensor (PHASE)]	**[Ignition switch: ON]**	Approximately 5 V
83	P	CAN communication line	—	—
84	L	CAN communication line	—	—
88	LG	DATA link connector	—	—
93	O	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
99	R	Stop lamp switch	**[Ignition switch: OFF]** • Brake pedal: Fully released	Approximately 0 V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14 V)
102	SB	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5 V
103	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6 V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4 V
104	Y	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0 V
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14 V)
106	P	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5 V
108	B	ECM ground	**[Engine is running]** • Idle speed	Body ground

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
110	G	Accelerator pedal position sensor 1	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9 V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7 V
111	R	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0 V

: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Wiring Diagram — ENGINE CONTROL SYSTEM —

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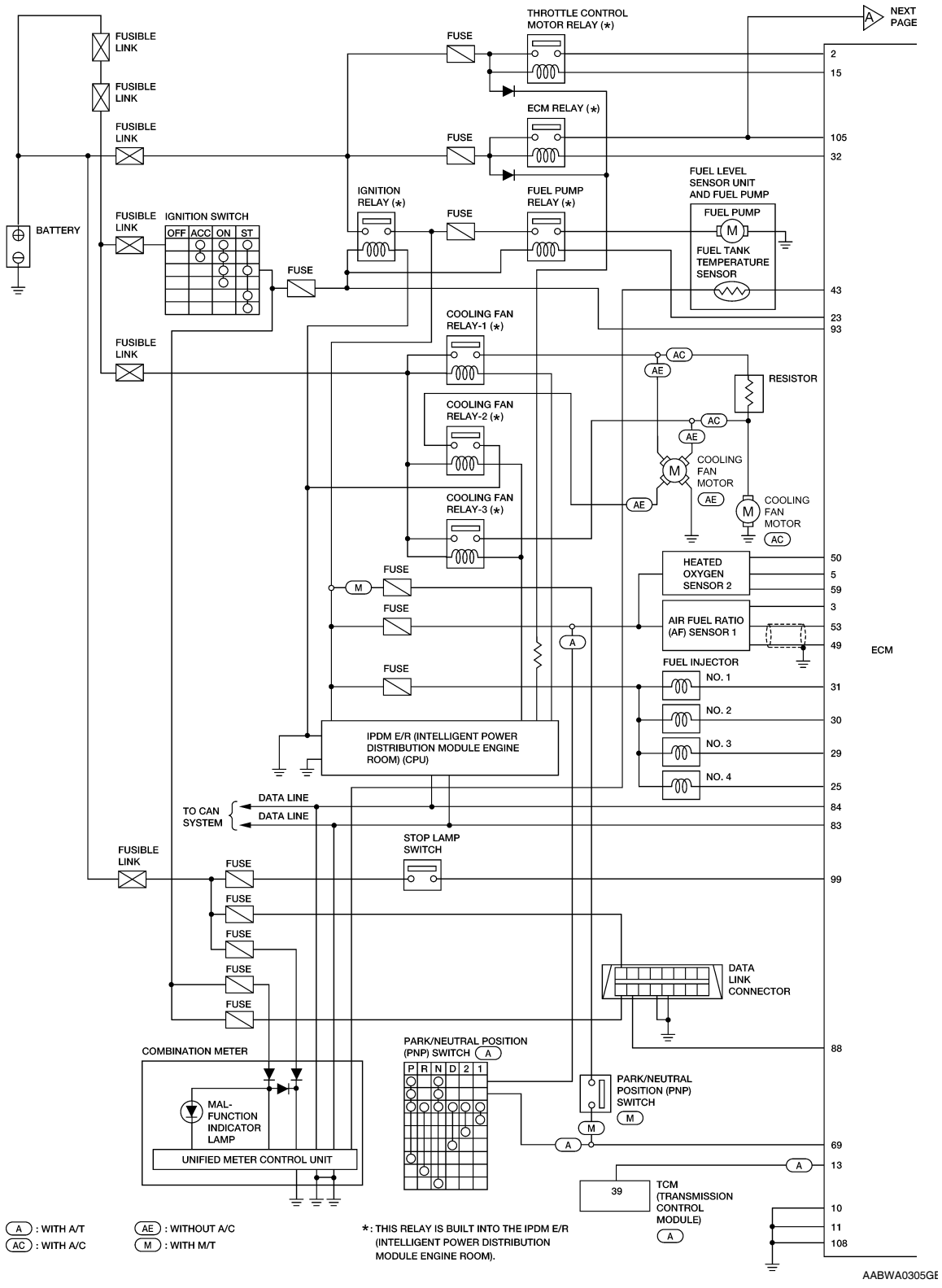

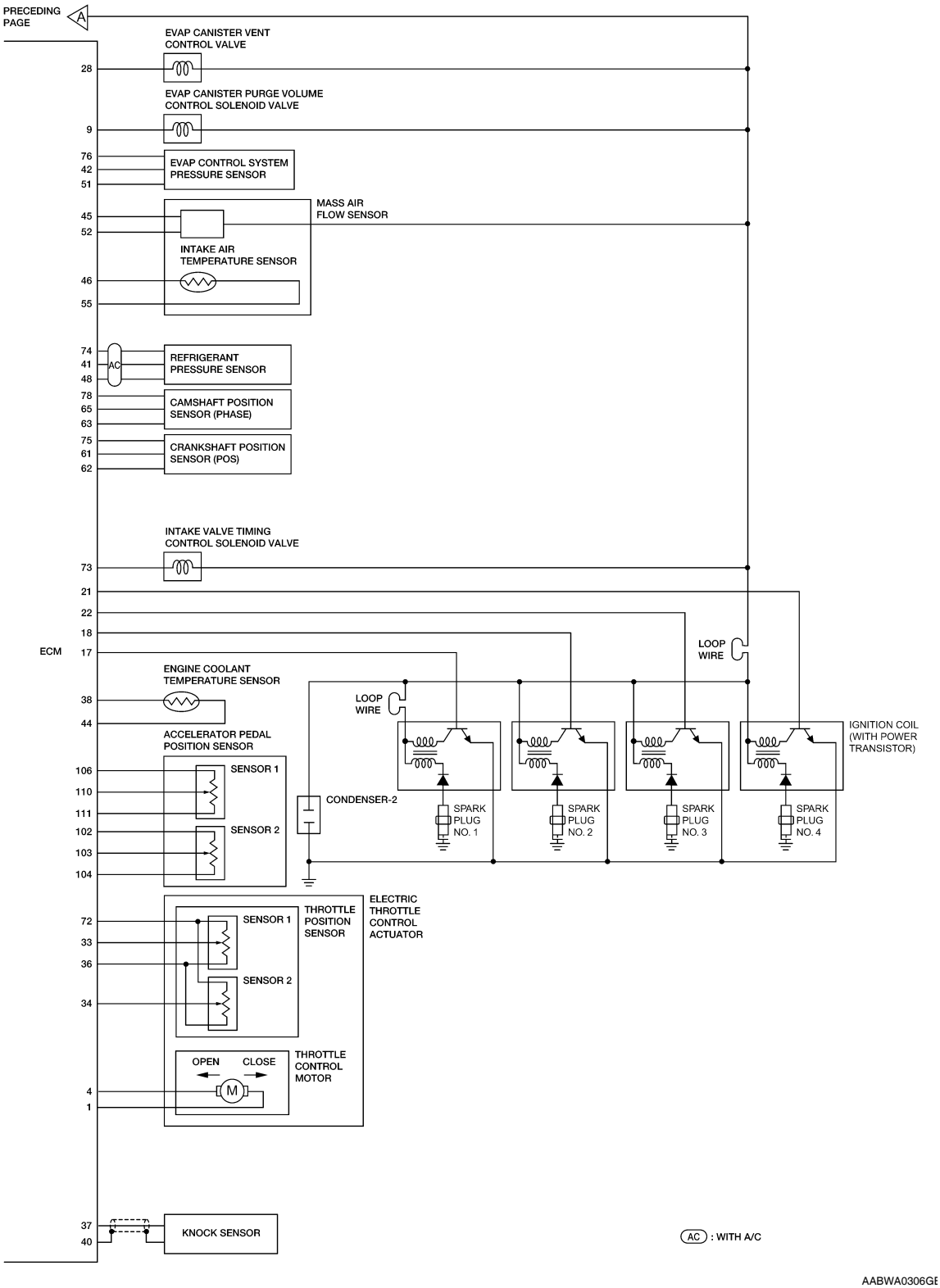

Fail Safe

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NON DTC RELATED ITEM

Detected items	Engine operating condition in fail-safe mode	Remarks
Malfunction indicator lamp circuit	Engine speed will not rise more than 2,500 rpm due to the fuel cut	When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system. Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function. The fail-safe function also operates when above diagnoses except MIL circuit are detected and demands the driver to repair the malfunction.

DTC RELATED ITEM

DTC No.	Detected items	Engine operating condition in fail-safe mode	
P0011	Intake valve timing control	The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function.	
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the following condition. CONSULT-III displays the engine coolant temperature decided by ECM.	
		Condition	Engine coolant temperature decided (CONSULT-III display)
		Just as ignition switch is turned ON or START	40°C (104°F)
		More than approx. 4 minutes after engine starting	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
		When the fail-safe system for 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.	
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.	
P1805	Brake switch	ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.	
		Vehicle condition	Driving condition
		When engine is idling	Normal
		When accelerating	Poor acceleration
P2100 P2103	Throttle control motor relay	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P2101	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
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.	

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 (A/T), Neutral (M/T) position, and engine speed will not exceed 1,000 rpm or more.
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Inspection Priority Chart

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If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
1	• U0101 U0140 U1001 CAN communication line • P0101 P0102 P0103 Mass air flow sensor • P0112 P0113 P0127 Intake air temperature sensor • P0116 P0117 P0118 P0125 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor • P0128 Thermostat function • P0181 P0182 P0183 Fuel tank temperature sensor • P0327 P0328 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 Camshaft position sensor (PHASE) • P0460 P0461 P0462 P0463 Fuel level sensor • P0500 Vehicle speed sensor • P0605 P0607 ECM • P0643 Sensor power supply • P0705 P0850 Park/neutral position (PNP) switch • P1610 - P1615 NATS • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor

Priority	Detected items (DTC)
2	• P0031 P0032 Air fuel ratio (A/F) sensor 1 heater • P0037 P0038 Heated oxygen sensor 2 heater • P0075 Intake valve timing control solenoid valve • P0130 P0131 P0132 P0133 P2A00 Air fuel ratio (A/F) sensor 1 • P0137 P0138 P0139 Heated oxygen sensor 2 • P0441 EVAP control system purge flow monitoring • P0443 P0444 P0445 EVAP canister purge volume control solenoid valve • P0447 P0448 EVAP canister vent control valve • P0451 P0452 P0453 EVAP control system pressure sensor • P0603 ECM power supply • P0710 P0720 P0725 P0731 P0732 P0733 P0734 P0740 P0744 P0745 P0750 P0755 P1705 P1760 A/T related sensors, solenoid valves and switches • P1217 Engine over temperature (OVERHEAT) • P1805 Brake switch • P2100 P2103 Throttle control motor relay • P2101 Electric throttle control function • P2118 Throttle control motor
3	• P0011 Intake valve timing control • P0171 P0172 Fuel injection system function • P0300 - P0304 Misfire • P0420 Three way catalyst function • P0442 P0456 EVAP control system (SMALL LEAK, VERY SMALL LEAK) • P0455 EVAP control system (GROSS LEAK) • P0506 P0507 Idle speed control system • P1148 Closed loop control • P1421 Cold start control • P1715 Primary speed sensor • P2119 Electric throttle control actuator

DTC Index

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×:Applicable —: Not applicable

DTC*1		Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page
CONSULT-III GST*2	ECM*3					
U0101	0101*4	LOST COMM (TCM)	—	1	×	EC-126
U0140	0140*4	LOST COMM (BCM)	—	1	×	EC-128
U1001	1001*4	CAN COMM CIRCUIT	—	2	—	EC-126
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	**Flashing*7**	**—**
P0011	0011	INT/V TIM CONT-B1	—	2	×	EC-132
P0031	0031	A/F SEN1 HTR (B1)	—	2	×	EC-136
P0032	0032	A/F SEN1 HTR (B1)	—	2	×	EC-136
P0037	0037	HO2S2 HTR (B1)	—	2	×	EC-140
P0038	0038	HO2S2 HTR (B1)	—	2	×	EC-140
P0075	0075	INT/V TIM V/CIR-B1	—	2	×	EC-144
P0101	0101	MAF SEN/CIRCUIT-B1	—	2	×	EC-148
P0102	0102	MAF SEN/CIRCUIT-B1	—	1	×	EC-156
P0103	0103	MAF SEN/CIRCUIT-B1	—	1	×	EC-156
P0112	0112	IAT SEN/CIRCUIT-B1	—	2	×	EC-162
P0113	0113	IAT SEN/CIRCUIT-B1	—	2	×	EC-162
P0116	0116	ECT SEN/CIRC	—	2	×	EC-165
P0117	0117	ECT SEN/CIRC	—	1	×	EC-167

DTC*1		Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page
CONSULT-III GST*2	ECM*3					
P0118	0118	ECT SEN/CIRC	—	1	×	EC-167
P0122	0122	TP SEN 2/CIRC-B1	—	1	×	EC-171
P0123	0123	TP SEN 2/CIRC-B1	—	1	×	EC-171
P0125	0125	ECT SENSOR	—	2	×	EC-175
P0127	0127	IAT SENSOR-B1	—	2	×	EC-178
P0128	0128	THERMSTAT FNCTN	—	2	×	EC-180
P0130	0130	A/F SENSOR1 (B1)	—	2	×	EC-182
P0131	0131	A/F SENSOR1 (B1)	—	2	×	EC-188
P0132	0132	A/F SENSOR1 (B1)	—	2	×	EC-193
P0133	0133	A/F SENSOR1 (B1)	×	2	×	EC-198
P0137	0137	HO2S2 (B1)	×	2	×	EC-204
P0138	0138	HO2S2 (B1)	×	2	×	EC-212
P0139	0139	HO2S2 (B1)	×	2	×	EC-221
P0171	0171	FUEL SYS-LEAN-B1	—	2	×	EC-229
P0172	0172	FUEL SYS-RICH-B1	—	2	×	EC-235
P0181	0181	FTT SENSOR	—	2	×	EC-240
P0182	0182	FTT SEN/CIRCUIT	—	2	×	EC-245
P0183	0183	FTT SEN/CIRCUIT	—	2	×	EC-245
P0222	0222	TP SEN 1/CIRC-B1	—	1	×	EC-249
P0223	0223	TP SEN 1/CIRC-B1	—	1	×	EC-249
P0300	0300	MULTI CYL MISFIRE	—	1 or 2	×	EC-253
P0301	0301	CYL 1 MISFIRE	—	1 or 2	×	EC-253
P0302	0302	CYL 2 MISFIRE	—	1 or 2	×	EC-253
P0303	0303	CYL 3 MISFIRE	—	1 or 2	×	EC-253
P0304	0304	CYL 4 MISFIRE	—	1 or 2	×	EC-253
P0327	0327	KNOCK SEN/CIRC-B1	—	2	—	EC-259
P0328	0328	KNOCK SEN/CIRC-B1	—	2	—	EC-259
P0335	0335	CKP SEN/CIRCUIT	—	2	×	EC-263
P0340	0340	CMP SEN/CIRC-B1	—	2	×	EC-268
P0420	0420	TW CATALYST SYS-B1	×	2	×	EC-273
P0441	0441	EVAP PURG FLOW/MON	×	2	×	EC-278
P0442	0442	EVAP SMALL LEAK	×	2	×	EC-284
P0443	0443	PURG VOLUME CONT/V	—	2	×	EC-291
P0444	0444	PURG VOLUME CONT/V	—	2	×	EC-297
P0445	0445	PURG VOLUME CONT/V	—	2	×	EC-297
P0447	0447	VENT CONTROL VALVE	—	2	×	EC-301
P0448	0448	VENT CONTROL VALVE	—	2	×	EC-306
P0451	0451	EVAP SYS PRES SEN	—	2	×	EC-312
P0452	0452	EVAP SYS PRES SEN	—	2	×	EC-315
P0453	0453	EVAP SYS PRES SEN	—	2	×	EC-322
P0455	0455	EVAP GROSS LEAK	—	2	×	EC-329
P0456	0456	EVAP VERY SML LEAK	×*6	2	×	EC-335

DTC*1		Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page
CONSULT-III GST*2	ECM*3					
P0460	0460	FUEL LEV SEN SLOSH	—	2	×	EC-342
P0461	0461	FUEL LEVEL SENSOR	—	2	×	EC-343
P0462	0462	FUEL LEVL SEN/CIRC	—	2	×	EC-345
P0463	0463	FUEL LEVL SEN/CIRC	—	2	×	EC-345
P0500	0500	VEH SPEED SEN/CIRC*5	—	2	×	EC-347
P0506	0506	ISC SYSTEM	—	2	×	EC-349
P0507	0507	ISC SYSTEM	—	2	×	EC-351
P0603	0603	ECM BACK UP/CIRCUIT	—	2	×	EC-353
P0605	0605	ECM	—	1 or 2	× or —	EC-355
P0607	0607	ECM	—	1 (A/T) 2 (M/T)	× (A/T) — (M/T)	EC-357
P0643	0643	SENSOR POWER/CIRC	—	1	×	EC-358
P0705	0705	PNP SW/CIRC	—	2	×	AT-91
P0710	0710	ATF TEMP SEN/CIRC*8	—	2	×	AT-96
P0720	0720	VEH SPD SEN/CIR AT*5	—	2	×	AT-101
P0725	0725	ENGINE SPEED SIG	—	2	×	AT-106
P0731	0731	A/T 1ST GR FNCTN*8	—	2	×	AT-110
P0732	0732	A/T 2ND GR FNCTN*8	—	2	×	AT-113
P0733	0733	A/T 3RD GR FNCTN*8	—	2	×	AT-116
P0734	0734	A/T 4TH GR FNCTN*8	—	2	×	AT-119
P0740	0740	TCC SOLENOID/CIRC	—	2	×	AT-124
P0744	0744	A/T TCC S/V FNCTN	—	2	×	AT-129
P0745	0745	L/PRESS SOL/CIRC	—	2	×	AT-134
P0750	0750	SFT SOL A/CIRC	—	1	×	AT-139
P0755	0755	SFT SOL B/CIRC	—	1	×	AT-144
P0850	0850	P-N POS SW/CIRCUIT	—	2	×	EC-362
P1148	1148	CLOSED LOOP-B1	—	1	×	EC-367
P1217	1217	ENG OVER TEMP	—	1	×	EC-368
P1225	1225	CTP LEARNING-B1	—	2	—	EC-372
P1226	1226	CTP LEARNING-B1	—	2	—	EC-374
P1421	1421	COLD START CONTROL	—	2	×	EC-376
P1610	1610	LOCK MODE	—	2	—	BL-259
P1611	1611	ID DISCORD, IMMU-ECM	—	2	—	BL-259
P1612	1612	CHAIN OF ECM-IMMU	—	2	—	BL-259
P1614	1614	CHAIN OF IMMU-KEY	—	2	—	BL-259
P1615	1615	DIFFERENCE OF KEY	—	2	—	BL-259
P1715	1715	IN PULY SPEED	—	2	—	EC-378
P1760	1760	O/R CLTCH SOL/CIRC	—	2	×	AT-149
P1805	1805	BRAKE SW/CIRCUIT	—	2	—	EC-380
P2100	2100	ETC MOT PWR-B1	—	1	×	EC-384
P2101	2101	ETC FNCTN/CIRC-B1	—	1	×	EC-388
P2103	2103	ETC MOT PWR	—	1	×	EC-384

DTC*1		Items (CONSULT-III screen terms)	SRT code	Trip	MIL	Reference page
CONSULT-III GST*2	ECM*3					
P2118	2118	ETC MOT-B1	—	1	×	EC-393
P2119	2119	ETC ACTR-B1	—	1	×	EC-397
P2122	2122	APP SEN 1/CIRC	—	1	×	EC-399
P2123	2123	APP SEN 1/CIRC	—	1	×	EC-399
P2127	2127	APP SEN 2/CIRC	—	1	×	EC-403
P2128	2128	APP SEN 2/CIRC	—	1	×	EC-403
P2135	2135	TP SENSOR-B1	—	1	×	EC-408
P2138	2138	APP SENSOR	—	1	×	EC-412
P2A00	2A00	A/F SENSOR1 (B1)	—	2	×	EC-417

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: The troubleshooting for this DTC needs CONSULT-III.

*5: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

*6: SRT code will not be set if the self-diagnostic result is NG.

*7: When the ECM is in the mode that displays SRT status, MIL may flash. For the details, refer to “How to Display SRT Status” in EC-90, "Diagnosis Description".

*8: When erasing this DTC, always use CONSULT-III or GST.

How to Set SRT Code

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To set all SRT codes, self-diagnoses for the SRT items must be performed one or more times. Refer to EC-90, "Diagnosis Description", “SYSTEM READINESS TEST (SRT) CODE”, “SRT Item”.
Each diagnosis may require a long period of actual driving under various conditions.

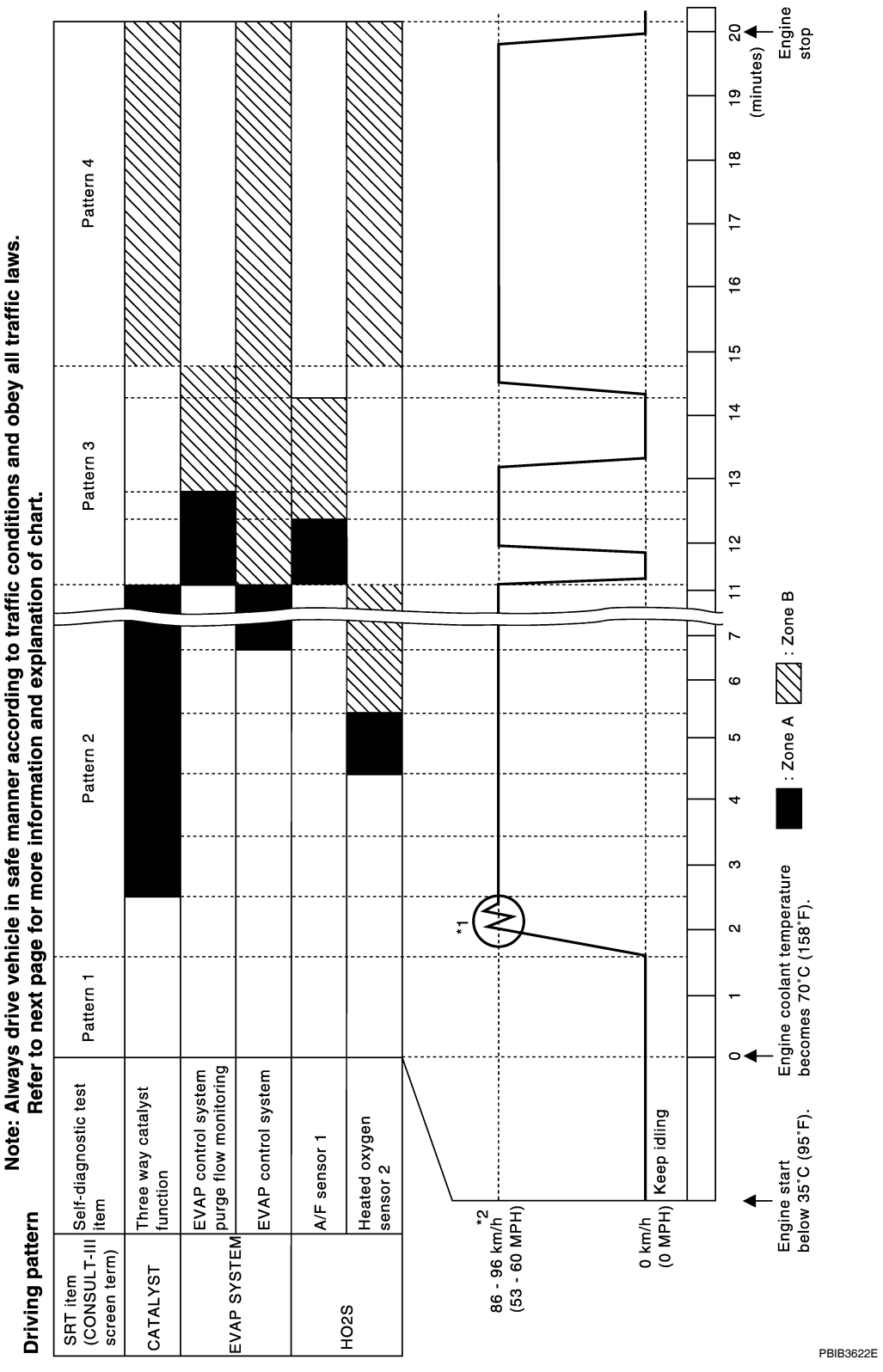
WITH CONSULT-III

Perform corresponding DTC CONFIRMATION PROCEDURE one by one based on Performance Priority in the table on “SRT Item”.

WITHOUT CONSULT-III

The most efficient driving pattern in which SRT codes can be properly set is explained below. The driving pattern should be performed one or more times to set all SRT codes.

DRIVING PATTERN



- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
  Zone A refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest.
  Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

- Sea level
- Flat road
- Ambient air temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.
  Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1:

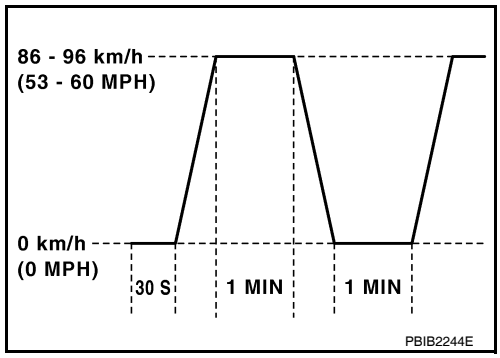
- **The engine is started at the engine coolant temperature of −10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 38 and ground is 3.0 - 4.3 V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 38 and ground is lower than 1.4 V).**
- **The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 43 and ground is less than 4.1 V).**

Pattern 2:

- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:

- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during decelerating vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).



Pattern 4:

- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted again.

*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.
*2: Checking the vehicle speed with GST is advised.

Suggested Transmission Gear Position for A/T Models
Set the selector lever in the D position.

Suggested Upshift Speeds for M/T Models
Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.

	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:		For quick acceleration in low altitude areas and high altitude areas [over 1,219 m (4,000 ft)]:
Gear change	ACCEL shift position [km/h (MPH)]	CRUISE shift point [km/h (MPH)]	km/h (MPH)
1st to 2nd	15 (9)	21 (13)	15 (9)
2nd to 3rd	25 (16)	38 (24)	30 (19)
3rd to 4th	40 (25)	55 (34)	45 (28)
4th to 5th	45 (28)	74 (46)	50 (31)

Test Value and Test Limit

INFOID:0000000004780389

The following is the information specified in Service $06 of SAE J1979.
The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
These data (test value and test limit) are specified by On Board Monitor ID(OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.
The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (eg., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	01H	Air fuel ratio (A/F) sensor 1 (Bank 1)	P0131	83H	0BH	Minimum sensor output voltage for test cycle
			P0131	84H	0BH	Maximum sensor output voltage for test cycle
			P0130	85H	0BH	Minimum sensor output voltage for test cycle
			P0130	86H	0BH	Maximum sensor output voltage for test cycle
			P0133	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0133	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A00	89H	84H	The amount of shift in air fuel ratio
			P2A00	8AH	84H	The amount of shift in air fuel ratio
			P0130	8BH	0BH	Difference in sensor output voltage
			P0133	8CH	83H	Response gain at the limited frequency
	02H	Heated oxygen sensor 2 (Bank 1)	P0138	07H	0CH	Minimum sensor output voltage for test cycle
			P0137	08H	0CH	Maximum sensor output voltage for test cycle
			P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
	03H	Heated oxygen sensor 3 (Bank 1)	P0143	07H	0CH	Minimum sensor output voltage for test cycle
			P0144	08H	0CH	Maximum sensor output voltage for test cycle
			P0146	80H	0CH	Sensor output voltage
			P0145	81H	0CH	Difference in sensor output voltage

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P0151	83H	0BH	Minimum sensor output voltage for test cycle
			P0151	84H	0BH	Maximum sensor output voltage for test cycle
			P0150	85H	0BH	Minimum sensor output voltage for test cycle
			P0150	86H	0BH	Maximum sensor output voltage for test cycle
			P0153	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0153	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A03	89H	84H	The amount of shift in air fuel ratio
			P2A03	8AH	84H	The amount of shift in air fuel ratio
			P0150	8BH	0BH	Difference in sensor output voltage
			P0153	8CH	83H	Response gain at the limited frequency
	06H	Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle
			P0157	08H	0CH	Maximum sensor output voltage for test cycle
			P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
	07H	Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle
			P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
			P0165	81H	0CH	Difference in sensor output voltage
CATA-LYST	21H	Three way catalyst function (Bank1)	P0420	80H	01H	O2 storage index
			P0420	82H	01H	Switching time lag engine exhaust index value
			P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2423	84H	84H	O2 storage index in HC trap catalyst
	22H	Three way catalyst function (Bank2)	P0430	80H	01H	O2 storage index
			P0430	82H	01H	Switching time lag engine exhaust index value
			P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
EGR SYSTEM	31H	EGR function	P0400	80H	96H	Low Flow Faults: EGR temp change rate (short term)
			P0400	81H	96H	Low Flow Faults: EGR temp change rate (long term)
			P0400	82H	96H	Low Flow Faults: Difference between max EGR temp and EGR temp under idling condition
			P0400	83H	96H	Low Flow Faults: Max EGR temp
			P1402	84H	96H	High Flow Faults: EGR temp increase rate
VVT SYSTEM	35H	VVT Monitor (Bank1)	P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
	36H	VVT Monitor (Bank2)	P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
EVAP SYSTEM	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3BH	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)
	3CH	EVAP control system leak (Very small leak)	P0456	80H	05H	Leak area index (for more than 0.02 inch)
			P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close
O2 SENSOR HEATER	41H	A/F sensor 1 heater (Bank 1)	Low Input:P0031 High Input:P0032	81H	0BH	Converted value of Heater electric current to voltage
	42H	Heated oxygen sensor 2 heater (Bank 1)	Low Input:P0037 High Input:P0038	80H	0CH	Converted value of Heater electric current to voltage
	43H	Heated oxygen sensor 3 heater (Bank 1)	P0043	80H	0CH	Converted value of Heater electric current to voltage
	45H	A/F sensor 1 heater (Bank 2)	Low Input:P0051 High Input:P0052	81H	0BH	Converted value of Heater electric current to voltage
	46H	Heated oxygen sensor 2 heater (Bank 2)	Low Input:P0057 High Input:P0058	80H	0CH	Converted value of Heater electric current to voltage
	47H	Heated oxygen sensor 3 heater (Bank 2)	P0063	80H	0CH	Converted value of Heater electric current to voltage

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
SECONDARY AIR	71H	Secondary Air system	P0411	80H	01H	Secondary Air Injection System Incorrect Flow Detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary Air Injection System Insufficient Flow
			P2445	82H	01H	Secondary Air Injection System Pump Stuck Off
			P2448	83H	01H	Secondary Air Injection System High Airflow
			Bank1: P2440 Bank2: P2442	84H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2440	85H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2444	86H	01H	Secondary Air Injection System Pump Stuck On
FUEL SYSTEM	81H	Fuel injection system function (Bank 1)	P0171 or P0172	80H	2FH	Long term fuel trim
			P0171 or P0172	81H	24H	The number of lambda control clamped
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	80H	2FH	Long term fuel trim
			P0174 or P0175	81H	24H	The number of lambda control clamped

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A1H	Multiple Cylinder Misfires	P0301	80H	24H	Misfiring counter at 1000 revolution of the first cylinder
			P0302	81H	24H	Misfiring counter at 1000 revolution of the second cylinder
			P0303	82H	24H	Misfiring counter at 1000 revolution of the third cylinder
			P0304	83H	24H	Misfiring counter at 1000 revolution of the fourth cylinder
			P0305	84H	24H	Misfiring counter at 1000 revolution of the fifth cylinder
			P0306	85H	24H	Misfiring counter at 1000 revolution of the sixth cylinder
			P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder
			P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder
			P0300	88H	24H	Misfiring counter at 1000 revolution of the multiple cylinders
			P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder
			P0302	8AH	24H	Misfiring counter at 200 revolution of the second cylinder
			P0303	8BH	24H	Misfiring counter at 200 revolution of the third cylinder
			P0304	8CH	24H	Misfiring counter at 200 revolution of the fourth cylinder
			P0305	8DH	24H	Misfiring counter at 200 revolution of the fifth cylinder
			P0306	8EH	24H	Misfiring counter at 200 revolution of the sixth cylinder
			P0307	8FH	24H	Misfiring counter at 200 revolution of the seventh cylinder
			P0308	90H	24H	Misfiring counter at 200 revolution of the eighth cylinder
			P0300	91H	24H	Misfiring counter at 1000 revolution of the single cylinder
			P0300	92H	24H	Misfiring counter at 200 revolution of the single cylinder
			P0300	93H	24H	Misfiring counter at 200 revolution of the multiple cylinders

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A2H	No. 1 Cylinder Misfire	P0301	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0301	0CH	24H	Misfire counts for last/current driving cycles
	A3H	No. 2 Cylinder Misfire	P0302	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0302	0CH	24H	Misfire counts for last/current driving cycles
	A4H	No. 3 Cylinder Misfire	P0303	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0303	0CH	24H	Misfire counts for last/current driving cycles
	A5H	No. 4 Cylinder Misfire	P0304	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0304	0CH	24H	Misfire counts for last/current driving cycles
	A6H	No. 5 Cylinder Misfire	P0305	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0305	0CH	24H	Misfire counts for last/current driving cycles
	A7H	No. 6 Cylinder Misfire	P0306	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0306	0CH	24H	Misfire counts for last/current driving cycles
	A8H	No. 7 Cylinder Misfire	P0307	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0307	0CH	24H	Misfire counts for last/current driving cycles
	A9H	No. 8 Cylinder Misfire	P0308	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0308	0CH	24H	Misfire counts for last/current driving cycles

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Table

INFOID:0000000004780390

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-435
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-498
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-431
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-74
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-456
	Incorrect idle speed adjustment						1	1	1	1		1			EC-30
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-388 EC-397
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-30
	Ignition circuit	1	1	2	2	2		2	2			2			EC-441
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-121
Mass air flow sensor circuit		1			2										EC-148 EC-148
Engine coolant temperature sensor circuit							3			3					EC-167 EC-175
Air fuel ratio (A/F) sensor 1 circuit			1	2	3	2		2	2			2			EC-182 EC-188 EC-193 EC-198 EC-417
Throttle position sensor circuit							2			2					EC-171 EC-249 EC-372 EC-374 EC-408
Accelerator pedal position sensor circuit				3	2	1									EC-399 EC-403 EC-412
Knock sensor circuit				2								3			EC-259

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Crankshaft position sensor (POS) circuit	2	2												EC-263
Camshaft position sensor (PHASE) circuit	3	2												EC-268
Vehicle speed signal circuit		2	3		3						3			EC-347
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-353 EC-355
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-144
PNP switch circuit			3		3		3	3			3			EC-362
Refrigerant pressure sensor circuit		2				3			3		4			EC-457
Electrical load signal circuit							3							EC-428
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	MTC-22
ABS actuator and electric unit (control unit)			4											BRC-8

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-9
	Fuel piping			5	5	5		5	5			5			FL-4
	Vapor lock														—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—
Air	Air duct	5	5	5	5	5	5	5	5	5		5			EM-26
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)														
	Electric throttle control actuator														EM-28
	Air leakage from intake manifold/Collector/Gasket														
Cranking	Battery	1	1	1		1		1	1			1		1	SC-5
	Generator circuit														SC-21
	Starter circuit	3													SC-9
	Signal plate	6													EM-96
	PNP switch	4													MT-12 (M/T) AT-95 (A/T)
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-79
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-96
	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-49
	Camshaft														EM-58
	Intake valve timing control														EM-49
	Intake valve												3		EM-82
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-31 EX-4
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-39 EM-42 LU-7 LU-9
	Oil level (Low)/Filthy oil														LU-7
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-14 CO-14
	Thermostat									5					CO-23
	Water pump														CO-21
	Water gallery														CO-9
	Cooling fan									5					CO-19
	Coolant level (Low)/Contaminated coolant														CO-9
NVIS (NISSAN Vehicle Immobilizer System — NATS)		1	1												BL-257

1 - 6: The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

Description

INFOID:0000000004780391

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 2,500 rpm under no load (for example, the selector lever position is neutral and engine speed is over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 2,000 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under Multiport Fuel Injection (MFI) System, EC-42, "System Description".

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000004786987

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the “SUPPLEMENTAL RESTRAINT SYSTEM” and “SEAT BELTS” of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the “SUPPLEMENTAL RESTRAINT SYSTEM”.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

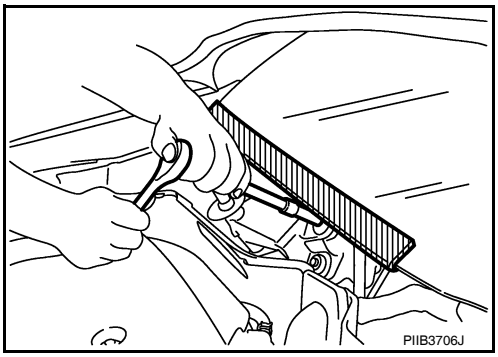
WARNING:

- **When working near the Airbag Diagnosis Sensor Unit or other Airbag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.**

Precaution for Procedure without Cowl Top Cover

INFOID:0000000004786988

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



On Board Diagnosis (OBD) System of Engine and A/T

INFOID:0000000004780394

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:

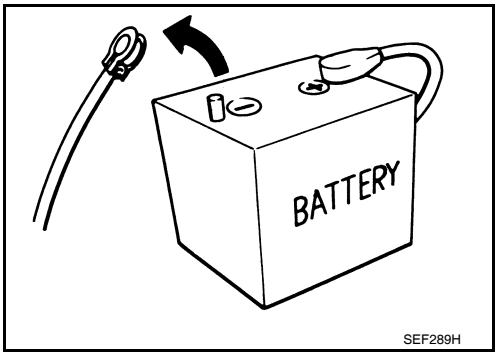
- **Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. 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-64, "Description".**

- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EVAP system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

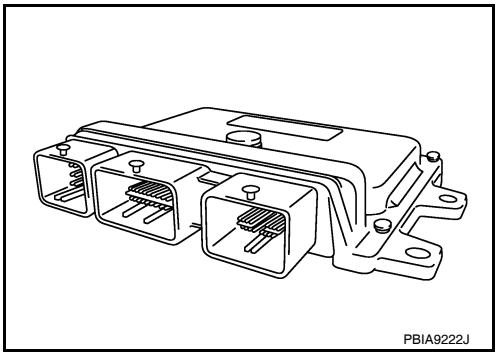
General Precautions

INFOID:0000000004780395

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect negative battery cable.**

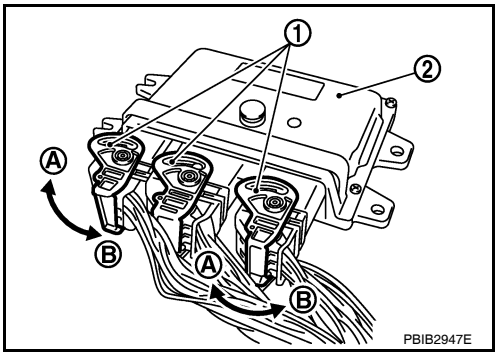


- **Do not disassemble ECM.**
- **If a battery cable is disconnected, the memory will return to the ECM value.**
  The ECM will now start to self-control at its initial value. Thus, engine operation can vary slightly in this case. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- **If the battery is disconnected, the following emission-related diagnostic information will be cleared within 24 hours.**
  - **Diagnostic trouble codes**
  - **1st trip diagnostic trouble codes**
  - **Freeze frame data**
  - **1st trip freeze frame data**
  - **System readiness test (SRT) codes**
  - **Test values**

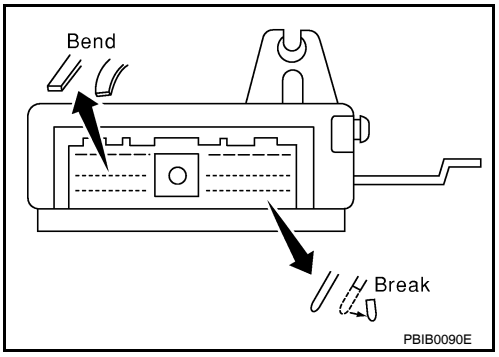


- **When connecting ECM harness connector (1), fasten (B) it securely with a lever as far as it will go as shown in the figure.**

  2. ECM
  A. Loosen

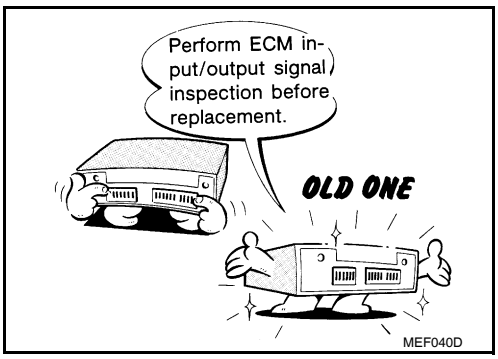


- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can 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 mal-**

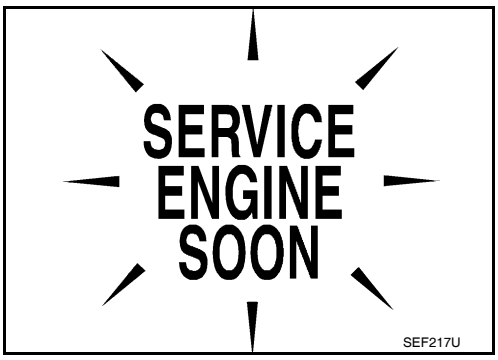


functions due to receiving external noise, degraded operation of ICs, etc.

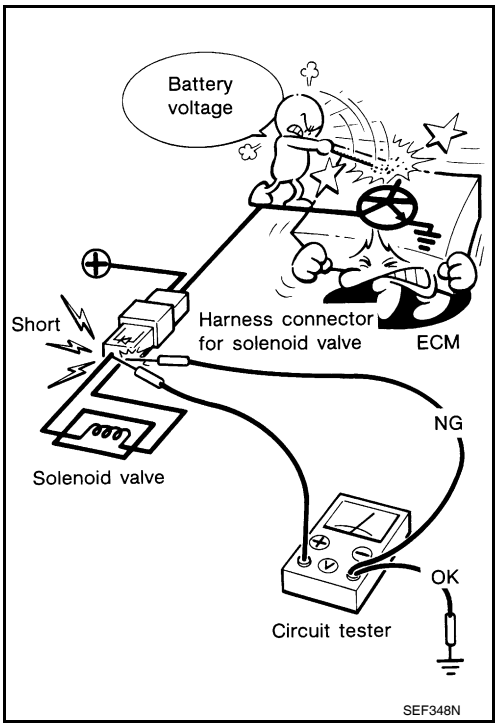
- Keep engine control system parts and harness dry.
- Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-461, "Reference Value".
- Handle mass air flow sensor carefully to avoid damage.
- Do not clean mass air flow sensor with any type of detergent.
- Do not disassemble electric throttle control actuator.
- Even a slight leak in the air intake system can cause serious incidents.
- Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).



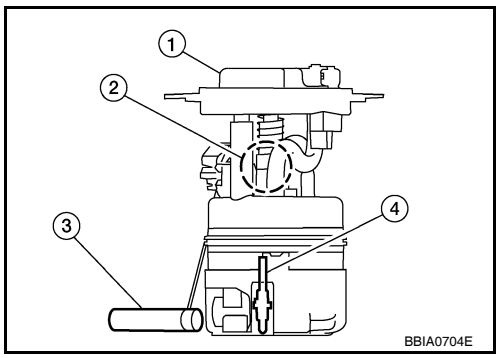
- After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check. The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.



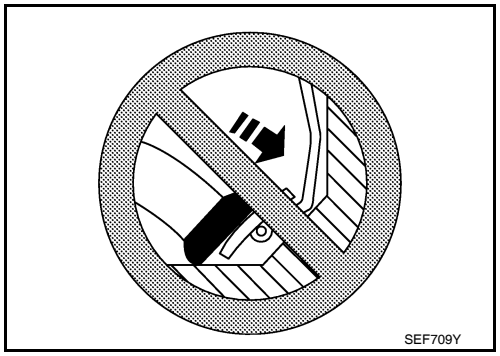
- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



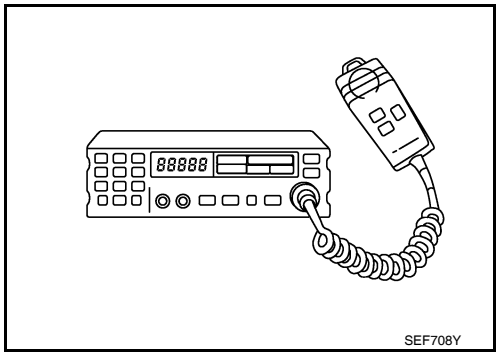
- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**
- **Fuel level sensor unit and fuel pump (1)**
- **Fuel pressure regulator (2)**
- **Fuel level sensor (3)**
- **Fuel tank temperature sensor (4)**



- **Do not depress accelerator pedal when starting.**
- **Immediately after starting, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**



- **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.**



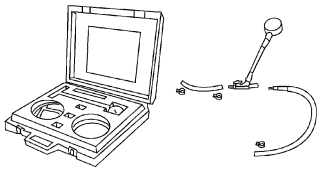
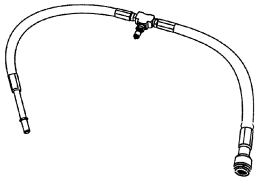
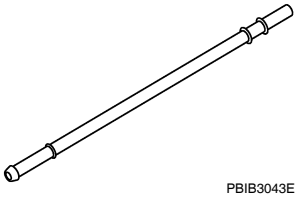
PREPARATION

PREPARATION

Special Service Tools

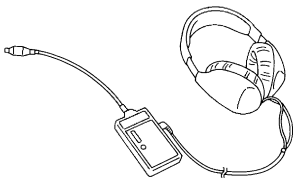
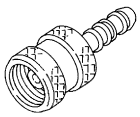
INFOID:0000000004780396

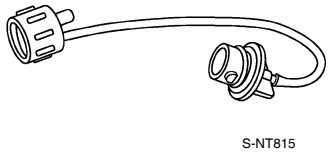
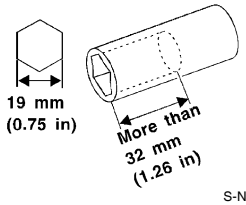
NOTE:
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
(J-44321) Fuel pressure gauge kit  LEC642	Checks fuel pressure
(J-44321-6) Fuel pressure adapter  LBIA0376E	Connects fuel pressure gauge to quick connector type fuel lines.
KV10118400 Fuel tube adapter  PBIB3043E	Measures fuel pressure

Commercial Service Tools

INFOID:0000000004780397

Tool name (Kent-Moore No.)	Description
Leak detector i.e.: (J-41416)  S-NT703	Locates the EVAP leak
EVAP service port adapter i.e.: (J-41413-OBD)  S-NT704	Applies positive pressure through EVAP service port

Tool name (Kent-Moore No.)	Description
Fuel filler cap adapter i.e.: (MLR-8382)  S-NT815	Checks fuel tank vacuum relief valve opening pressure
Socket wrench  S-NT705	Removes and installs engine coolant temperature sensor
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)	Reconditions 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)	Lubricates oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

ON-VEHICLE MAINTENANCE

FUEL PRESSURE

Inspection

INFOID:0000000004780398

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.
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

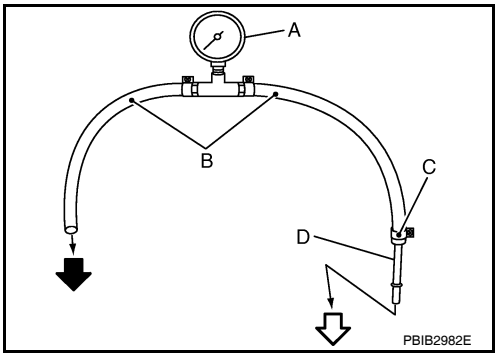
CAUTION:

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

NOTE:

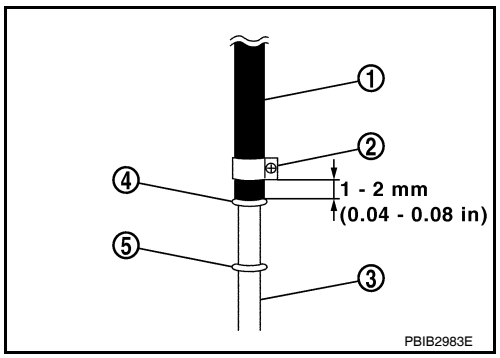
- **Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because C11 models do not have fuel return system.**
- **The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.**
- **Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains seal ability with O-rings inside.**
- **Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.**

1. Release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".
2. Prepare fuel hose for fuel pressure check B and fuel tube adapter (KV10118400) D, then connect fuel pressure gauge A.
   - : To quick connector
   - : To fuel tube (engine side)
   - C: Clamp
   - Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
   - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
   - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
   - Use Pressure Gauge to check fuel pressure.



3. Remove fuel hose. Refer to EM-156, "Removal and Installation".
   - Do not twist or kink fuel hose because it is plastic hose.

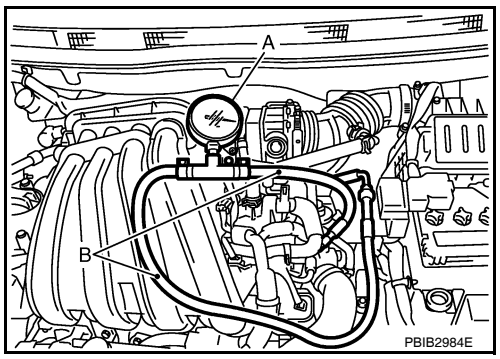
4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.
   - No.2 spool (5)
   - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
   - Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
   - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
   - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
   - When reconnecting fuel line, always use new clamps.
   - Use a torque driver to tighten clamps.
   - Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).



Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

   - Make sure that clamp screw does not contact adjacent parts.

5. Connect fuel tube adapter to quick connector.
   - A: Fuel pressure gauge
   - B: Fuel hose for fuel pressure check
6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
7. Turn ignition switch ON and check for fuel leakage.
8. Start engine and check for fuel leakage.
9. Read the indication of fuel pressure gauge.
   - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
   - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.



At idling: Approximately 350 kPa (3.57 kg/cm^2, 51 psi)

10. If result is unsatisfactory, go to next step.
11. Check the following.
    - Fuel hoses and fuel tubes for clogging
    - Fuel filter for clogging
    - Fuel pump
    - Fuel pressure regulator for clogging

    If OK, replace fuel pressure regulator.
    If NG, repair or replace.
12. Before disconnecting Fuel Pressure Gauge and Fuel Pressure Adapter J-44321-6, release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".

EVAP LEAK CHECK

Inspection

INFOID:0000000004780399

CAUTION:

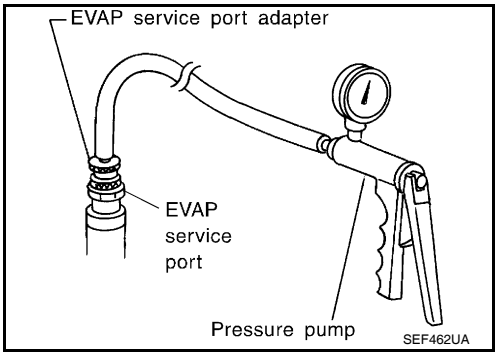
- **Do not use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in EVAP system.**

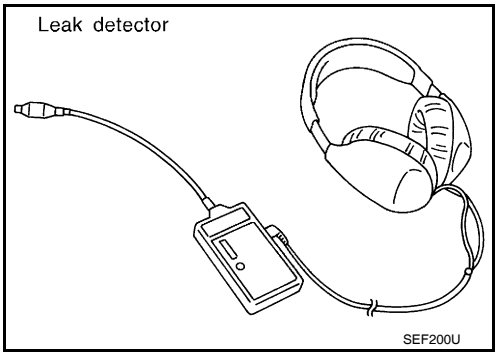
NOTE:

- Do not start engine.
- Improper installation of EVAP service port adapter [commercial service tool: (J-41413-OBD)] to the EVAP service port may cause a leak.

WITH CONSULT-III

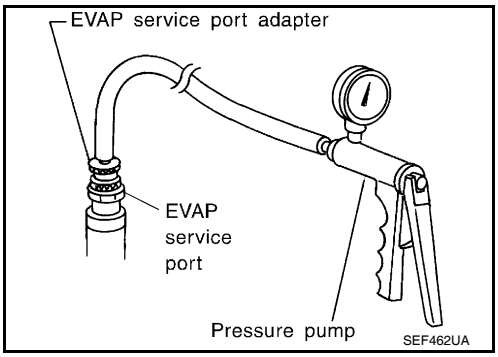
1. Install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.
2. Turn ignition switch ON.
3. Select the “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-III.
4. Touch “START”. A bar graph (Pressure indicating display) will appear on the screen.
5. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
6. Remove EVAP service port adapter [commercial service tool: (J-41413-OBD)] and hose with pressure pump.
7. Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to EC-74, "System Description".



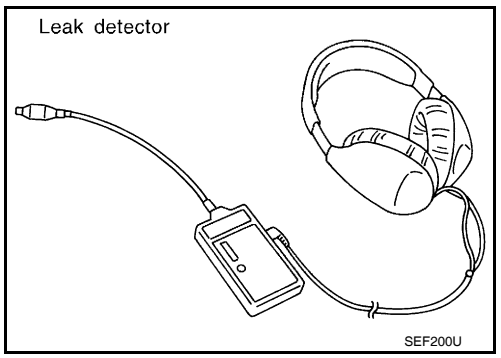


WITHOUT CONSULT-III

1. Install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.
2. Apply battery voltage between the terminals of EVAP canister vent control valve to make a closed EVAP system.
3. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2, 0.2 to 0.4 psi).
4. Remove EVAP service port adapter [commercial service tool: (J-41413-OBD)] and hose with pressure pump.



5. Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to EC-74, "System Description".

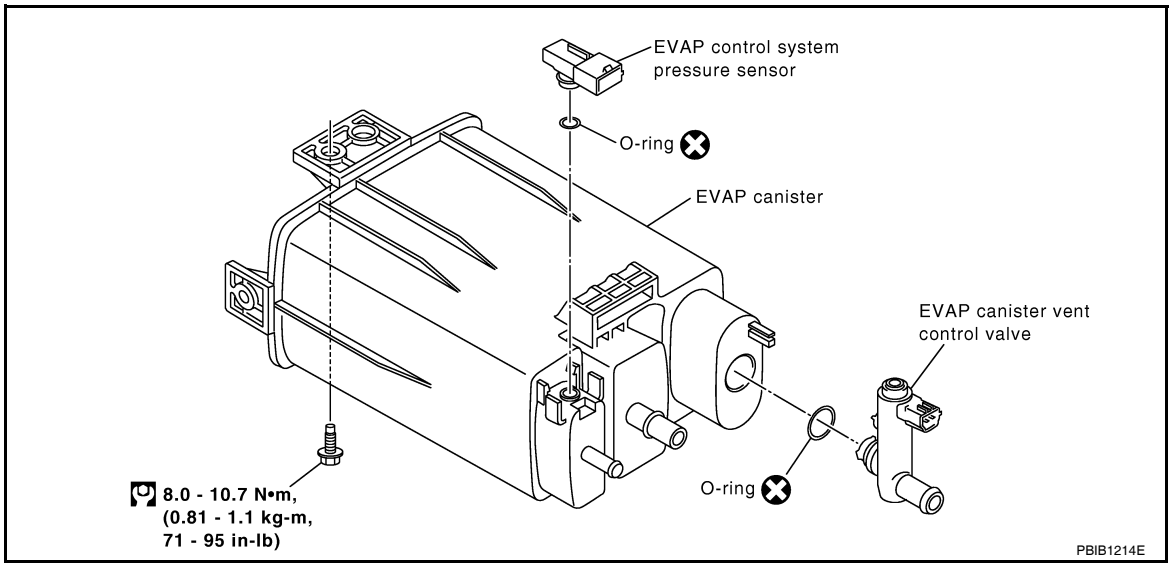


ON-VEHICLE REPAIR

EVAP CANISTER

Exploded View

INFOID:0000000004780400



Removal and Installation

INFOID:0000000004780401

REMOVAL

1. Lift up the vehicle.
2. Remove EVAP canister fixing bolt.
3. Remove EVAP canister.

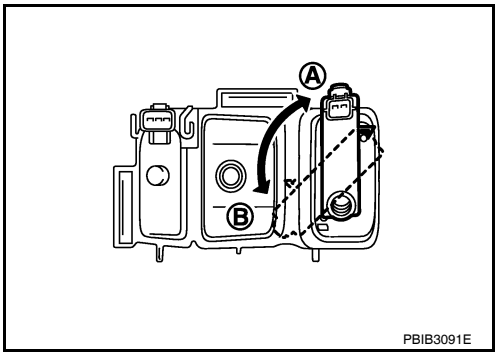
NOTE:
The EVAP canister vent control valve and EVAP canister system pressure sensor can be removed without removing the EVAP canister.

INSTALLATION

Install in the reverse order of removal.
NOTE:
Tighten EVAP canister fixing bolt to the specified torque.

DISASSEMBLY

1. Turn EVAP canister vent control valve counterclockwise.
- Lock (A)
- Unlock (B)
2. Remove the EVAP canister vent control valve.



ASSEMBLY

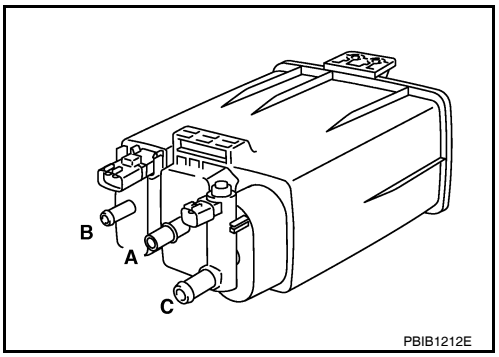
Assemble in the reverse order of disassembly.
CAUTION:
Always replace O-ring with a new one.

Inspection

INFOID:0000000004780402

Check EVAP canister as per the following:

1. Block port (B).
2. Blow air into port (A) and check that it flows freely out of port (C).
3. Release blocked port (B).
4. Apply vacuum pressure to port (B) and check that vacuum pressure exists at the ports (A) and (C).
5. Block port (A) and (B).
6. Apply pressure to port (C) and check that there is no leakage.



SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000004780403

Transmission	Condition	Specification
A/T	No load* (in P or N position)	700 ± 50 rpm
M/T	No load* (in Neutral position)	650 ± 50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Timing

INFOID:0000000004780404

Transmission	Condition	Specification
A/T	No load* (in P or N position)	6 ± 5°BTDC
M/T	No load* (in Neutral position)	6 ± 5°BTDC

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

INFOID:0000000004780405

Condition	Specification (Using CONSULT-III or GST)
At idle	10 – 35 %
At 2,500 rpm	10 – 35 %

Mass Air Flow Sensor

INFOID:0000000004780406

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	0.9 – 1.3V*
Mass air flow (Using CONSULT-III or GST)	1.0 – 4.0 g·m/sec at idle* 2.0 – 10.0 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.

SERVICE INFOMATION

APPLICATION NOTICE

How to Check Vehicle Type

INFOID:0000000004539412

Check the vehicle serial number to confirm the service information in EC section.

Vehicle serial number	Service information
Up to serial 386333	MR TYPE 1
From serial 386334	MR TYPE 2

INDEX FOR DTC

U1000-U1010

INFOID:0000000004537011

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
U1000	1000*4	CAN COMM CIRCUIT	EC-633
U1001	1001*4	CAN COMM CIRCUIT	EC-633
U1010	1010	CONTROL UNIT(CAN)	EC-635

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: The troubleshooting for this DTC needs CONSULT-III.

P0011-P0075

INFOID:0000000004804738

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0011	0011	INT/V TIM CONT-B1	EC-636
P0031	0031	A/F SEN1 HTR (B1)	EC-640
P0032	0032	A/F SEN1 HTR (B1)	EC-640
P0037	0037	HO2S2 HTR (B1)	EC-645
P0038	0038	HO2S2 HTR (B1)	EC-645
P0075	0075	INT/V TIM V/CIR-B1	EC-650

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0101-P0128

INFOID:0000000004804752

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0101	0101	MAF SEN/CIRCUIT-B1	EC-655
P0102	0102	MAF SEN/CIRCUIT-B1	EC-663
P0103	0103	MAF SEN/CIRCUIT-B1	EC-663
P0112	0112	IAT SEN/CIRCUIT-B1	EC-670
P0113	0113	IAT SEN/CIRCUIT-B1	EC-670
P0117	0117	ECT SEN/CIRC	EC-674
P0118	0118	ECT SEN/CIRC	EC-674
P0122	0122	TP SEN 2/CIRC-B1	EC-679
P0123	0123	TP SEN 2/CIRC-B1	EC-679
P0125	0125	ECT SENSOR	EC-684
P0127	0127	IAT SENSOR-B1	EC-687
P0128	0128	THERMSTAT FNCTN	EC-690

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0130-P0183

INFOID:0000000004804751

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0130	0130	A/F SENSOR1 (B1)	EC-692
P0131	0131	A/F SENSOR1 (B1)	EC-698
P0132	0132	A/F SENSOR1 (B1)	EC-704
P0133	0133	A/F SENSOR1 (B1)	EC-710
P0137	0137	HO2S2 (B1)	EC-717
P0138	0138	HO2S2 (B1)	EC-724
P0139	0139	HO2S2 (B1)	EC-733
P0171	0171	FUEL SYS-LEAN-B1	EC-740
P0172	0172	FUEL SYS-RICH-B1	EC-746
P0181	0181	FTT SENSOR	EC-752
P0182	0182	FTT SEN/CIRCUIT	EC-756
P0183	0183	FTT SEN/CIRCUIT	EC-756

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0222-P0420

INFOID:0000000004804750

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0222	0222	TP SEN 1/CIRC-B1	EC-760
P0223	0223	TP SEN 1/CIRC-B1	EC-760
P0300	0300	MULTI CYL MISFIRE	EC-765
P0301	0301	CYL 1 MISFIRE	EC-765
P0302	0302	CYL 2 MISFIRE	EC-765
P0303	0303	CYL 3 MISFIRE	EC-765
P0304	0304	CYL 4 MISFIRE	EC-765
P0327	0327	KNOCK SEN/CIRC-B1	EC-771
P0328	0328	KNOCK SEN/CIRC-B1	EC-771
P0335	0335	CKP SEN/CIRCUIT	EC-775
P0340	0340	CMP SEN/CIRC-B1	EC-781
P0420	0420	TW CATALYST SYS-B1	EC-787

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0441-P0463

INFOID:0000000004804746

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0441	0441	EVAP PURG FLOW/MON	EC-792
P0442	0442	EVAP SMALL LEAK	EC-797
P0443	0443	PURG VOLUME CONT/V	EC-804
P0444	0444	PURG VOLUME CONT/V	EC-811
P0445	0445	PURG VOLUME CONT/V	EC-811
P0447	0447	VENT CONTROL VALVE	EC-817
P0448	0448	VENT CONTROL VALVE	EC-823
P0451	0451	EVAP SYS PRES SEN	EC-829
P0452	0452	EVAP SYS PRES SEN	EC-832
P0453	0453	EVAP SYS PRES SEN	EC-839
P0455	0455	EVAP GROSS LEAK	EC-847
P0456	0456	EVAP VERY SML LEAK	EC-853
P0460	0460	FUEL LEV SEN SLOSH	EC-860
P0461	0461	FUEL LEVEL SENSOR	EC-862
P0462	0462	FUEL LEVL SEN/CIRC	EC-864
P0463	0463	FUEL LEVL SEN/CIRC	EC-864

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0500-P0643

INFOID:0000000004804745

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0500	0500	VEH SPEED SEN/CIRC	EC-866
P0506	0506	ISC SYSTEM	EC-868
P0507	0507	ISC SYSTEM	EC-870
P0605	0605	ECM	EC-872
P0643	0643	SENSOR POWER/CIRC	EC-874

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0705-P0734

INFOID:0000000004804744

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0705	0705	PNP SW/CIRC	AT-91 (A/T), CVT-244 (CVT)
P0710	0710	ATF TEMP SEN/CIRC	AT-96 (A/T), CVT-249 (CVT)

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0715	0715	INPUT SPD SEN/CIRC	CVT-254
P0720	0720	VEH SPD SEN/CIR AT*5	AT-101 (A/T), CVT-258 (CVT)
P0725	0725	ENGINE SPEED SIG	AT-106
P0731	0731	A/T 1ST GR FNCTN	AT-110
P0732	0732	A/T 2ND GR FNCTN	AT-113
P0733	0733	A/T 3RD GR FNCTN	AT-116
P0734	0734	A/T 4TH GR FNCTN	AT-119

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0740-P0845

INFOID:0000000004804743

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0740	0740	TCC SOLENOID/CIRC	AT-124
P0744	0744	A/T TCC S/V FNCTN	AT-129 (A/T), CVT-271 (CVT)
P0745	0745	L/PRESS SOL/CIRC	CVT-273
P0746	0746	PRS CNT SOL/A FCTN	CVT-278
P0750	0750	SFT SOL A/CIRC	AT-139
P0755	0755	SFT SOL B/CIRC	AT-144
P0776	0776	PRS CNT SOL/B FCTN	CVT-280
P0778	0778	PRS CNT SOL/B CIRC	CVT-282
P0840	0840	TR PRS SENS/A CIRC	CVT-287
P0845	0845	TR PRS SENS/B CIRC	CVT-119

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0850-P1574

INFOID:0000000004804742

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P0850	0850	P-N POS SW/CIRCUIT	EC-879
P1148	1148	CLOSED LOOP-B1	EC-885
P1217	1217	ENG OVER TEMP	EC-886
P1225	1225	CTP LEARNING-B1	EC-895
P1226	1226	CTP LEARNING-B1	EC-897
P1421	1421	COLD START CONTROL	EC-899
P1564	1564	ASCD SW	EC-901

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P1572	1572	ASCD BRAKE SW	EC-907
P1574	1574	ASCD VHL SPD SEN	EC-916

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P1610-P1615

INFOID:0000000004804739

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P1610	1610	LOCK MODE	BL-259
P1611	1611	ID DISCORD,IMMU-ECM	BL-259
P1612	1612	CHAIN OF ECM-IMMU	BL-259
P1614	1614	CHAIN OF IMMU-KEY	BL-259
P1615	1615	DIFFERENCE OF KEY	BL-259

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P1705-P1805

INFOID:0000000004804740

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P1705	1705	TP SEN/CIRC CVT	CVT-299
P1715	1715	IN PULY SPEED	EC-918 (A/T), EC-919 (CVT)
P1740	1740	LU-SLCT SOL/CIRC	CVT-306
P1760	1760	O/R CLTCH SOL/CIRC	AT-149
P1777	1777	STEP MOTR CIRC	CVT-311
P1778	1778	STEP MOTR FNC	CVT-315
P1805	1805	BRAKE SW/CIRCUIT	EC-921

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P2100-P2A00

INFOID:0000000004805065

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P2100	2100	ETC MOT PWR-B1	EC-925
P2101	2101	ETC FNCTN/CIRC-B1	EC-929
P2103	2103	ETC MOT PWR	EC-925

DTC*1		Items (CONSULT-III screen terms)	Reference page
CONSULT-III GST*2	ECM*3		
P2118	2118	ETC MOT-B1	EC-935
P2119	2119	ETC ACTR-B1	EC-940
P2122	2122	APP SEN 1/CIRC	EC-942
P2123	2123	APP SEN 1/CIRC	EC-942
P2127	2127	APP SEN 2/CIRC	EC-947
P2128	2128	APP SEN 2/CIRC	EC-947
P2135	2135	TP SENSOR-B1	EC-954
P2138	2138	APP SENSOR	EC-959
P2A00	2A00	A/F SENSOR1 (B1)	EC-966

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000004537013

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the “SUPPLEMENTAL RESTRAINT SYSTEM” and “SEAT BELTS” of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the “SUPPLEMENTAL RESTRAINT SYSTEM”.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

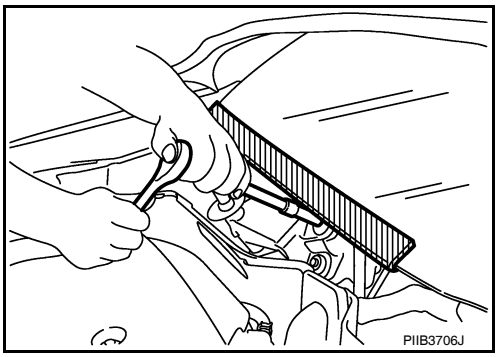
WARNING:

- **When working near the Airbag Diagnosis Sensor Unit or other Airbag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.**

Precaution for Procedure without Cowl Top Cover

INFOID:0000000004537014

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



On Board Diagnosis (OBD) System of Engine and A/T, CVT

INFOID:0000000004537015

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:

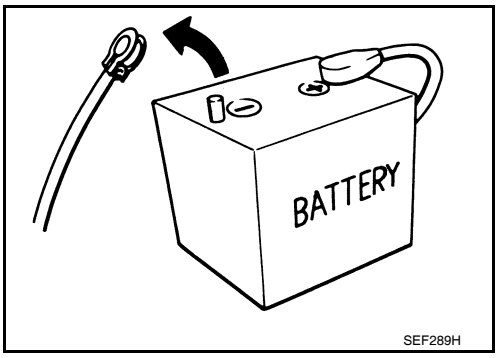
- **Be sure to turn the ignition switch OFF and disconnect the battery ground cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A 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-64, "Description".**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.**

- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

Precaution

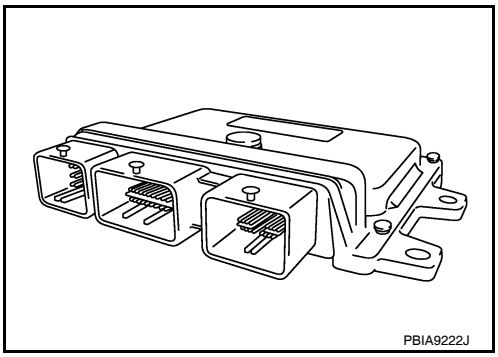
INFOID:0000000004537016

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect negative battery cable.**

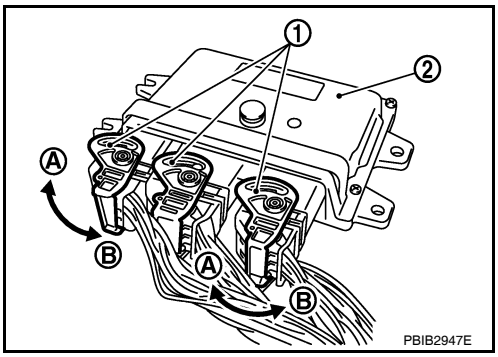


SEF289H

- **Do not disassemble ECM.**
- **If battery cable is disconnected, the memory will return to the initial ECM values.**
  The ECM will now start to self-control at its initial values. Engine operation can vary slightly in this case. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- **If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.**
  - **Diagnostic trouble codes**
  - **1st trip diagnostic trouble codes**
  - **Freeze frame data**
  - **1st trip freeze frame data**
  - **System readiness test (SRT) codes**
  - **Test values**

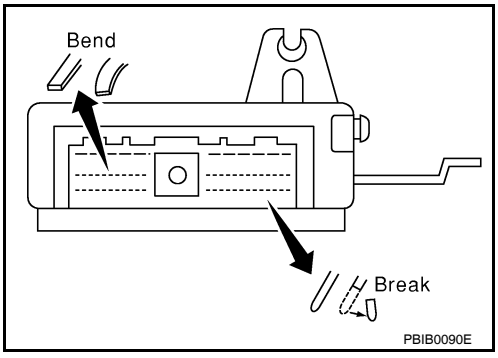

PBIA9222J

- **When connecting ECM harness connector, fasten (B) it securely with a lever (1) as far as it will go as shown in the figure.**
  - **ECM (2)**
  - **Loosen (A)**



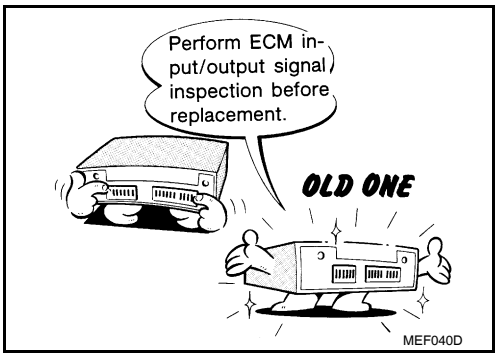
PBIB2947E

- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.**

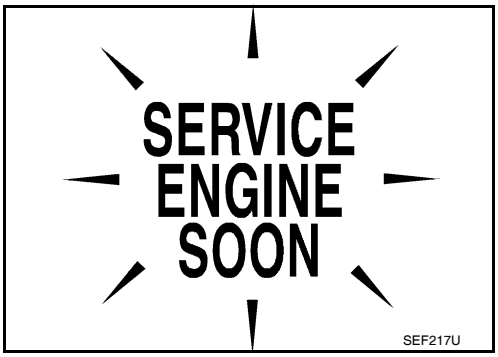


PBIB0090E

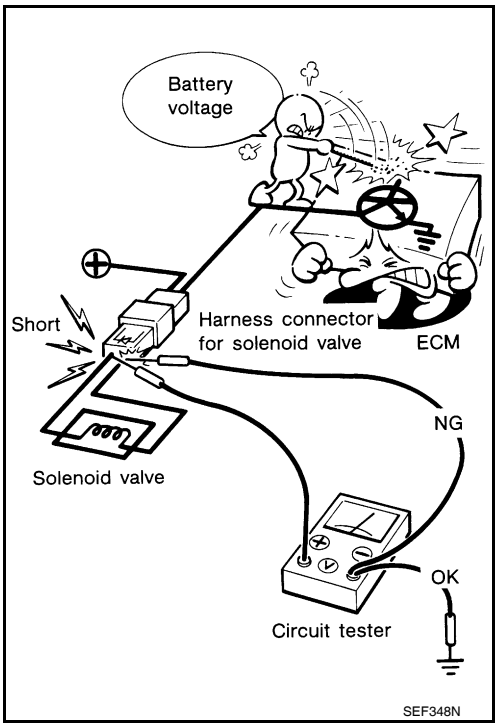
- **Keep engine control system parts and harness dry.**
- **Before replacing ECM, perform "ECM Terminals and Reference Value" inspection and make sure ECM functions properly. Refer to EC-597, "ECM Terminal and Reference Value".**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **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).**



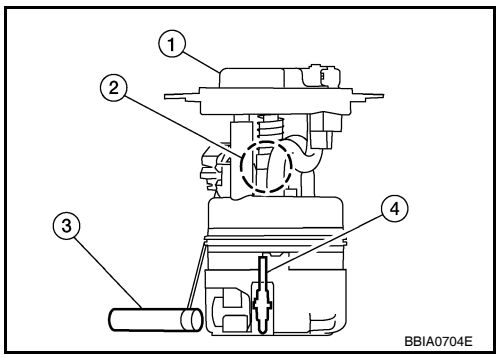
- **After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Overall Function Check.**
  The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Overall Function Check should be a good result if the repair is completed.



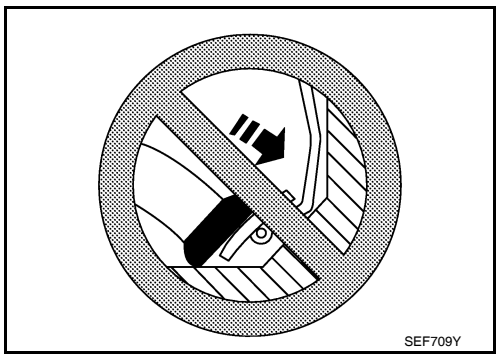
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**



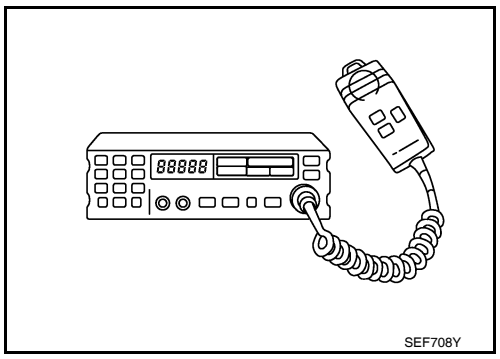
- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**
  - **Fuel level sensor unit and fuel pump (1)**
  - **Fuel pressure regulator (2)**
  - **Fuel level sensor (3)**
  - **Fuel tank temperature sensor (4)**



- **Do not depress accelerator pedal when starting.**
- **Immediately after starting, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**



- **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 radio can be kept smaller.**
  - **Be sure to ground the radio to vehicle body.**

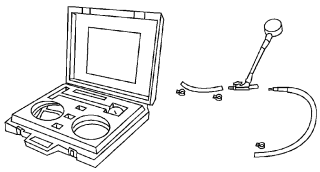
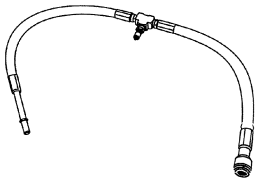
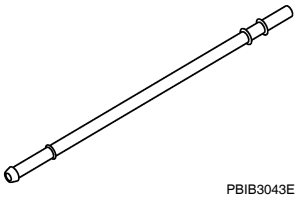


PREPARATION

Special Service Tool

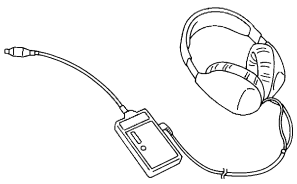
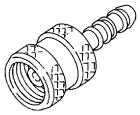
INFOID:0000000004537017

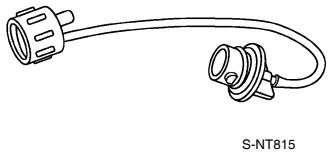
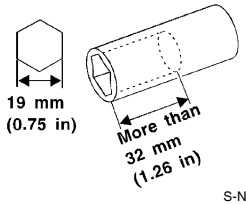
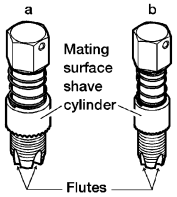
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
(J-44321) Fuel pressure gauge Kit  LEC642	Checking fuel pressure
(J-44321-6) Fuel pressure adapter  LBIA0376E	Connecting fuel pressure gauge to quick connector type fuel lines.
KV10118400 Fuel tube adapter  PBIB3043E	Measuring fuel pressure

Commercial Service Tool

INFOID:0000000004537018

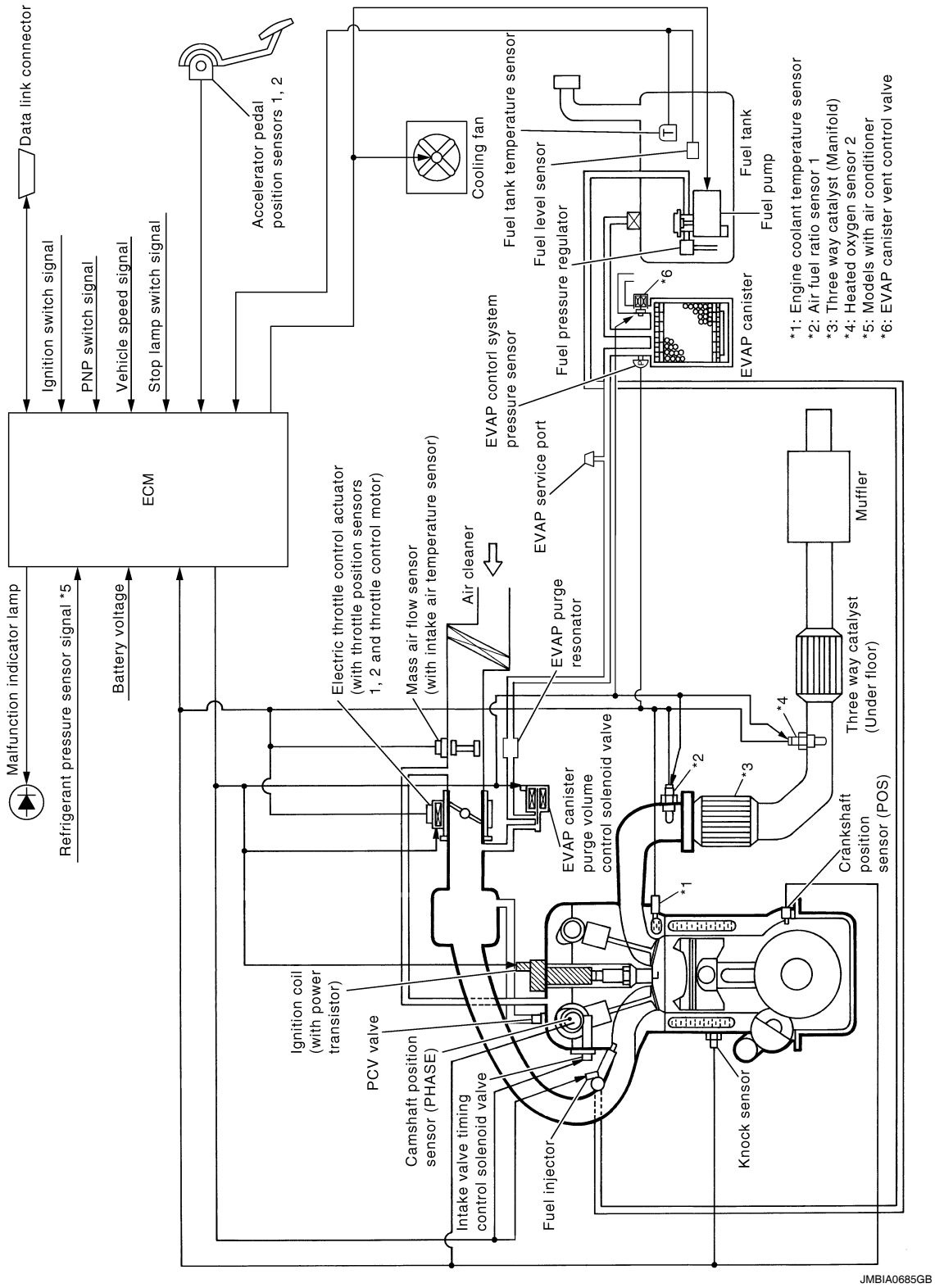
Tool number (Kent-Moore No.) Tool name	Description
Leak detector i.e.: (J-41416)  S-NT703	Locating the EVAP leak
EVAP service port adapter i.e.: (J-41413-OBD)  S-NT704	Applying positive pressure through EVAP service port

Tool number (Kent-Moore No.) Tool name	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
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)  AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor** **b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor**
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)  S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

ENGINE CONTROL SYSTEM

Schematic

INFOID:0000000004537019



Multiport Fuel Injection (MFI) System

INFOID:0000000004537020

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		
Engine coolant temperature sensor	Engine coolant temperature		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage*3		
Knock sensor	Engine knocking condition		
EPS control unit	Power steering operation*2		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		
Air conditioner switch	Air conditioner operation*2		
ABS actuator and electric unit (control unit)	Vehicle speed*2		
Combination meter			

*1: This sensor is not used to control the engine system under normal conditions.

*2: This signal is sent to the ECM through CAN communication line.

*3: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from the crankshaft position sensor (POS), camshaft position sensor (PHASE) and the mass air flow sensor.

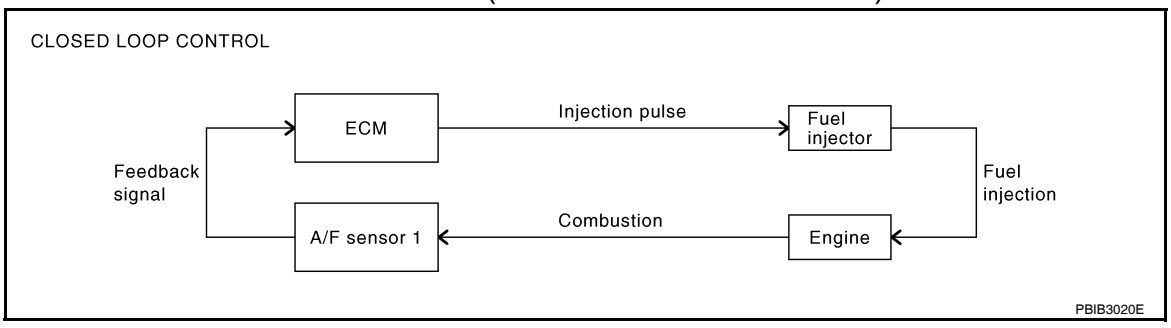
VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

<Fuel increase>
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (A/T and CVT models)
- High-load, high-speed operation

<Fuel decrease>
- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



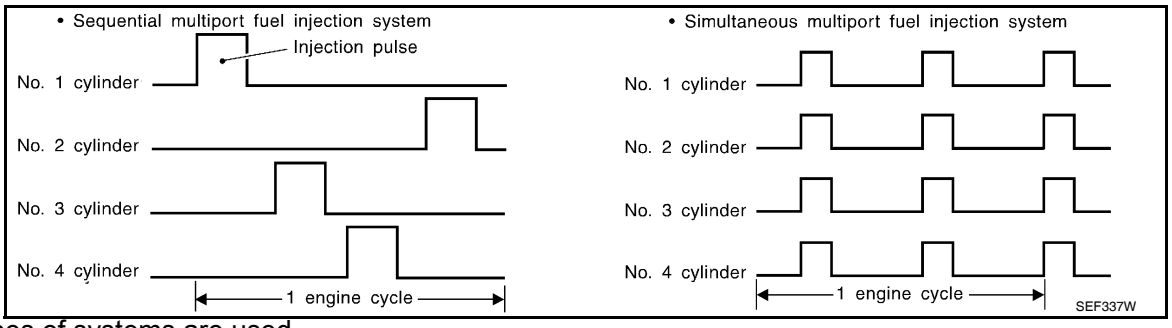
The mixture ratio feedback system provides the best air/fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses air fuel ratio (A/F) sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about air fuel ratio (A/F) sensor 1, refer to EC-698. 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 air fuel ratio (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 air fuel ratio (A/F) sensor 1 or its circuit
- Insufficient activation of air fuel ratio (A/F) sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (A/T and CVT models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from air fuel ratio (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 air fuel ratio (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 fuel 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.

Electronic Ignition (EI) System

INFOID:0000000004537021

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2 Piston position	Ignition timing control	Power transistor
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*2		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
ABS actuator and electric unit (control unit)	Vehicle speed*1		
Combination meter			

*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.

Fuel Cut Control (at No Load and High Engine Speed)

INFOID:0000000004537022

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Park/neutral position (PNP) switch	Neutral position	Fuel cut control	Fuel injector
Accelerator pedal position sensor	Accelerator pedal position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
ABS actuator and electric unit (control unit)	Vehicle speed*		
Combination meter			

*: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

If the engine speed is above 2,000 rpm under no load [for example, the shift lever position is P or N (A/T, CVT), Neutral (M/T) 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 1,500 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under EC-518, "Multiport Fuel Injection (MFI) System".

AIR CONDITIONING CUT CONTROL

Input/Output Signal Chart

INFOID:0000000004537023

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner ON signal*1	Air conditioner cut control	Air conditioner relay
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*2		
Refrigerant pressure sensor	Refrigerant pressure		
EPS control unit	Power steering operation*1		
ABS actuator and electric unit (control unit)	Vehicle speed*1		
Combination meter			

*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

INFOID:0000000004537024

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.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Description

INFOID:0000000004537025

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	Electric throttle control actuator
Stop lamp switch	Brake pedal operation		
ASCD clutch switch (M/T models)	Clutch pedal operation		
ASCD steering switch	ASCD steering switch operation		
Park/neutral position (PNP) switch	Gear position		
Combination meter	Vehicle speed*		
TCM (A/T and 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 144 km/h (89 MPH).
ECM controls throttle angle of electric throttle control actuator to regulate engine speed.
Operation status of ASCD is indicated by CRUISE indicator and SET indicator in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.
NOTE:
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press MAIN switch. (The CRUISE indicator in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH), press SET/COAST switch. (Then SET indicator in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is depressed 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 two 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 the neutral position (M/T models)
- Selector lever is changed to N, P, R position (A/T and CVT models)
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.
- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.
  When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ACCELERATE switch.
- Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

If MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

When the SET/COAST switch is depressed 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 depressed after cancel operation other than depressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released.
- Clutch pedal is released (M/T models)
- Selector lever is in other than P and N positions (A/T and CVT models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (89 MPH)

Component Description

INFOID:0000000004537026

ASCD STEERING SWITCH

Refer to EC-901.

ASCD BRAKE SWITCH

Refer to EC-907 and EC-973.

ASCD CLUTCH SWITCH

Refer to EC-907 and EC-973.

STOP LAMP SWITCH

Refer to EC-907, EC-921and EC-973.

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EC-925, EC-929, EC-935and EC-940.

ASCD INDICATOR

Refer to EC-981.

CAN COMMUNICATION

System Description

INFOID:0000000004537027

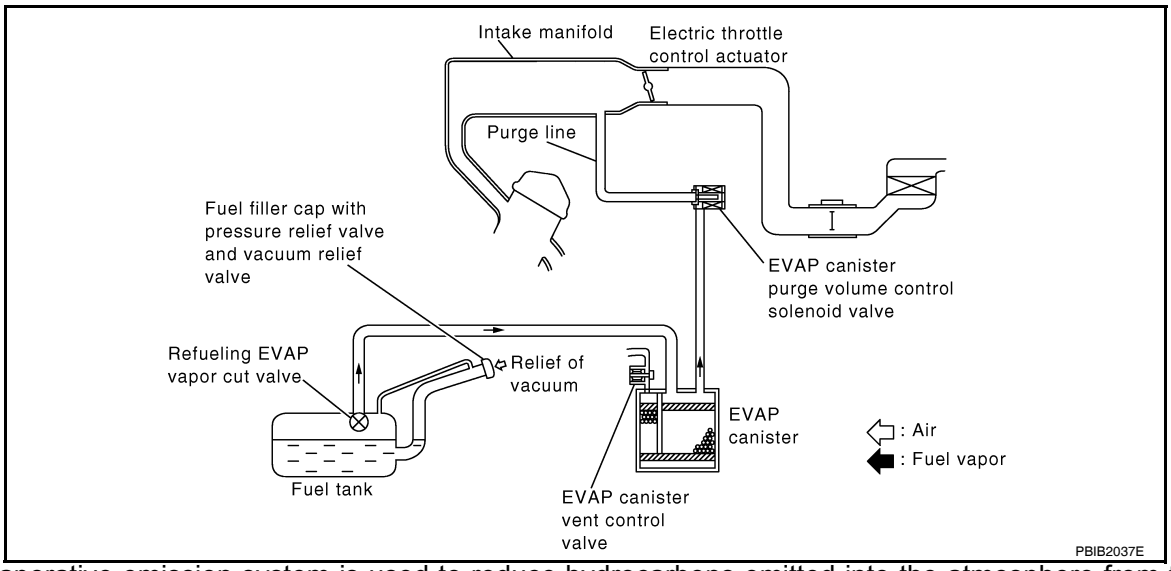
CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information 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-26, "CAN Communication Signal Chart", about CAN communication for detail.

EVAPORATIVE EMISSION SYSTEM

Description

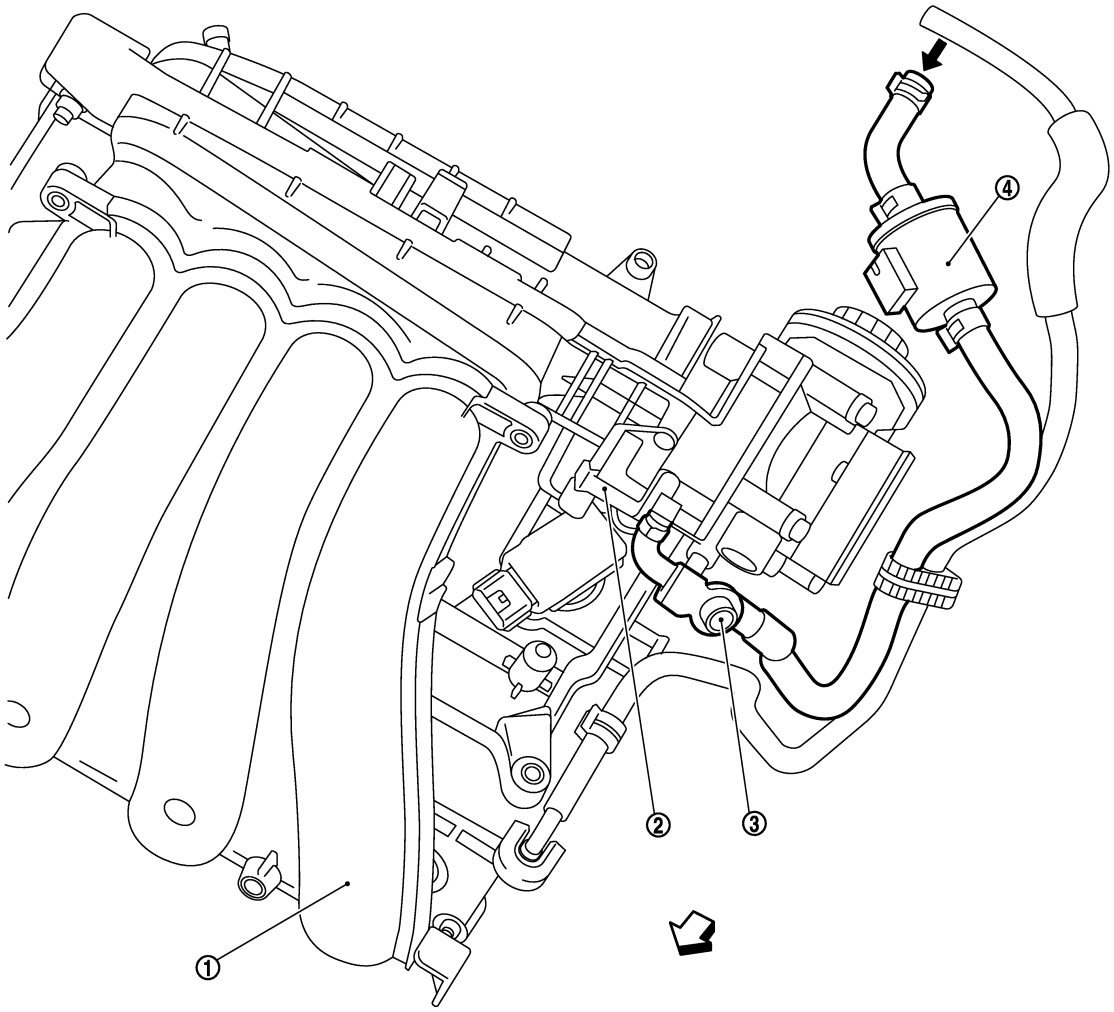
INFOID:0000000004537028

SYSTEM DESCRIPTION



The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating.

EVAPORATIVE EMISSION LINE DRAWING

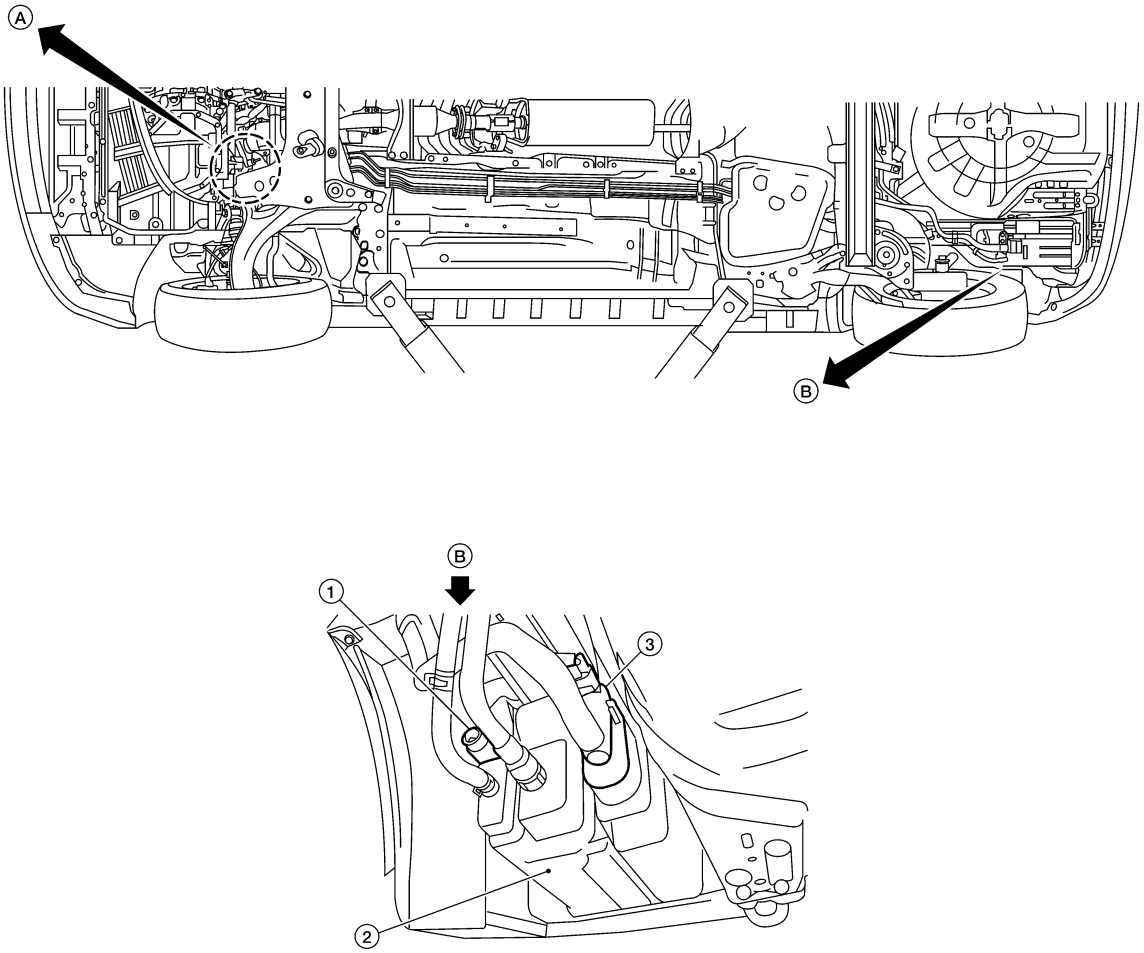


PBIB3330E

: Vehicle front
: From next figure

1. Intake manifold collector
2. EVAP canister purge volume control solenoid valve
3. EVAP service port
4. EVAP purge resonator

NOTE: Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.



BBIA0692E

(A): To previous figure

1. EVAP control system pressure sensor 2. EVAP canister 3. EVAP canister vent control valve

NOTE: Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

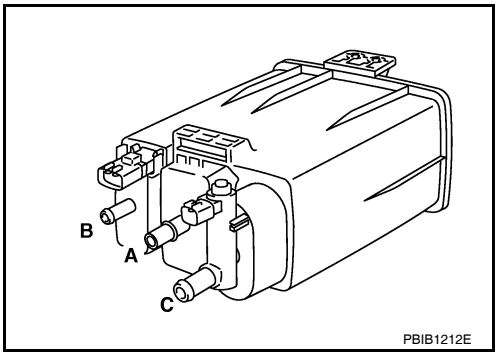
Component Inspection

INFOID:0000000004537029

EVAP CANISTER

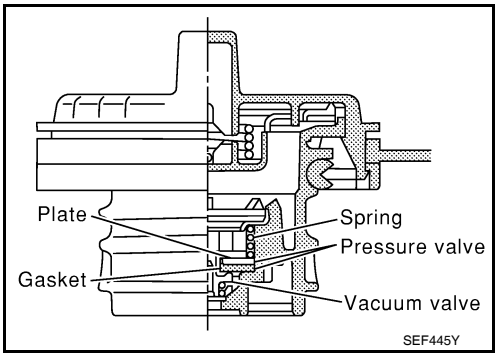
Check EVAP canister as follows:

1. Block port **B**.
2. Blow air into port **A**and check that it flows freely out of port **C**.
3. Release blocked port **B**.
4. Apply vacuum pressure to port **B**and check that vacuum pressure exists at the ports **A** and **C**.
5. Block port **A** and **B**.
6. Apply pressure to port **C**and check that there is no leakage.



FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

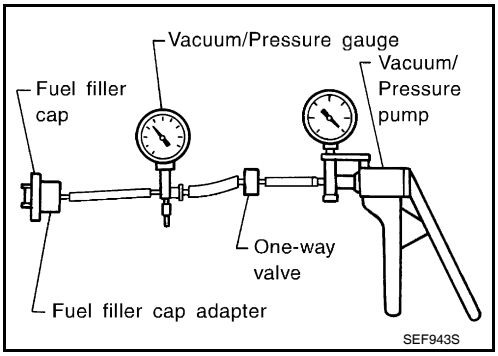
1. Wipe clean valve housing.



2. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa
(0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum: −6.0 to −3.4 kPa
(−0.061 to −0.035 kg/cm^2, −0.87 to −0.48 psi)

3. If out of specification, replace fuel filler cap as an assembly.



CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Refer to EC-815, "Component Inspection".

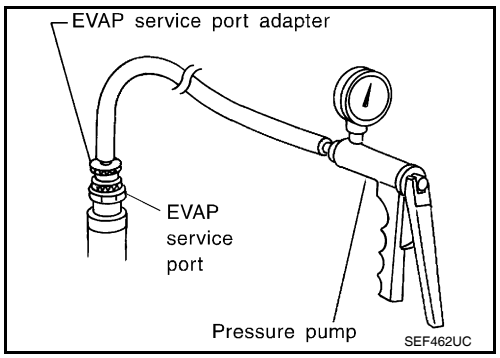
FUEL TANK TEMPERATURE SENSOR
Refer to EC-759, "Component Inspection".

EVAP CANISTER VENT CONTROL VALVE
Refer to EC-821, "Component Inspection".

EVAP CONTROL SYSTEM PRESSURE SENSOR
Refer to EC-838, "Component Inspection".

EVAP SERVICE PORT

Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leak.

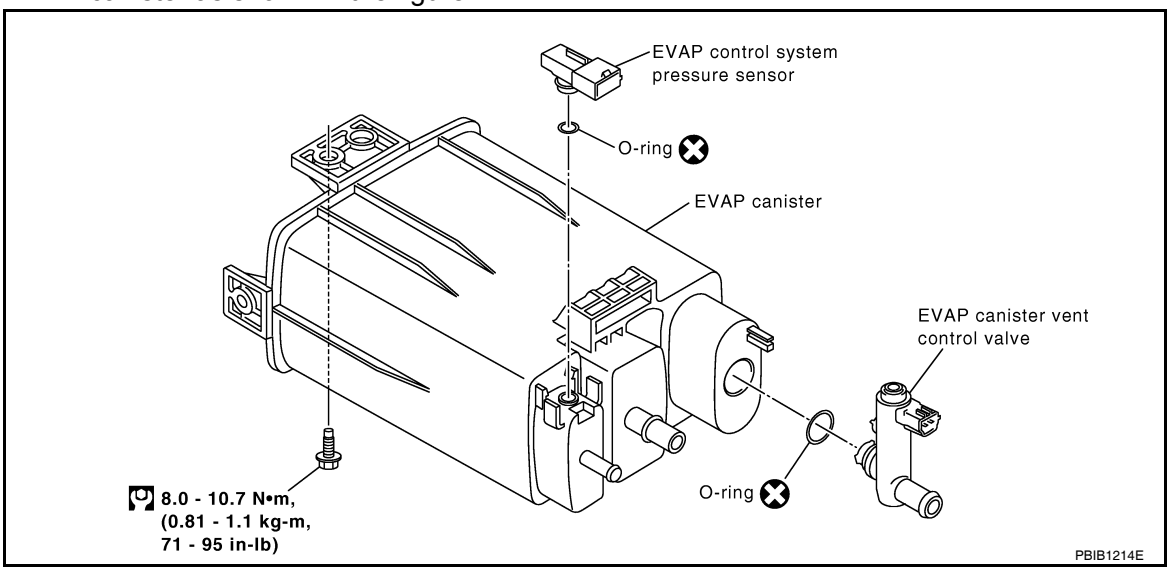


Removal and Installation

INFOID:0000000004537030

EVAP CANISTER

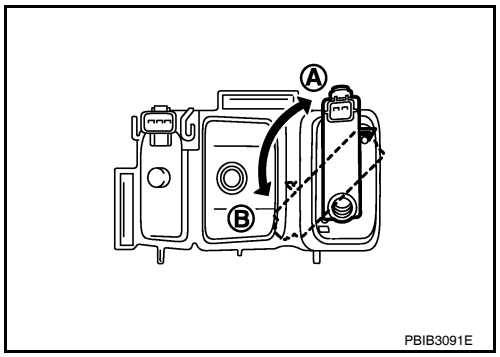
Tighten EVAP canister as shown in the figure.



EVAP CANISTER VENT CONTROL VALVE

1. Turn EVAP canister vent control valve counterclockwise.
• Lock (A)
• Unlock (B)
2. Remove the EVAP canister vent control valve.

Always replace O-ring with a new one.



How to Detect Fuel Vapor Leakage

INFOID:0000000004537031

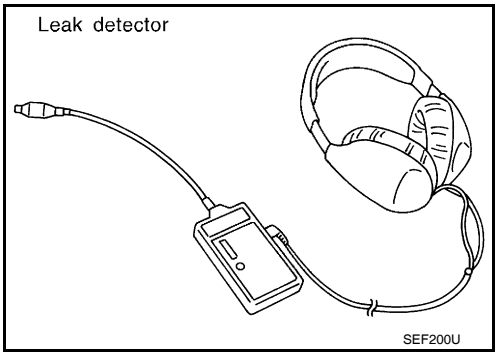
CAUTION:
- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in EVAP system.**

NOTE:
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

WITH CONSULT-III

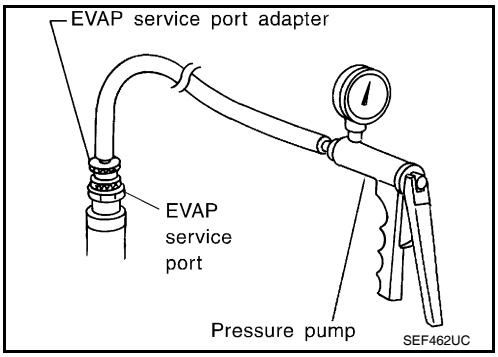
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump and hose to the EVAP service port adapter.

3. Turn ignition switch ON.
4. Select the “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-III.
5. Touch “START”. A bar graph (Pressure indicating display) will appear on the screen.
6. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7. Remove EVAP service port adapter and hose with pressure pump.
8. Locate the leak using a leak detector. Refer to EC-527, "Description".

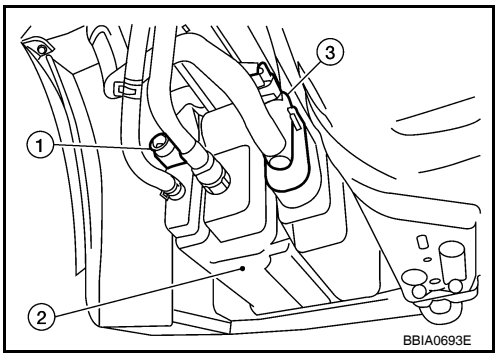


WITHOUT CONSULT-III

1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump with pressure gauge to the EVAP service port adapter.



3. Apply battery voltage to the terminal of EVAP canister vent control valve (3) to make a closed EVAP system.
   - EVAP control system pressure sensor (1)
   - EVAP canister (2)

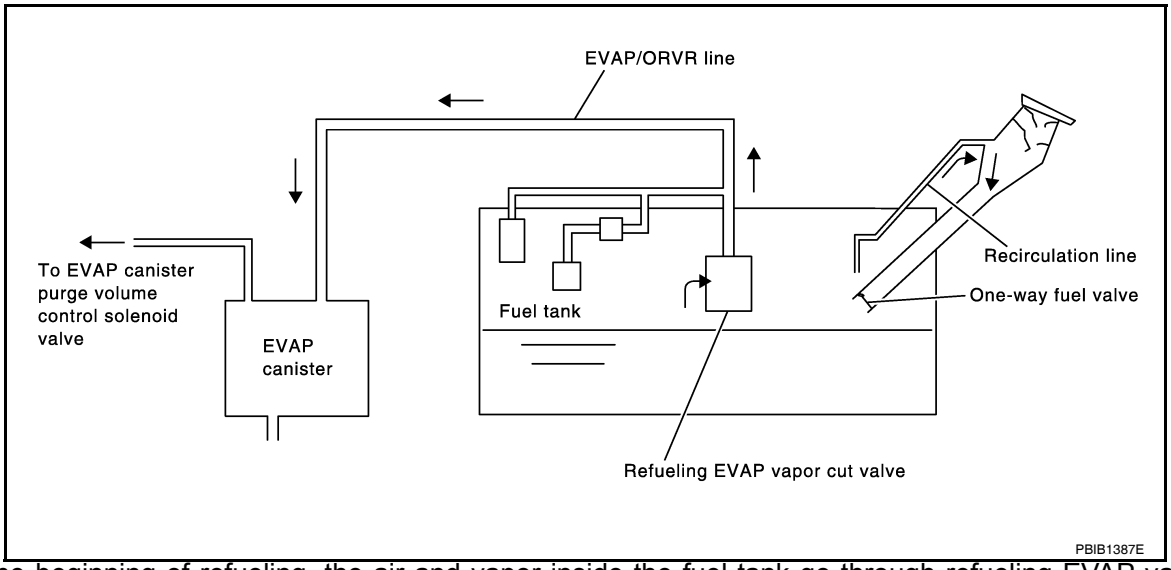


4. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2, 0.2 to 0.4 psi).
5. Remove EVAP service port adapter and hose with pressure pump.
6. Locate the leak using a leak detector. Refer to EC-527, "Description".

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

System Description

INFOID:0000000004537032



From the beginning of refueling, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve and EVAP/ORVR line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.
When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

WARNING:
When conducting inspections below, be sure to observe the following:
- **Put a "CAUTION: FLAMMABLE" sign in workshop.**
- **Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.**
- **Be sure to furnish the workshop with a CO_2 fire extinguisher.**

CAUTION:
- **Before removing fuel line parts, carry out the following procedures:**
  - **Put drained fuel in an explosion-proof container and put lid on securely.**
  - **Release fuel pressure from fuel line. Refer to EC-574, "Fuel Pressure Check".**
  - **Disconnect negative battery cable.**
- **Always replace O-ring when the fuel gauge retainer is removed.**
- **Do not kink or twist hose and tube when they are installed.**
- **Do not tighten hose and clamps excessively to avoid damaging hoses.**
- **After installation, run engine and check for fuel leaks at connection.**
- **Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.**

Diagnosis Procedure

INFOID:0000000004537033

SYMPTOM: FUEL ODOR FROM EVAP CANISTER IS STRONG.

1. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
   The weight should be less than 1.9 kg (4.2 lb).

OK or NG

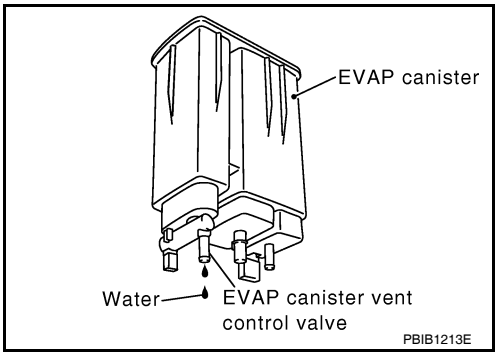
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 3.
No >> GO TO 5.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

5. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-535, "Component Inspection".

OK or NG

OK >> **INSPECTION END**
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

SYMPTOM: CANNOT REFUEL/FUEL ODOR FROM THE FUEL FILLER OPENING IS STRONG WHILE REFUELING.

1. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
   The weight should be less than 1.9 kg (4.2 lb).

OK or NG

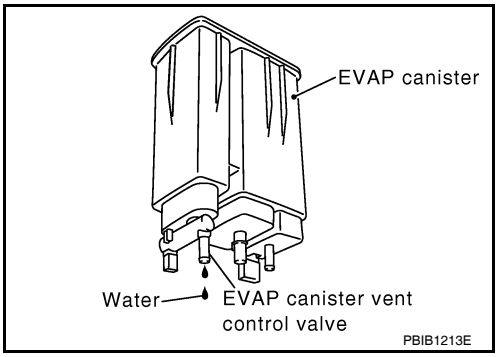
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 3.
No >> GO TO 5.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

5. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling EVAP vapor cut valve for clogging, kink, looseness and improper connection.

OK or NG

OK >> GO TO 6.
NG >> Repair or replace hoses and tubes.

6. CHECK FILLER NECK TUBE

Check recirculation line for clogging, dents and cracks.

OK or NG

OK >> GO TO 7.
NG >> Replace filler neck tube.

7. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-535, "Component Inspection".

OK or NG

OK >> GO TO 8.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

8. CHECK FUEL FILLER TUBE

Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.

OK or NG

OK >> GO TO 9.
NG >> Replace fuel filler tube.

9. CHECK ONE-WAY FUEL VALVE-I

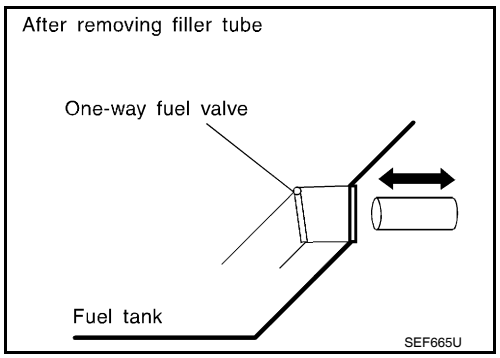
Check one-way valve for clogging.

OK or NG

OK >> GO TO 10.
NG >> Repair or replace one-way fuel valve with fuel tank.

10. CHECK ONE-WAY FUEL VALVE-II

1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as follows.
   When a stick is inserted, the valve should open, when removing stick it should close.
   Do not drop any material into the tank.



OK or NG

OK >> **INSPECTION END**
NG >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.

Component Inspection

INFOID:0000000004537034

REFUELING EVAP VAPOR CUT VALVE

With CONSULT-III

1. Remove fuel tank. Refer to FL-9.
2. Drain fuel from the tank as follows:

a. Remove fuel feed hose located on the fuel gauge retainer.

b. Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.

c. Drain fuel using “FUEL PUMP RELAY” in “ACTIVE TEST” mode with CONSULT-III.

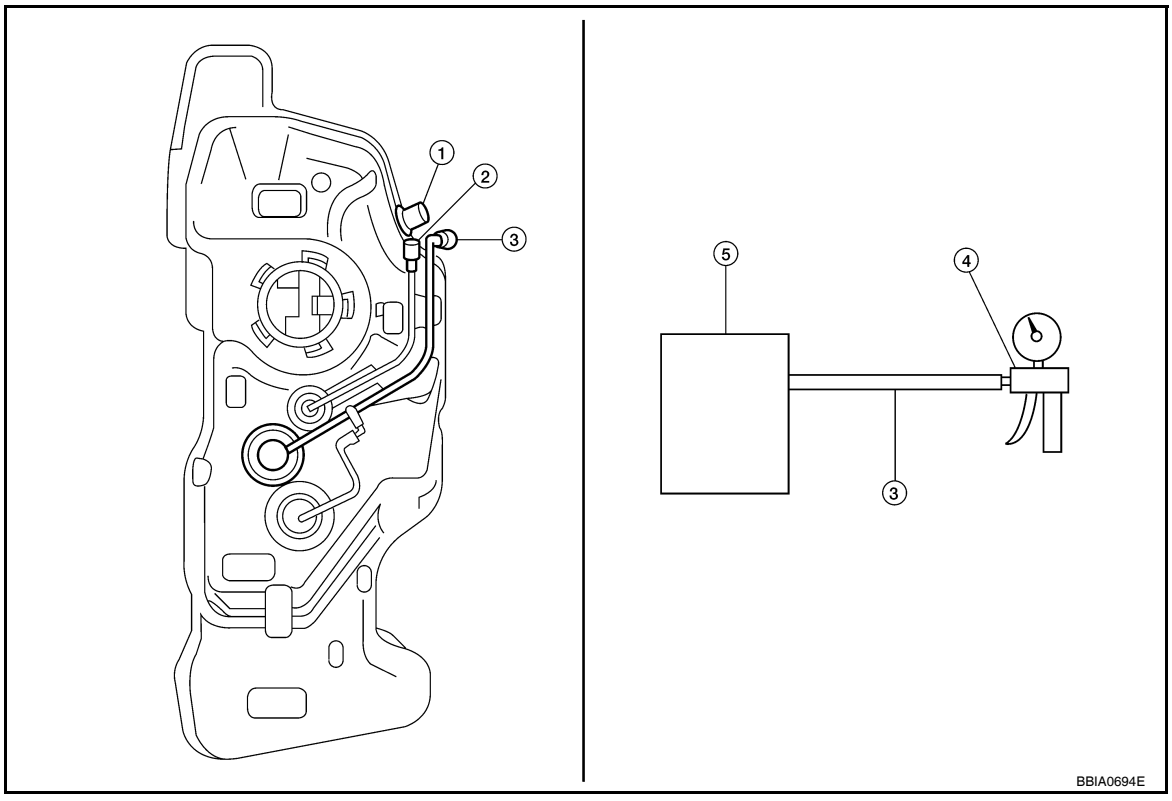
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
4. Check refueling EVAP vapor cut valve for being stuck to open as follows.

a. Connect vacuum pump to hose end.

b. Remove fuel gauge retainer with fuel gauge unit.
Always replace O-ring with new one.

c. Put fuel tank upside down.

d. Apply vacuum pressure to hose end [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



1. Filler tube
2. Recirculation line
3. EVAP/ORVR line
4. Vacuum/pressure handy pump
5. Fuel tank

Without CONSULT-III

1. Remove fuel tank. Refer to FL-9.
2. Drain fuel from the tank as follows:

a. Remove fuel gauge retainer.

b. Drain fuel from the tank using a handy pump into a fuel container.

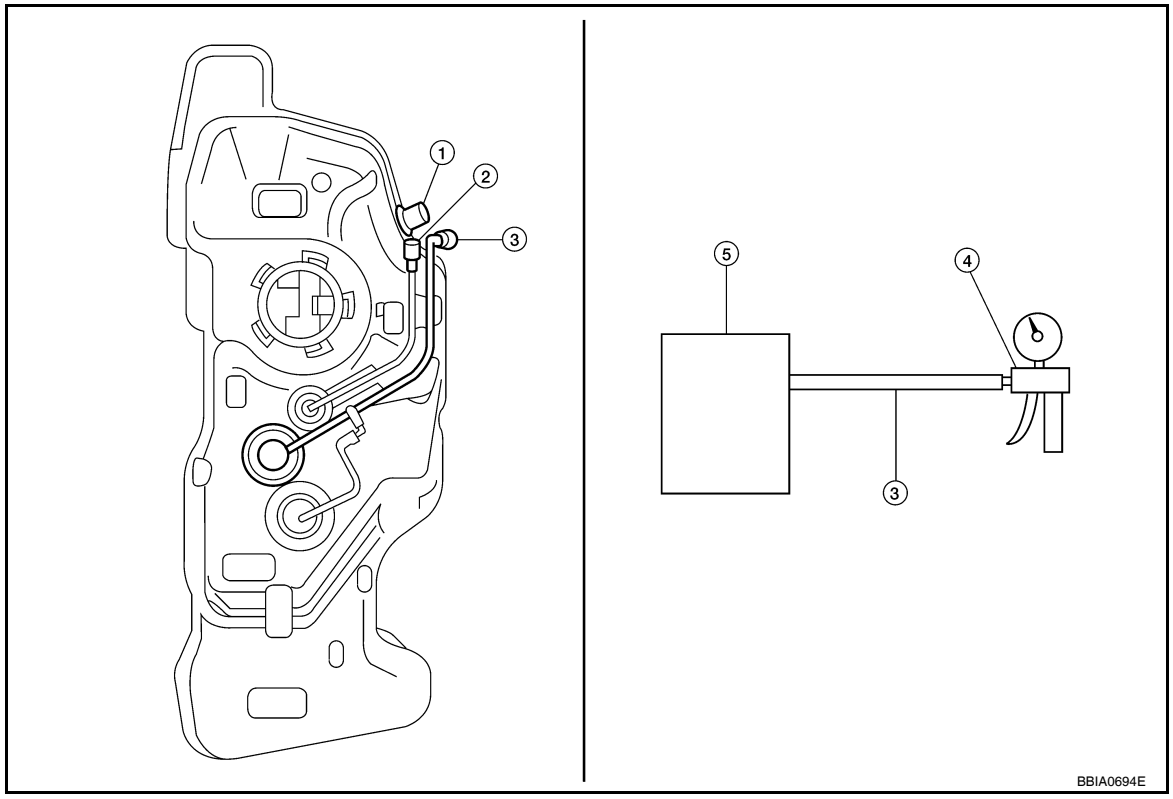
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
4. Check refueling EVAP vapor cut valve for being stuck to open as follows.

a. Connect vacuum pump to hose end.

b. Remove fuel gauge retainer with fuel gauge unit.
Always replace O-ring with new one.

c. Put fuel tank upside down.

d. Apply vacuum pressure to hose end [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



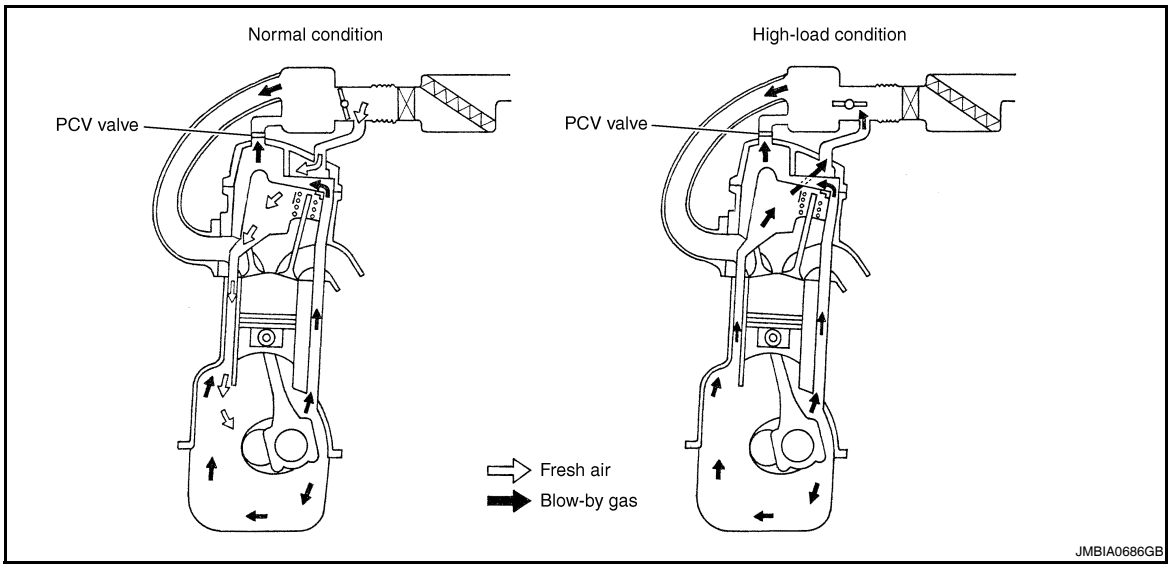
1. Filler tube
2. Recirculation line
3. EVAP/ORVR line
4. Vacuum/pressure handy pump
5. Fuel tank

POSITIVE CRANKCASE VENTILATION

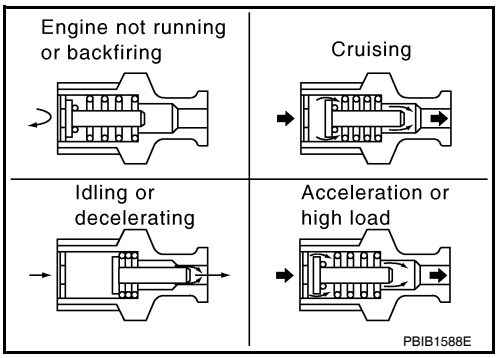
Description

INFOID:0000000004537035

SYSTEM DESCRIPTION



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.

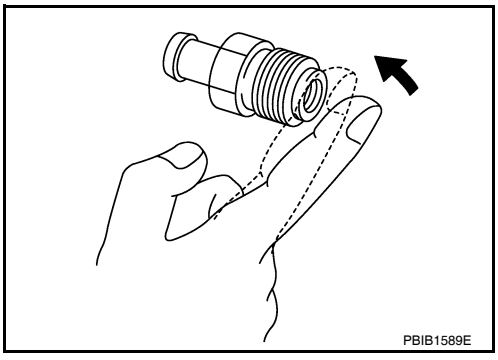


Component Inspection

INFOID:0000000004537036

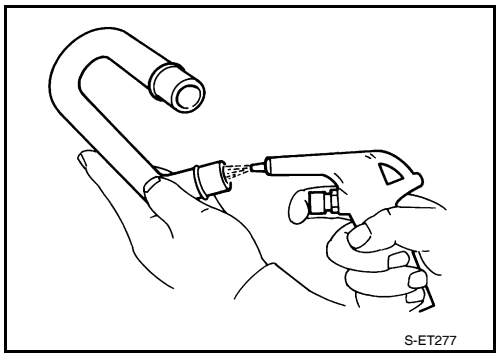
PCV (POSITIVE CRANKCASE VENTILATION) VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.



PCV VALVE VENTILATION HOSE

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM-NATS)

Description

INFOID:0000000004560766

- **If the security indicator illuminates with the ignition switch ON or DTC P1610 - P1615 is displayed in "SELF DIAGNOSTIC RESULT" mode, perform the trouble diagnosis for corresponding to the detected DTC. Refer to EC-506, "U1000-U1010".**
- **Check that no DTC is displayed in "SELF DIAGNOSIS RESULT" mode of "BCM" before erasing the detected DTC in "ENGINE" mode with CONSULT-III.**
- **When replacing ECM, refer to EC-571, "Procedure After Replacing ECM".**

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Introduction

INFOID:0000000004537038

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	Diagnostic service
Diagnostic Trouble Code (DTC)	Service $03 of SAE J1979
Freeze Frame data	Service $02 of SAE J1979
System Readiness Test (SRT) code	Service $01 of SAE J1979
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Service $07 of SAE J1979
1st Trip Freeze Frame data	
Test values and Test limits	Service $06 of SAE J1979
Calibration ID	Service $09 of SAE J1979

The above information can be checked using procedures listed in the table below.

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	SRT status	Test value
CONSULT-III	×	×	×	×	×	×	—
GST	×	×	×	—	×	×	×
ECM	×	×*	—	—	—	×	—

*: 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-582, "Fail-Safe Chart".)

Two Trip Detection Logic

INFOID:0000000004537039

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. Specific on board diagnostic items will cause the ECM to light up 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	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to EC-542, "Emission-related Diagnostic Information".)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by MIL lighting up when there is malfunction on engine control system.

Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.
The fail-safe function also operates when above diagnoses except MIL circuit are detected, and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Emission-related Diagnostic Information

INFOID:0000000004537040

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

×: Applicable —: Not applicable

Items (CONSULT-III screen terms)	DTC*1		SRT code	Trip	MIL lighting up	Reference page
	CONSULT-III GST*2	ECM*3				
CAN COMM CIRCUIT	U1000	1000*4	—	1 (CVT) 1 (A/T) 2 (M/T)	× (CVT) × (A/T) — (M/T)	EC-633
CAN COMM CIRCUIT	U1001	1001*4	—	2	—	EC-633
CONTROL UNIT(CAN)	U1010	1010	—	1 (CVT) 1 (A/T) 2 (M/T)	× (CVT) × (A/T) — (M/T)	EC-635
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—	—	**Flashing***5	EC-557
INT/V TIM CONT-B1	P0011	0011	—	2	×	EC-636
A/F SEN1 HTR (B1)	P0031	0031	—	2	×	EC-640
A/F SEN1 HTR (B1)	P0032	0032	—	2	×	EC-640
HO2S2 HTR (B1)	P0037	0037	—	2	×	EC-645
HO2S2 HTR (B1)	P0038	0038	—	2	×	EC-645
INT/V TIM V/CIR-B1	P0075	0075	—	2	×	EC-650
MAF SEN/CIRCUIT-B1	P0101	0101	—	2	×	EC-655
MAF SEN/CIRCUIT-B1	P0102	0102	—	1	×	EC-663
MAF SEN/CIRCUIT-B1	P0103	0103	—	1	×	EC-663
IAT SEN/CIRCUIT-B1	P0112	0112	—	2	×	EC-670
IAT SEN/CIRCUIT-B1	P0113	0113	—	2	×	EC-670
ECT SEN/CIRC	P0117	0117	—	1	×	EC-674
ECT SEN/CIRC	P0118	0118	—	1	×	EC-674
TP SEN 2/CIRC-B1	P0122	0122	—	1	×	EC-679
TP SEN 2/CIRC-B1	P0123	0123	—	1	×	EC-679
ECT SENSOR	P0125	0125	—	1	×	EC-684
IAT SENSOR-B1	P0127	0127	—	2	×	EC-687
THERMSTAT FNCTN	P0128	0128	—	2	×	EC-690
A/F SENSOR1 (B1)	P0130	0130	—	2	×	EC-692
A/F SENSOR1 (B1)	P0131	0131	—	2	×	EC-698
A/F SENSOR1 (B1)	P0132	0132	—	2	×	EC-704
A/F SENSOR1 (B1)	P0133	0133	×	2	×	EC-710
HO2S2 (B1)	P0137	0137	×	2	×	EC-717
HO2S2 (B1)	P0138	0138	×	2	×	EC-724
HO2S2 (B1)	P0139	0139	×	2	×	EC-733

Items (CONSULT-III screen terms)	DTC*1		SRT code	Trip	MIL lighting up	Reference page
	CONSULT-III GST*2	ECM*3				
FUEL SYS-LEAN-B1	P0171	0171	—	2	×	EC-740
FUEL SYS-RICH-B1	P0172	0172	—	2	×	EC-746
FTT SENSOR	P0181	0181	—	2	×	EC-752
FTT SEN/CIRCUIT	P0182	0182	—	2	×	EC-756
FTT SEN/CIRCUIT	P0183	0183	—	2	×	EC-756
TP SEN 1/CIRC-B1	P0222	0222	—	1	×	EC-760
TP SEN 1/CIRC-B1	P0223	0223	—	1	×	EC-760
MULTI CYL MISFIRE	P0300	0300	—	2	×	EC-765
CYL 1 MISFIRE	P0301	0301	—	2	×	EC-765
CYL 2 MISFIRE	P0302	0302	—	2	×	EC-765
CYL 3 MISFIRE	P0303	0303	—	2	×	EC-765
CYL 4 MISFIRE	P0304	0304	—	2	×	EC-765
KNOCK SEN/CIRC-B1	P0327	0327	—	2	—	EC-771
KNOCK SEN/CIRC-B1	P0328	0328	—	2	—	EC-771
CKP SEN/CIRCUIT	P0335	0335	—	2	×	EC-775
CMP SEN/CIRC-B1	P0340	0340	—	2	×	EC-781
TW CATALYST SYS-B1	P0420	0420	×	2	×	EC-787
EVAP PURG FLOW/MON	P0441	0441	×	2	×	EC-792
EVAP SMALL LEAK	P0442	0442	×	2	×	EC-797
PURG VOLUME CONT/V	P0443	0443	—	2	×	EC-804
PURG VOLUME CONT/V	P0444	0444	—	2	×	EC-811
PURG VOLUME CONT/V	P0445	0445	—	2	×	EC-811
VENT CONTROL VALVE	P0447	0447	—	2	×	EC-817
VENT CONTROL VALVE	P0448	0448	—	2	×	EC-823
EVAP SYS PRES SEN	P0451	0451	—	2	×	EC-829
EVAP SYS PRES SEN	P0452	0452	—	2	×	EC-832
EVAP SYS PRES SEN	P0453	0453	—	2	×	EC-839
EVAP GROSS LEAK	P0455	0455	—	2	×	EC-847
EVAP VERY SML LEAK	P0456	0456	×*6	2	×	EC-853
FUEL LEV SEN SLOSH	P0460	0460	—	2	×	EC-860
FUEL LEVEL SENSOR	P0461	0461	—	2	×	EC-862
FUEL LEVL SEN/CIRC	P0462	0462	—	2	×	EC-864
FUEL LEVL SEN/CIRC	P0463	0463	—	2	×	EC-864
VEH SPEED SEN/CIRC*7	P0500	0500	—	2	×	EC-866
ISC SYSTEM	P0506	0506	—	2	×	EC-868
ISC SYSTEM	P0507	0507	—	2	×	EC-870
ECM	P0605	0605	—	1 or 2	— or ×	EC-872
SENSOR POWER/CIRC	P0643	0643	—	1	×	EC-874
PNP SW/CIRC	P0705	0705	—	2	×	AT-91 (A/T), CVT-244 (CVT)
ATF TEMP SEN/CIRC	P0710	0710	—	1(CVT) 2(A/T)	×	AT-96 (A/T), CVT-249 (CVT)
INPUT SPD SEN/CIRC	P0715	0715	—	2	×	CVT-254

Items (CONSULT-III screen terms)	DTC*1		SRT code	Trip	MIL lighting up	Reference page
	CONSULT-III GST*2	ECM*3				
VEH SPD SEN/CIR AT*7	P0720	0720	—	2	×	AT-101 (A/T), CVT-258 (CVT)
ENGINE SPEED SIG	P0725	0725	—	2	×	CVT-263
A/T 1ST GR FNCTN	P0731	0731	—	2	×	AT-110
A/T 2ND GR FNCTN	P0732	0732	—	2	×	AT-113
A/T 3RD GR FNCTN	P0733	0733	—	2	×	AT-116
A/T 4TH GR FNCTN	P0734	0734	—	2	×	AT-119
TCC SOLENOID/CIRC	P0740	0740	—	2	×	AT-124
A/T TCC S/V FNCTN	P0744	0744	—	2	×	AT-129 (A/T), CVT-271 (CVT)
L/PRESS SOL/CIRC	P0745	0745	—	2	×	CVT-273
PRS CNT SOL/A FCTN	P0746	0746	—	1	×	CVT-278
SFT SOL A/CIRC	P0750	0750	—	1	×	AT-139
SFT SOL B/CIRC	P0755	0755	—	1	×	AT-144
PRS CNT SOL/B FCTN	P0776	0776	—	2	×	CVT-280
PRS CNT SOL/B CIRC	P0778	0778	—	2	×	CVT-282
TR PRS SENS/A CIRC	P0840	0840	—	2	×	CVT-287
TR PRS SENS/B CIRC	P0845	0845	—	2	×	CVT-119
P-N POS SW/CIRCUIT	P0850	0850	—	2	×	EC-879
CLOSED LOOP-B1	P1148	1148	—	1	×	EC-885
ENG OVER TEMP	P1217	1217	—	1	×	EC-886
CTP LEARNING-B1	P1225	1225	—	2	—	EC-895
CTP LEARNING-B1	P1226	1226	—	2	—	EC-897
COLD START CONTROL	P1421	1421	—	2	×	EC-899
ASCD SW	P1564	1564	—	1	—	EC-901
ASCD BRAKE SW	P1572	1572	—	1	—	EC-907
ASCD VHL SPD SEN	P1574	1574	—	1	—	EC-916
LOCK MODE	P1610	1610	—	2	—	BL-259
ID DISCORD,IMMU-ECM	P1611	1611	—	2	—	BL-259
CHAIN OF ECM-IMMU	P1612	1612	—	2	—	BL-259
CHAIN OF IMMU-KEY	P1614	1614	—	2	—	BL-259
DIFFERENCE OF KEY	P1615	1615	—	2	—	BL-259
TP SEN/CIRC A/T	P1705	1705	—	1	×	CVT-299
IN PULY SPEED	P1715	1715	—	2	—	EC-918 (A/T), EC-919 (CVT)
LU-SLCT SOL/CIRC	P1740	1740	—	2	×	CVT-306
O/R CLTCH SOL/CIRC	P1760	1760	—	2	×	AT-149
STEP MOTR CIRC	P1777	1777	—	1	×	CVT-311
STEP MOTR FNC	P1778	1778	—	2	×	CVT-315
BRAKE SW/CIRCUIT	P1805	1805	—	2	—	EC-921
ETC MOT PWR-B1	P2100	2100	—	1	×	EC-925
ETC FNCTN/CIRC-B1	P2101	2101	—	1	×	EC-929
ETC MOT PWR	P2103	2103	—	1	×	EC-925

Items (CONSULT-III screen terms)	DTC*1		SRT code	Trip	MIL lighting up	Reference page
	CONSULT-III GST*2	ECM*3				
ETC MOT-B1	P2118	2118	—	1	×	EC-935
ETC ACTR-B1	P2119	2119	—	1	×	EC-940
APP SEN 1/CIRC	P2122	2122	—	1	×	EC-942
APP SEN 1/CIRC	P2123	2123	—	1	×	EC-942
APP SEN 2/CIRC	P2127	2127	—	1	×	EC-947
APP SEN 2/CIRC	P2128	2128	—	1	×	EC-947
TP SENSOR-B1	P2135	2135	—	1	×	EC-954
APP SENSOR	P2138	2138	—	1	×	EC-959
A/F SENSOR1 (B1)	P2A00	2A00	—	2	×	EC-966

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: The troubleshooting for this DTC needs CONSULT-III.

*5: When the ECM in the mode of displaying SRT status, MIL may flash. For the details, refer to "How to Display SRT Status".

*6: SRT code will not be set if the self-diagnostic result is NG.

*7: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

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 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 blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".

For malfunctions in which 1st trip DTCs are displayed, refer to "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS". These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-III.

1st trip DTC is specified in Service $07 of SAE J1979. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a malfunction. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to EC-577, "Trouble Diagnosis Introduction". Then perform DTC Confirmation Procedure or Overall Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

WITH CONSULT-III

WITH GST

CONSULT-III or GST (Generic Scan Tool) Examples: P0340, P0850, P1148, etc.

These DTCs are prescribed by SAE J2012.

(CONSULT-III also displays the malfunctioning component or system.)

NO TOOLS

The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC.

Example: 0340, 0850, 1148, etc.

These DTCs are controlled by NISSAN.

- **1st trip DTC No. is the same as DTC No.**
- **Output of a DTC indicates a malfunction. However, GST and the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-III can identify malfunction status as shown below. Therefore, using CONSULT-III (if available) is recommended.**

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].

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-III or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-III screen, not on the GST. For details, see EC-604, "CONSULT-III Function (ENGINE)".
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items (Includes A/T or CVT related items)
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS".

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Service $01 of SAE J1979.
As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.
If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating “INCMP”, use the information in this Service Manual to set the SRT to “CMPLT”.
In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate “CMPLT” for each application system. Once set as “CMPLT”, the SRT status remains “CMPLT” until the self-diagnosis memory is erased.
Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate “INCMP” for these items.
NOTE:
The SRT will also indicate “INCMP” if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.
If, during the state emissions inspection, the SRT indicates “CMPLT” for all test items, the inspector will continue with the emissions test. However, if the SRT indicates “INCMP” for one or more of the SRT items the vehicle is returned to the customer untested.

NOTE:
If MIL is ON during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates “CMPLT” for all test items. Therefore, it is important to check SRT (“CMPLT”) and DTC (No DTCs) before the inspection.

SRT Item
The table below shows required self-diagnostic items to set the SRT to “CMPLT”.

SRT item (CONSULT-III indication)	Performance Priority*	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420
EVAP SYSTEM	2	EVAP control system purge flow monitoring	P0441
	1	EVAP control system	P0442
	2	EVAP control system	P0456
HO2S	2	Air fuel ratio (A/F) sensor 1	P0133
		Heated oxygen sensor 2	P0137
		Heated oxygen sensor 2	P0138
		Heated oxygen sensor 2	P0139

*: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT-III.

SRT Set Timing
SRT is set as “CMPLT” after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

Self-diagnosis result		Example				
		Diagnosis	Ignition cycle ← ON →	OFF ← ON →	OFF ← ON →	OFF ← ON →
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)
		P0402	OK (1)	— (1)	— (1)	OK (2)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“CMPLT”	“CMPLT”	“CMPLT”	“CMPLT”
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)
		P0402	— (0)	— (0)	OK (1)	— (1)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“INCMP”	“INCMP”	“CMPLT”	“CMPLT”
NG exists	Case 3	P0400	OK	OK	—	—
		P0402	—	—	—	—
		P1402	NG	—	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MIL “ON”)
		SRT of EGR	“INCMP”	“INCMP”	“INCMP”	“CMPLT”

OK: Self-diagnosis is carried out and the result is OK.

NG: Self-diagnosis is carried out and the result is NG.

—: Self-diagnosis is not carried out.

When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate “CMPLT”. → Case 1 above
When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses have at least one OK result. → Case 2 above

If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate “CMPLT”. → Case 3 above

The table above shows that the minimum number of cycles for setting SRT as “INCMP” is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

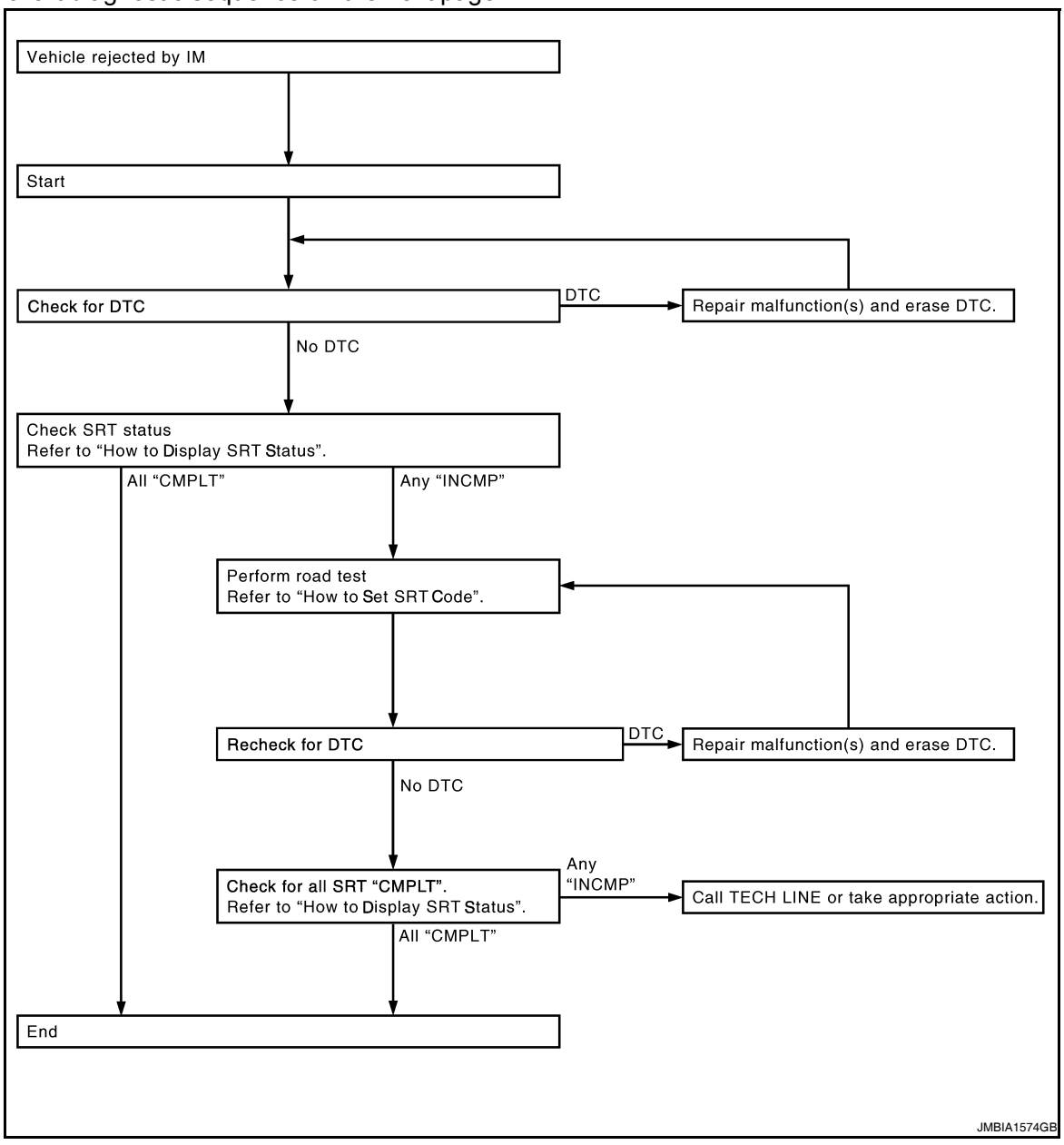
- The SRT will indicate “CMPLT” at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires “CMPLT” of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to “CMPLT” of SRT, the self-diagnosis memory must be erased from ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate “INCMP”.

NOTE:

SRT can be set as “CMPLT” together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates “CMPLT”.

SRT Service Procedure

If a vehicle has failed the state emissions inspection due to one or more SRT items indicating “INCMP”, review the flowchart diagnostic sequence on the next page.



How to Display SRT Status

WITH CONSULT-III

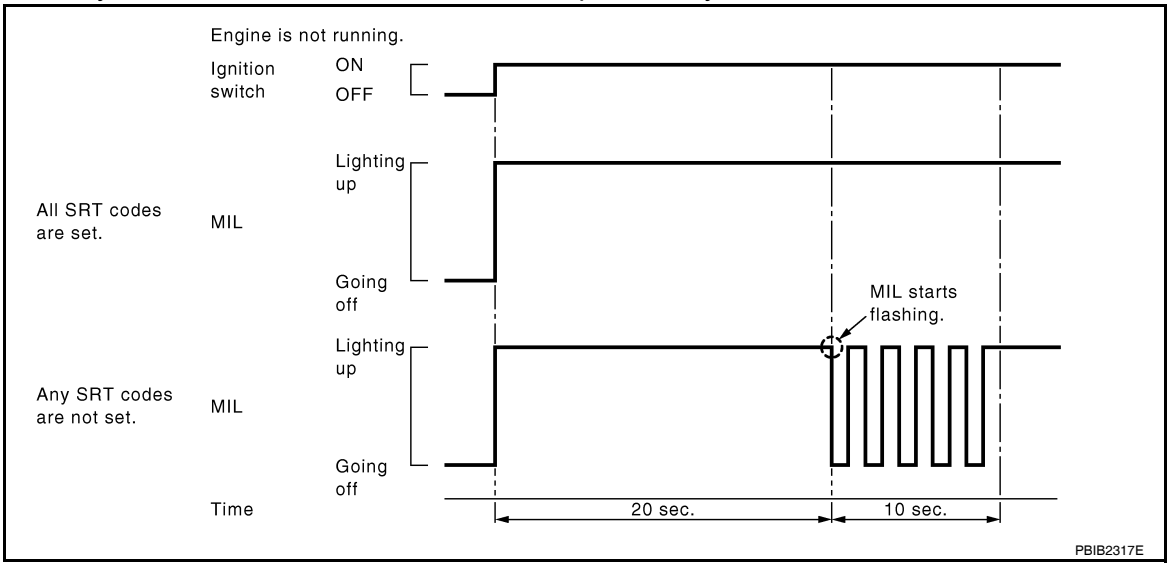
Selecting “SRT STATUS” in “DTC & SRT ONFIRMATION” mode with CONSULT-III.
For items whose SRT codes are set, a “CMPLT” is displayed on the CONSULT-III screen; for items whose SRT codes are not set, “INCMP” is displayed.

NOTE:
Though displayed on the CONSULT-III screen, “HO2S HTR” is not SRT item.

WITH GST
Selecting Service $01 with GST (Generic Scan Tool)

NO TOOLS
A SRT code itself can not be displayed while only SRT status can be.

1. Turn ignition switch ON and wait 20 seconds.
2. SRT status is indicated as shown below.
   - When all SRT codes are set, MIL lights up continuously.
   - When any SRT codes are not set, MIL will flash periodically for 10 seconds.

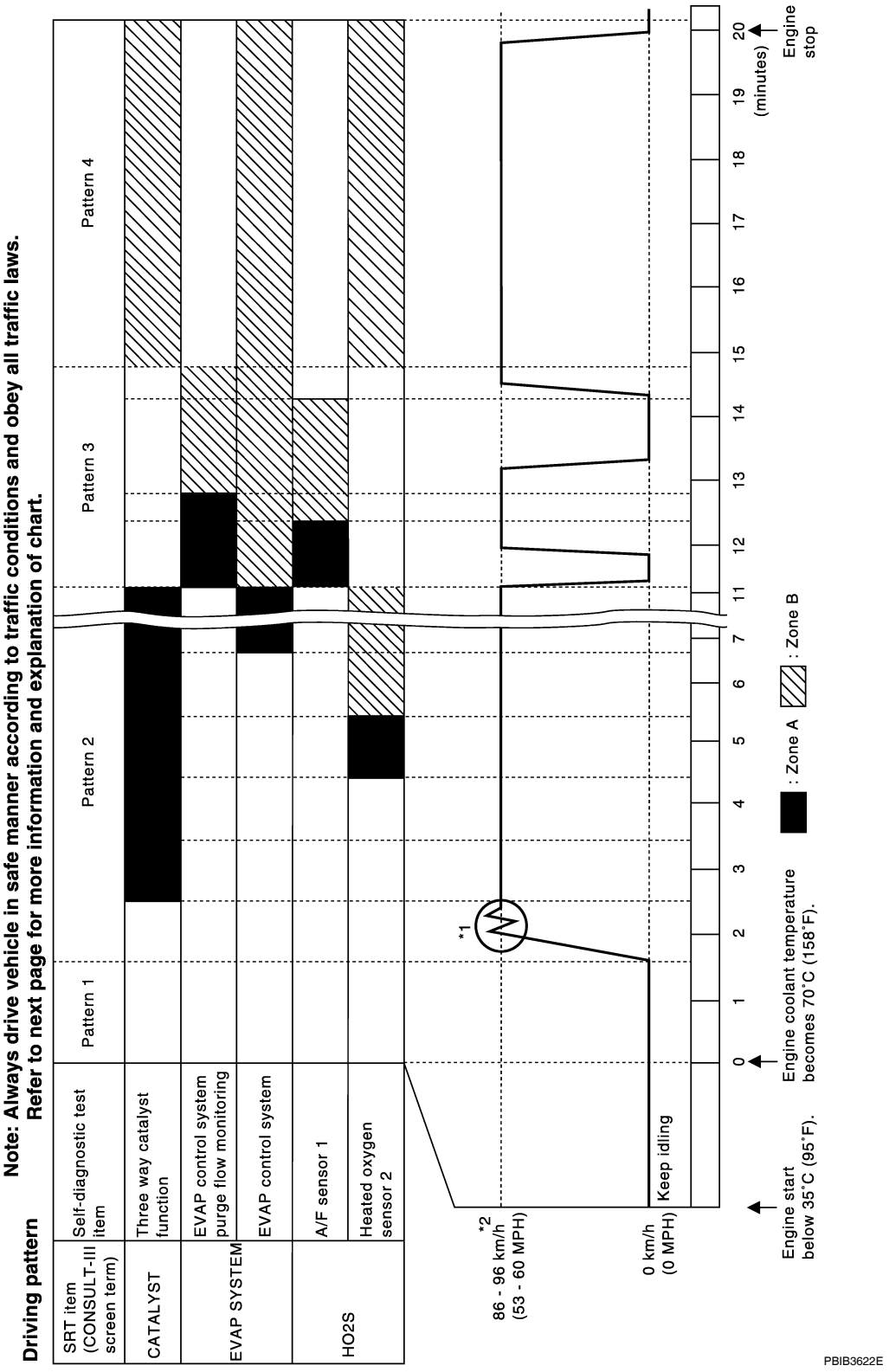


How to Set SRT Code
To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

WITH CONSULT-III
Perform corresponding DTC Confirmation Procedure one by one based on Performance Priority in the table on "SRT Item".

WITHOUT CONSULT-III
The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes.

Driving Pattern



- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
  Zone A refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest.
  Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

- Sea level
- Flat road
- Ambient air temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.
  Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1:

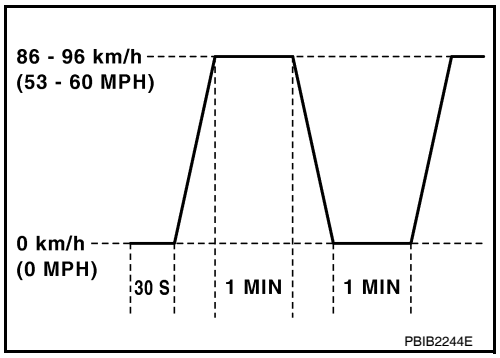
- **The engine is started at the engine coolant temperature of −10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 38 and ground is 3.0 - 4.3V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 38 and ground is lower than 1.4V).**
- **The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 43 and ground is less than 4.1V).**

Pattern 2:

- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:

- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during decelerating vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).



Pattern 4:

- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.
*2: Checking the vehicle speed with GST is advised.

Suggested Transmission Gear Position for A/T and CVT Models

Set the selector lever in the D position (CVT), D position with the overdrive switch turned ON (A/T).

Suggested upshift speeds for M/T models

Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.

	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:	For quick acceleration in low altitude areas	For high attitude areas [over 1,219m (4,000 ft)]:
Gear change	ACCEL shift point km/h (MPH)	km/h (MPH)	km/h (MPH)
1st to 2nd	13 (8)	24 (15)	24 (15)
2nd to 3rd	27 (17)	40 (25)	40 (25)
3rd to 4th	40 (25)	53 (33)	65 (40)
4th to 5th	58 (36)	71 (44)	73 (45)
5th to 6th	82 (51)	82 (51)	82 (51)

Suggested Maximum Speed in Each Gear

Downshift to a lower gear if the engine is not running smoothly, or if you need to accelerate.
Do not exceed the maximum suggested speed (shown below) in any gear. For level road driving, use the highest gear suggested for that speed. Always observe posted speed limits and drive according to the road conditions to ensure safe operation. Do not over-rev the engine when shifting to a lower gear as it may cause engine damage or loss of vehicle control.

Gear	km/h (MPH)
1st	50 (30)
2nd	90 (55)
3rd	—
4th	—
5th	—
6th	—

TEST VALUE AND TEST LIMIT (GST ONLY — NOT APPLICABLE TO CONSULT-III)

The following is the information specified in Service $06 of SAE J1979.
The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
These data (test value and test limit) are specified by On Board Monitor ID(OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.
The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (eg., if the bank 2 is not applied on this vehicle, only the items of the bank 1 is displayed)

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	01H	Air fuel ratio (A/F) sensor 1 (Bank 1)	P0131	83H	0BH	Minimum sensor output voltage for test cycle
			P0131	84H	0BH	Maximum sensor output voltage for test cycle
			P0130	85H	0BH	Minimum sensor output voltage for test cycle
			P0130	86H	0BH	Maximum sensor output voltage for test cycle
			P0133	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0133	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A00	89H	84H	The amount of shift in air fuel ratio
			P2A00	8AH	84H	The amount of shift in air fuel ratio
			P0130	8BH	0BH	Difference in sensor output voltage
			P0133	8CH	83H	Response gain at the limited frequency
	02H	Heated oxygen sensor 2 (Bank 1)	P0138	07H	0CH	Minimum sensor output voltage for test cycle
			P0137	08H	0CH	Maximum sensor output voltage for test cycle
			P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
	03H	Heated oxygen sensor 3 (Bank 1)	P0143	07H	0CH	Minimum sensor output voltage for test cycle
			P0144	08H	0CH	Maximum sensor output voltage for test cycle
			P0146	80H	0CH	Sensor output voltage
			P0145	81H	0CH	Difference in sensor output voltage

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P0151	83H	0BH	Minimum sensor output voltage for test cycle
			P0151	84H	0BH	Maximum sensor output voltage for test cycle
			P0150	85H	0BH	Minimum sensor output voltage for test cycle
			P0150	86H	0BH	Maximum sensor output voltage for test cycle
			P0153	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0153	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A03	89H	84H	The amount of shift in air fuel ratio
			P2A03	8AH	84H	The amount of shift in air fuel ratio
			P0150	8BH	0BH	Difference in sensor output voltage
			P0153	8CH	83H	Response gain at the limited frequency
	06H	Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle
			P0157	08H	0CH	Maximum sensor output voltage for test cycle
			P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
	07H	Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle
			P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
			P0165	81H	0CH	Difference in sensor output voltage
CATALYST	21H	Three way catalyst function (Bank1)	P0420	80H	01H	O2 storage index
			P0420	82H	01H	Switching time lag engine exhaust index value
			P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2423	84H	84H	O2 storage index in HC trap catalyst
	22H	Three way catalyst function (Bank2)	P0430	80H	01H	O2 storage index
			P0430	82H	01H	Switching time lag engine exhaust index value
			P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
EGR SYSTEM	31H	EGR function	P0400	80H	96H	Low Flow Faults: EGR temp change rate (short term)
			P0400	81H	96H	Low Flow Faults: EGR temp change rate (long term)
			P0400	82H	96H	Low Flow Faults: Difference between max EGR temp and EGR temp under idling condition
			P0400	83H	96H	Low Flow Faults: Max EGR temp
			P1402	84H	96H	High Flow Faults: EGR temp increase rate
EVAP SYSTEM	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3BH	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04inch)
	3CH	EVAP control system (Very small leak)	P0456	80H	05H	Leak area index (for more than 0.02inch)
			P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control value close
O2 SENSOR HEATER	41H	A/F sensor 1 heater (Bank 1)	Low Input:P0031 High Input:P0032	81H	0BH	Converted value of Heater electric current to voltage
	42H	Heated oxygen sensor 2 (Bank 1)	Low Input:P0037 High Input:P0038	80H	0CH	Converted value of Heater electric current to voltage
	43H	Heated oxygen sensor 3 (Bank 1)	P0043	80H	0CH	Converted value of Heater electric current to voltage
	45H	A/F sensor 1 heater (Bank 2)	Low Input:P0051 High Input:P0052	81H	0BH	Converted value of Heater electric current to voltage
	46H	Heated oxygen sensor 2 (Bank 2)	Low Input:P0057 High Input:P0058	80H	0CH	Converted value of Heater electric current to voltage
	47H	Heated oxygen sensor 3 (Bank 2)	P0063	80H	0CH	Converted value of Heater electric current to voltage
SECONDARY AIR	71H	Secondary Air system	P0411	80H	01H	Secondary Air Injection System Incorrect Flow Detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary Air Injection System Insufficient Flow
			P2445	82H	01H	Secondary Air Injection System Pump Stuck Off
			P2448	83H	01H	Secondary Air Injection System High Airflow
			Bank1: P2440 Bank2: P2442	84H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2440	85H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2444	86H	01H	Secondary Air Injection System Pump Stuck On

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
FUEL SYSTEM	81H	Fuel injection system function (Bank 1)	P0171 or P0172	80H	2FH	Long term fuel trim
			P0171 or P0172	81H	24H	The number of lambda control clamped
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	80H	2FH	Long term fuel trim
			P0174 or P0175	81H	24H	The number of lambda control clamped
MISFIRE	A1H	Multiple Cylinder Misfire	P0301	80H	24H	Misfiring counter at 1000rev of the first cylinder
			P0302	81H	24H	Misfiring counter at 1000rev of the second cylinder
			P0303	82H	24H	Misfiring counter at 1000rev of the third cylinder
			P0304	83H	24H	Misfiring counter at 1000rev of the fourth cylinder
			P0305	84H	24H	Misfiring counter at 1000rev of the fifth cylinder
			P0306	85H	24H	Misfiring counter at 1000rev of the sixth cylinder
			P0307	86H	24H	Misfiring counter at 1000rev of the seventh cylinder
			P0308	87H	24H	Misfiring counter at 1000rev of the eighth cylinder
			P0300	88H	24H	Misfiring counter at 1000rev of the multiple cylinders
			P0301	89H	24H	Misfiring counter at 200rev of the first cylinder
			P0302	8AH	24H	Misfiring counter at 200rev of the second cylinder
			P0303	8BH	24H	Misfiring counter at 200rev of the third cylinder
			P0304	8CH	24H	Misfiring counter at 200rev of the fourth cylinder
			P0305	8DH	24H	Misfiring counter at 200rev of the fifth cylinder
			P0306	8EH	24H	Misfiring counter at 200rev of the fifth cylinder
			P0307	8FH	24H	Misfiring counter at 200rev of the fifth cylinder
			P0308	90H	24H	Misfiring counter at 200rev of the fifth cylinder
			P0300	91H	24H	Misfiring counter at 1000rev of the single cylinder
			P0300	92H	24H	Misfiring counter at 200rev of the single cylinder
			P0300	93H	24H	Misfiring counter at 200rev of the multiple cylinders

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A2H	No.1 Cylinder Misfire	P0301	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0301	0CH	24H	Misfire counts for last/current driving cycles
	A3H	No.2 Cylinder Misfire	P0302	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0302	0CH	24H	Misfire counts for last/current driving cycles
	A4H	No.3 Cylinder Misfire	P0303	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0303	0CH	24H	Misfire counts for last/current driving cycles
	A5H	No.4 Cylinder Misfire	P0304	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0304	0CH	24H	Misfire counts for last/current driving cycles
	A6H	No.5 Cylinder Misfire	P0305	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0305	0CH	24H	Misfire counts for last/current driving cycles
	A7H	No.6 Cylinder Misfire	P0306	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0306	0CH	24H	Misfire counts for last/current driving cycles
	A8H	No.7 Cylinder Misfire	P0307	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0307	0CH	24H	Misfire counts for last/current driving cycles
	A9H	No.8 Cylinder Misfire	P0308	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0308	0CH	24H	Misfire counts for last/current driving cycles

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase 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.
- If the DTC is not for A/T or CVT related items (see EC-506), skip step 1.

1. Erase DTC in TCM.
2. Select "ENGINE" with CONSULT-III.
3. Select "SELF-DIAG RESULTS".

4. Touch "ERASE". (The DTC in the ECM will be erased.)

With GST

NOTE:

If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.

1. Select Service $04 with GST.

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
- System readiness test (SRT) codes
- Test values

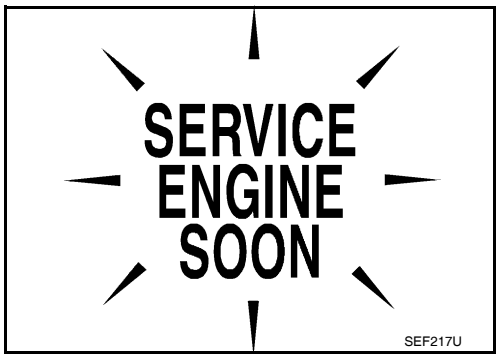
Malfunction Indicator Lamp (MIL)

INFOID:0000000004537041

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 DI-20 or see EC-1010.
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 or blink the MIL in the 1st trip. • Misfire (Possible three way catalyst damage) • One trip detection diagnoses
Mode II	Ignition switch in ON position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by MIL lighting up when there is malfunction on engine control system.
Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.
The fail-safe function also operates when above diagnoses except MIL circuit are detected, and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

MIL Flashing Without DTC
When any SRT codes are not set, MIL may flash without DTC. For the details, refer to EC-542, "Emission-related Diagnostic Information".

HOW TO SWITCH DIAGNOSTIC TEST MODE

NOTE:
- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
- **Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.**

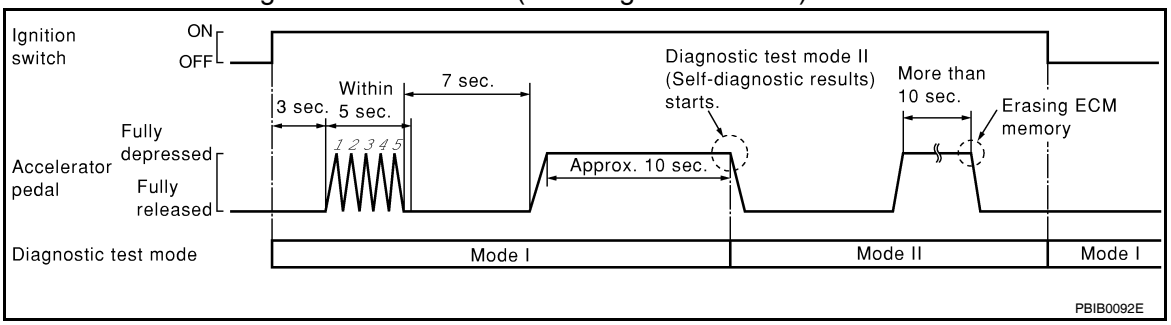
How to Set Diagnostic Test Mode II (Self-diagnostic Results)

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.
b. Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MIL starts blinking.
4. Fully release the accelerator pedal.

ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).



How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results).
   Refer to "How to Set Diagnostic Test Mode II (Self-diagnostic Results)".
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
   The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

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 DI-20 or EC-1010.

DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

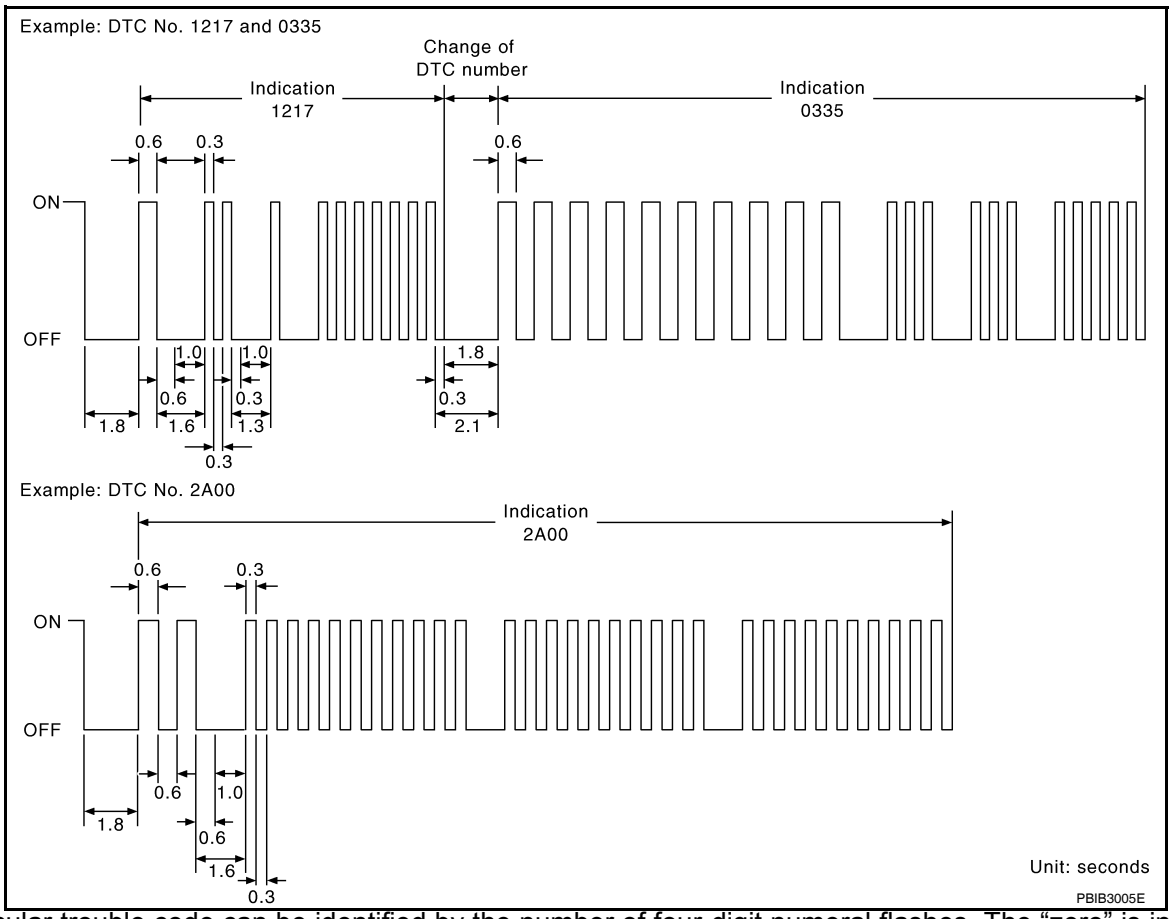
MIL	Condition
ON	When the malfunction is detected.
OFF	No malfunction

These DTC numbers are 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 or GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The “zero” is indicated by the number of ten flashes. The “A” is indicated by the number of eleven flash. 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-506)

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)
The DTC can be erased from the back-up memory in the ECM by depressing accelerator pedal.
Refer to "How to Erase Diagnostic Test Mode II (Self-diagnostic Results)".
- **If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

OBD System Operation Chart

INFOID:0000000004537042

RELATIONSHIP BETWEEN MIL, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to EC-541, "Two Trip Detection Logic".
- The MIL will go off after the vehicle is driven 3 times (driving pattern B) with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern

C) without the same malfunction recurring. The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-III will count the number of times the vehicle is driven.

- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

SUMMARY CHART

Items	Fuel Injection System	Misfire	Other
MIL (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

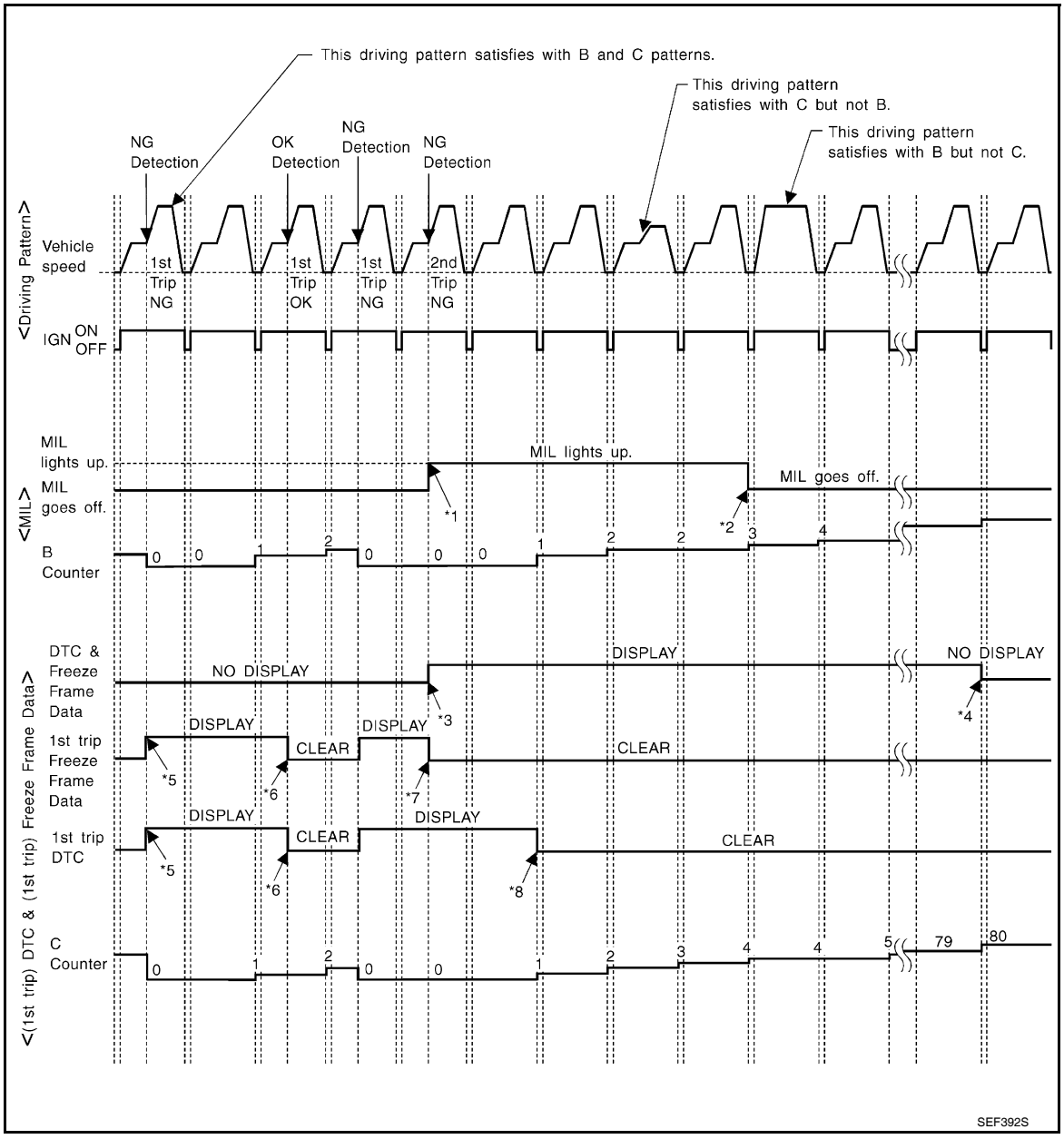
For details about patterns B and C under “Fuel Injection System” and “Misfire”, see "EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM””.

For details about patterns A and B under “Other”, see "EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM””.

*1: Clear timing is at the moment OK is detected.

*2: Clear timing is when the same malfunction is detected in the 2nd trip.

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

*8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”

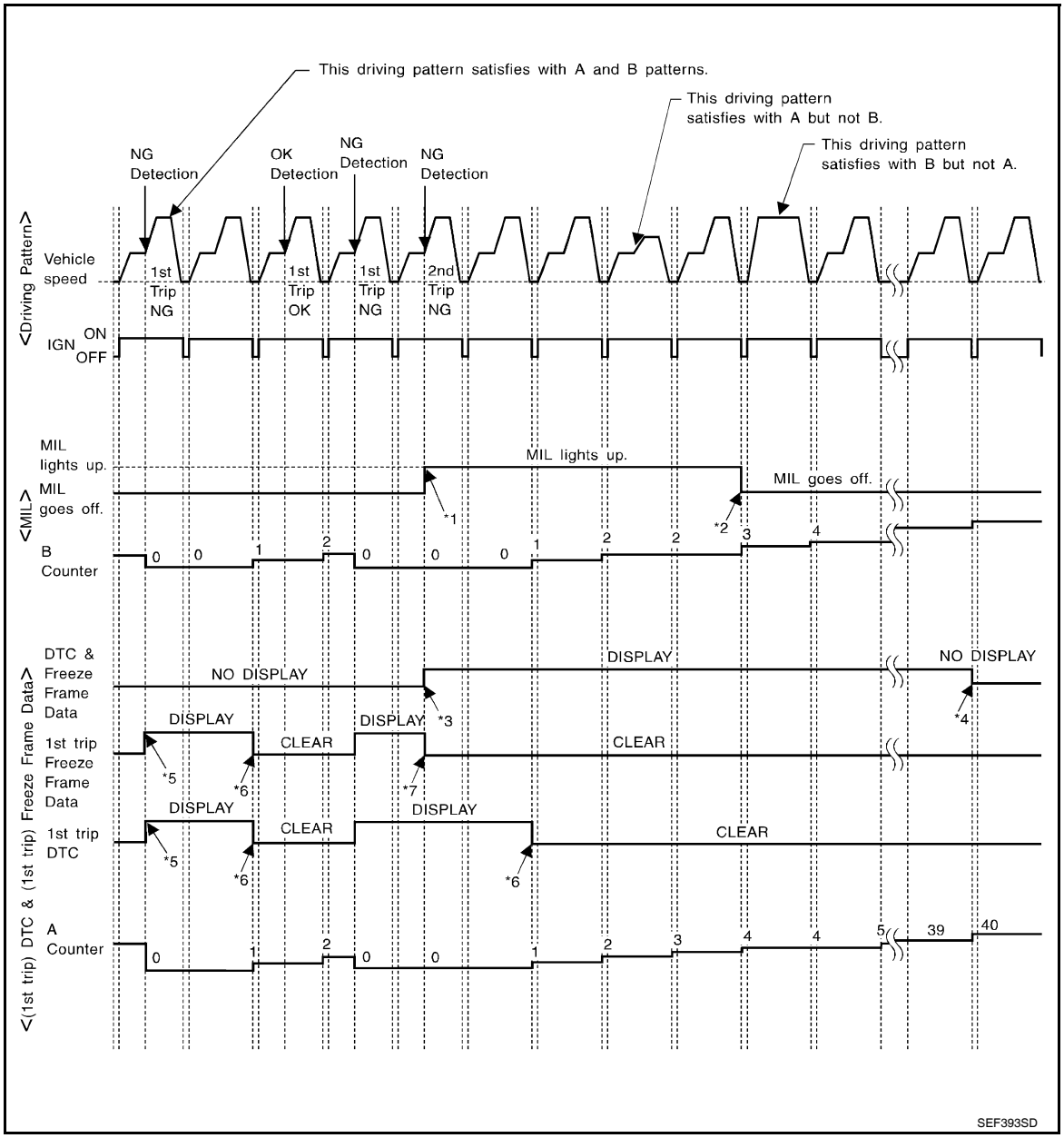
<Driving Pattern B>
Driving pattern B means the vehicle operation as follows:

All components and systems should be monitored at least once by the OBD system.
- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunction.
- The MIL will go off when the B counter reaches 3. (*2 in “OBD SYSTEM OPERATION CHART”)

<Driving Pattern C>
Driving pattern C means the vehicle operation as follows:
The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature (T) condition:
- When the freeze frame data shows lower than 70°C (158°F), “T” should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), “T” should be higher than or equal to 70°C (158°F).

Example:
If the stored freeze frame data is as follows:
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)
To be satisfied with driving pattern C, the vehicle should run under the following conditions:
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)
- The C counter will be cleared when the malfunction is detected regardless of vehicle conditions above.
- The C counter will be counted up when vehicle conditions above is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS EXCEPT FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

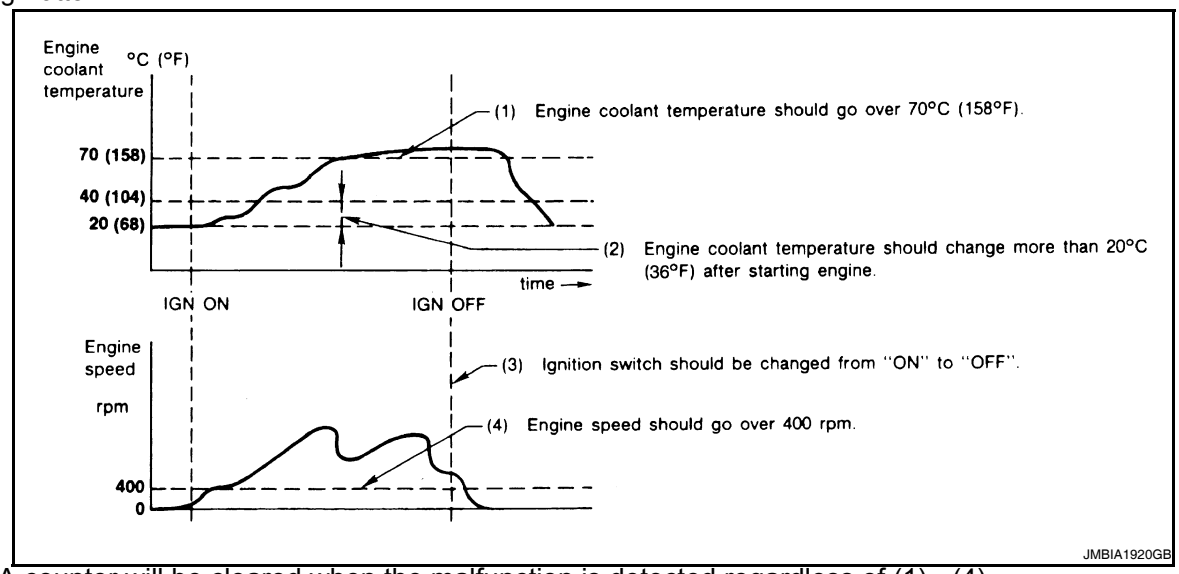
*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

EXPLANATION FOR DRIVING PATTERNS EXCEPT FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”

<Driving Pattern A>



- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will go off when the B counter reaches 3 (*2 in “OBD SYSTEM OPERATION CHART”).

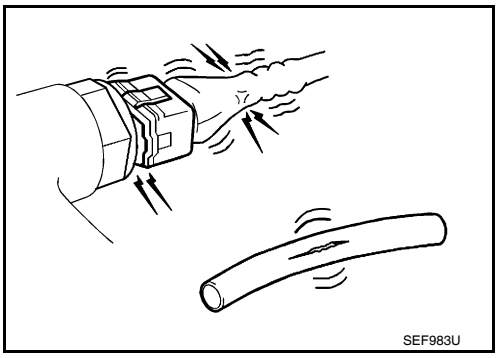
BASIC SERVICE PROCEDURE

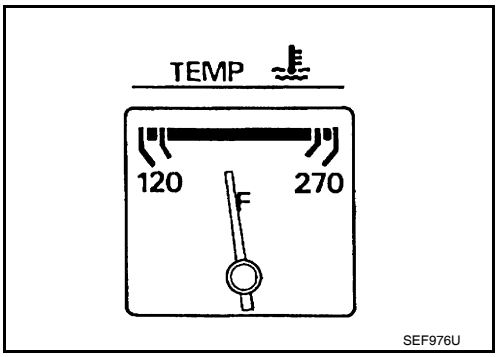
Basic Inspection

INFOID:0000000004537043

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.

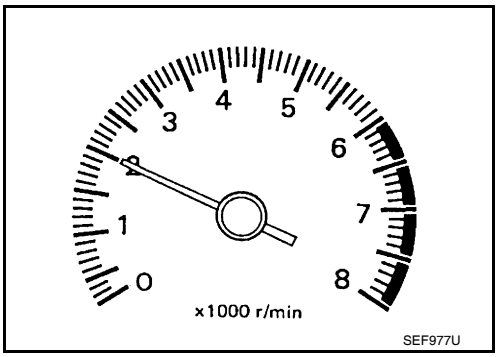




5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT-III or GST.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2.REPAIR OR REPLACE

Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3.

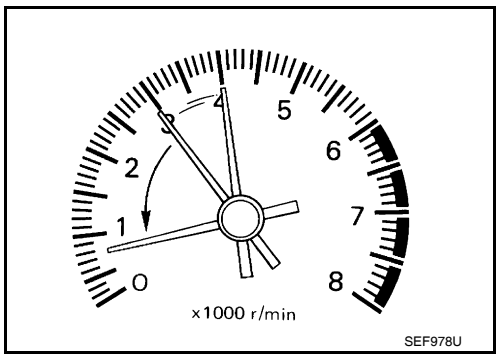
3.CHECK TARGET IDLE SPEED

With CONSULT-III

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. Read idle speed in “DATA MONITOR” mode with CONSULT-III. Refer to EC-570, "Idle Speed and Ignition Timing Check".

M/T: 700 ± 50 rpm (in Neutral position)
A/T: 700 ± 50 rpm (in P or N position)
CVT: 700 ± 50 rpm (in P or N position)



Without CONSULT-III
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. Refer to EC-570, "Idle Speed and Ignition Timing Check".

M/T: 700 ± 50 rpm (in Neutral position)
A/T: 700 ± 50 rpm (in P or N position)
CVT: 700 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 4.

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-572, "Accelerator Pedal Released Position Learning".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-572, "Throttle Valve Closed Position Learning".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-572, "Idle Air Volume Learning".
Is Idle Air Volume Learning carried out successfully?

Yes or No

Yes >> GO TO 7.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-III. Refer to EC-570, "Idle Speed and Ignition Timing Check".

M/T: 700 ± 50 rpm (in Neutral position)
A/T: 700 ± 50 rpm (in P or N position)
CVT: 700 ± 50 rpm (in P or N position)

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to EC-570, "Idle Speed and Ignition Timing Check".

M/T: 700 ± 50 rpm (in Neutral position)
A/T: 700 ± 50 rpm (in P or N position)
CVT: 700 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- Check crankshaft position sensor (POS) and circuit.
  Refer to EC-775.
- Check camshaft position sensor (PHASE) and circuit.
  Refer to EC-781.

OK or NG

OK >> GO TO 9.
NG >> 1. Repair or replace.
2. GO TO 4.

9. CHECK ECM FUNCTION

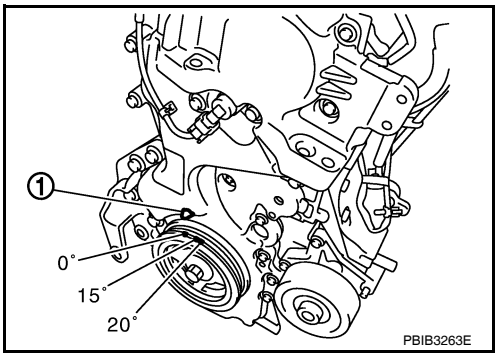
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs.
   Refer to BL-249, "ECM Re-communicating Function".

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light.
   Refer to EC-570, "Idle Speed and Ignition Timing Check".

- Timing indicator (1)



M/T: 13 ± 5° BTDC (in Neutral position)
A/T: 13 ± 5° BTDC (in P or N position)
CVT: 13 ± 5° BTDC (in P or N position)

OK or NG

OK >> GO TO 19.
NG >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-572, "Accelerator Pedal Released Position Learning".

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-572, "Throttle Valve Closed Position Learning".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-572, "Idle Air Volume Learning".
Is Idle Air Volume Learning carried out successfully?
Yes or No

Yes >> GO TO 14.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-III. Refer to EC-570, "Idle Speed and Ignition Timing Check".

M/T: 700 ± 50 rpm (in Neutral position)
A/T: 700 ± 50 rpm (in P or N position)
CVT: 700 ± 50 rpm (in P or N position)

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to EC-570, "Idle Speed and Ignition Timing Check".

M/T: 700 ± 50 rpm (in Neutral position)
A/T: 700 ± 50 rpm (in P or N position)
CVT: 700 ± 50 rpm (in P or N position)

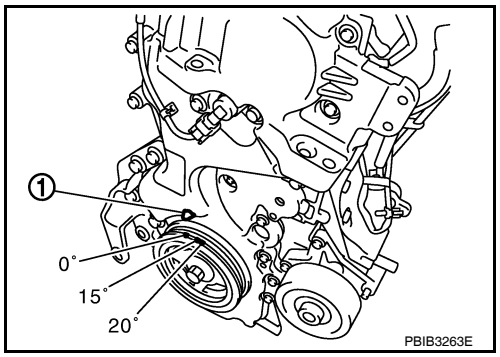
OK or NG

OK >> GO TO 15.
NG >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.
Refer to EC-570, "Idle Speed and Ignition Timing Check".

- Timing indicator (1)



M/T: 13 ± 5° BTDC (in Neutral position)
A/T: 13 ± 5° BTDC (in P or N position)
CVT: 13 ± 5° BTDC (in P or N position)

OK or NG

OK >> GO TO 19
NG >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-160.

OK or NG

OK >> GO TO 17.
NG >> 1. Repair the timing chain installation.
2. GO TO 4.

17. DETECT MALFUNCTIONING PART

Check the following.

- Check crankshaft position sensor (POS) and circuit.
Refer to EC-775.
- Check camshaft position sensor (PHASE) and circuit.
Refer to EC-781.

OK or NG

OK >> GO TO 18.
NG >> 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 NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-249, "ECM Re-communicating Function".

>> GO TO 4.

19. INSPECTION END

Did you replace ECM, referring this Basic Inspection procedure?

Yes or No

Yes >> 1. Perform EC-572, "VIN Registration".
2. **INSPECTION END**

No >> **INSPECTION END**

Idle Speed and Ignition Timing Check

INFOID:0000000004537044

IDLE SPEED

With CONSULT-III

Check idle speed in “DATA MONITOR” mode with CONSULT-III.

With GST

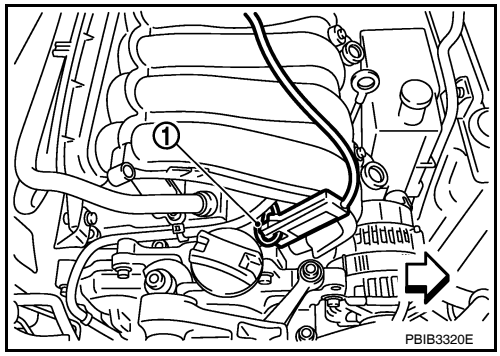
Check idle speed in Service $01 with GST.

IGNITION TIMING

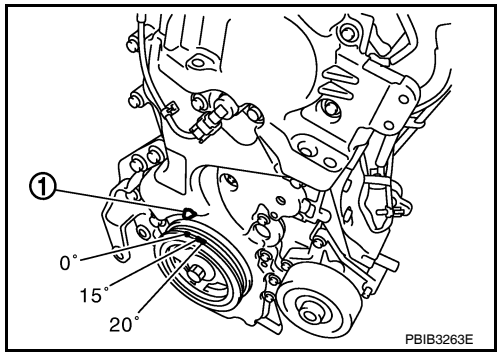
Any of following two methods may be used.

Method A

1. Attach timing light to loop wire (1) as shown.
   - : Vehicle front



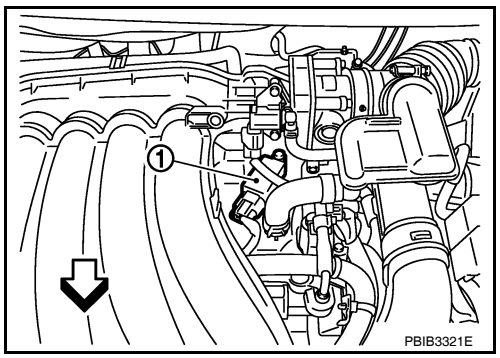
2. Check ignition timing.
   - Timing indicator (1)



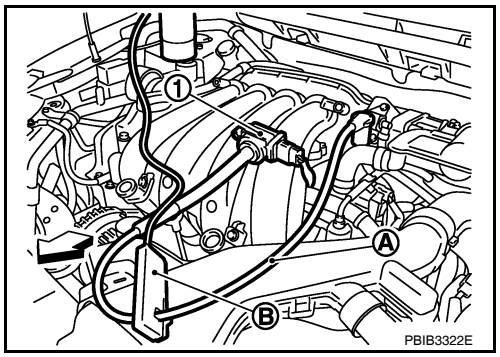
Method B

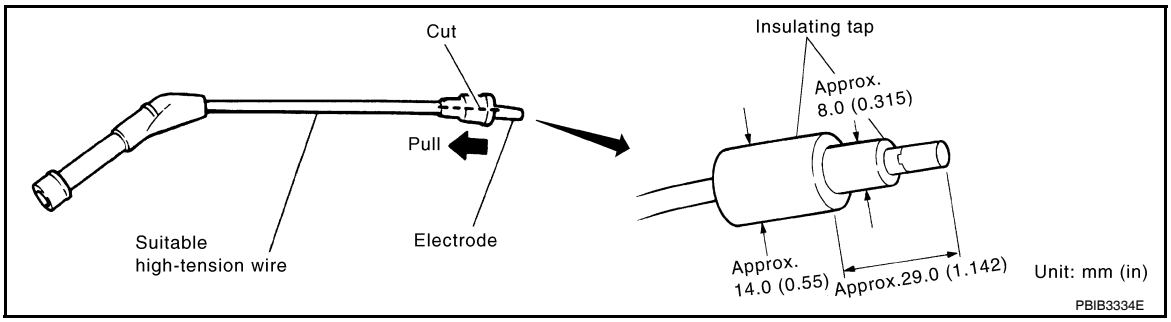
1. Remove No. 4 ignition coil (1).

- : Vehicle front

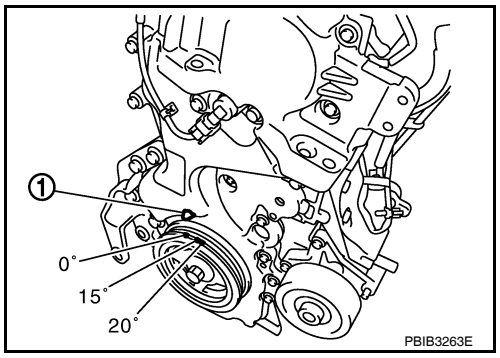


2. Connect No. 4 ignition coil (1) and No. 4 spark plug with suitable high-tension wire (A) as shown, and attach timing light clamp (B) to this wire.
   - : Vehicle front





3. Check ignition timing.
   - Timing indicator (1)



Procedure After Replacing ECM

INFOID:0000000004537045

When replacing ECM, the following procedure must be performed.

1. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-249, "ECM Re-communicating Function".
2. Perform EC-572, "VIN Registration".
3. Perform EC-572, "Accelerator Pedal Released Position Learning".
4. Perform EC-572, "Throttle Valve Closed Position Learning".

5. Perform EC-572, "Idle Air Volume Learning".

VIN Registration

INFOID:0000000004537046

DESCRIPTION

VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced.

NOTE:

Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).

OPERATION PROCEDURE

With CONSULT-III

1. Check the VIN of the vehicle and note it. Refer to GI-43.
2. Turn ignition switch ON and engine stopped.
3. Select “VIN REGISTRATION” in “WORK SUPPORT” mode.
4. Follow the instruction of CONSULT-III display.

Accelerator Pedal Released Position Learning

INFOID:0000000004537047

DESCRIPTION

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.

OPERATION PROCEDURE

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.

Throttle Valve Closed Position Learning

INFOID:0000000004537048

DESCRIPTION

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.

OPERATION PROCEDURE

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.

Idle Air Volume Learning

INFOID:0000000004537049

DESCRIPTION

Idle Air Volume Learning is an operation to learn the idle air volume that keeps each engine 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.

PREPARATION

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 - 95°C (158 - 203°F)
- Park/neutral position (PNP) switch: ON
- Electric load switch: OFF

[Air conditioner, headlamp, rear window defogger]
On vehicles equipped with daytime light systems, if the parking brake is applied before the engine is started the headlamp will not be illuminated.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
- Models with CONSULT-III (A/T and CVT models)
- Drive vehicle until “FLUID TEMP SE” in “DATA MONITOR” mode of “A/T” or “CVT” system indicates less than 0.9V.
- Models without CONSULT-III (A/T and CVT models) and M/T models
- Drive vehicle for 10 minutes.

OPERATION PROCEDURE

With CONSULT-III

1. Perform EC-572, "Accelerator Pedal Released Position Learning".
2. Perform EC-572, "Throttle Valve Closed Position Learning".
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode.
6. Touch “START” and wait 20 seconds.
7. Make sure that “CMPLT” is displayed on CONSULT-III screen. If “CMPLT” is not displayed, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the DIAGNOSTIC PROCEDURE below.
8. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.
   Refer to EC-566, "Basic Inspection".

ITEM	SPECIFICATION
Idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position) CVT: 700 ± 50 rpm (in P or N position)
Ignition timing	M/T: 13 ± 5° BTDC (in Neutral position) A/T: 13 ± 5° BTDC (in P or N position) CVT: 13 ± 5° BTDC (in P or N position)

Without CONSULT-III

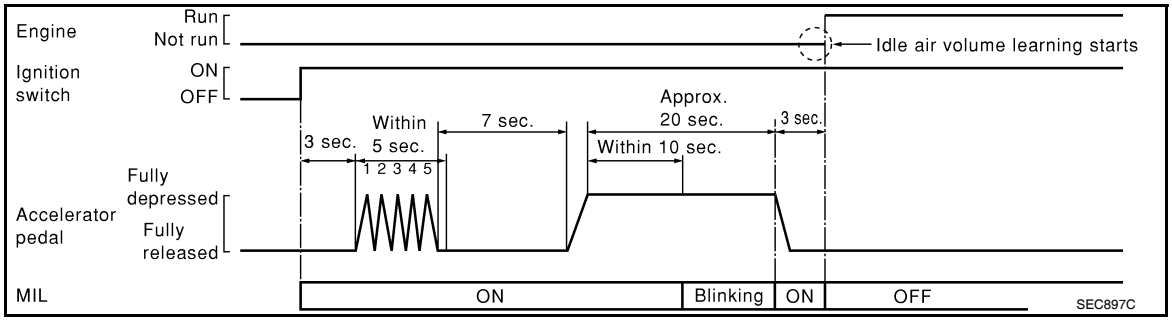
NOTE:
- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**

1. Perform EC-572, "Accelerator Pedal Released Position Learning".
2. Perform EC-572, "Throttle Valve Closed Position Learning".
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
7. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.
b. Fully release the accelerator pedal.

8. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops blinking and turned ON.
9. Fully release the accelerator pedal within 3 seconds after the MIL turned ON.
10. Start engine and let it idle.

11. Wait 20 seconds.



12. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications. Refer to EC-566, "Basic Inspection".

ITEM	SPECIFICATION
Idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position) CVT: 700 ± 50 rpm (in P or N position)
Ignition timing	M/T: 13 ± 5° BTDC (in Neutral position) A/T: 13 ± 5° BTDC (in P or N position) CVT: 13 ± 5° BTDC (in P or N position)

13. If idle speed and ignition timing are not within the specification, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the DIAGNOSTIC PROCEDURE below.

DIAGNOSTIC PROCEDURE

If idle air volume learning cannot be performed successfully, proceed as follows:

1. **Check that throttle valve is fully closed.**
2. **Check PCV valve operation.**
3. **Check that downstream of throttle valve is free from air leakage.**
4. **When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.**
   It is useful to perform EC-618.
5. **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.**

Fuel Pressure Check

INFOID:0000000004537050

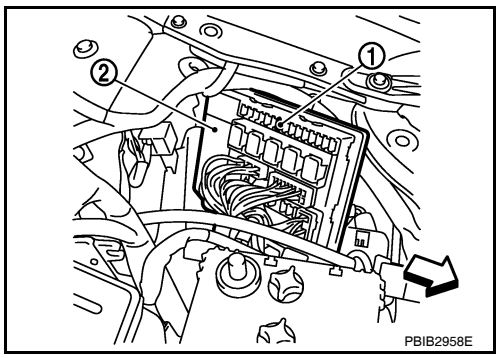
FUEL PRESSURE RELEASE

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 (1) located in IPDM E/R (2).
   - : Vehicle front
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

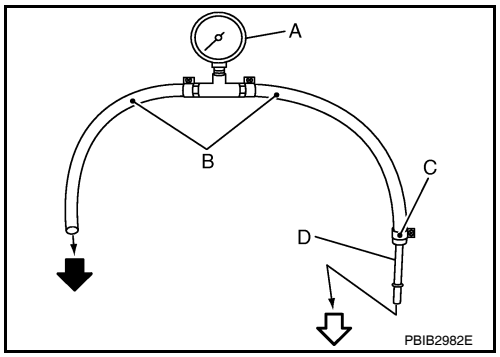
CAUTION:

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

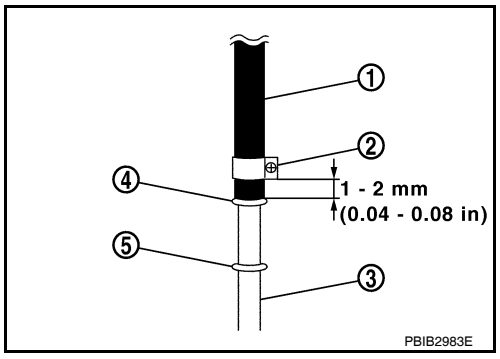
NOTE:

- **Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because C11 models do not have fuel return system.**
- **The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.**
- **Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains sealability with O-rings inside.**
- **Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.**

1. Release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".
2. Prepare fuel hose for fuel pressure check B and fuel tube adapter (KV10118400) D, then connect fuel pressure gauge A.
   - : To quick connector
   - : To fuel tube (engine side)
   - C: Clamp
   - Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
   - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
   - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
   - Use Pressure Gauge to check fuel pressure.



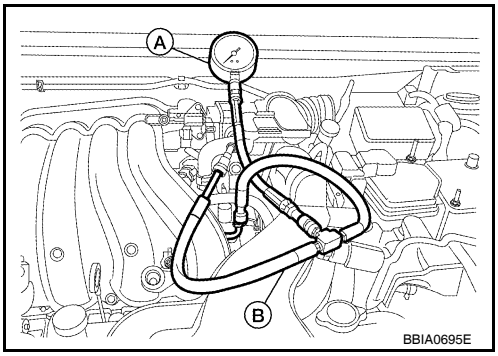
3. Remove fuel hose. Refer to EM-156.
   - Do not twist or kink fuel hose because it is plastic hose.
4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.
   - No.2 spool (5)
   - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
   - Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
   - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
   - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
   - When reconnecting fuel line, always use new clamps.
   - Use a torque driver to tighten clamps.
   - Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).



Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

- Make sure that clamp screw does not contact adjacent parts.

5. Connect fuel tube adapter to quick connector.
   - A: Fuel pressure gauge
   - B: Fuel hose for fuel pressure check
6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
7. Turn ignition switch ON and check for fuel leakage.
8. Start engine and check for fuel leakage.
9. Read the indication of fuel pressure gauge.
   - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
   - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.



At idling: Approximately 350 kPa (3.57 kg/cm^2, 51 psi)

10. If result is unsatisfactory, go to next step.
11. Check the following.
    - Fuel hoses and fuel tubes for clogging
    - Fuel filter for clogging
    - Fuel pump
    - Fuel pressure regulator for clogging

    If OK, replace fuel pressure regulator.
    If NG, repair or replace.
12. Check the following.
    - Fuel hoses and fuel tubes for clogging
    - Fuel filter for clogging
    - Fuel pump
    - Fuel pressure regulator for clogging

    If OK, replace fuel pressure regulator.
    If NG, repair or replace.
13. Before disconnecting Fuel Pressure Gauge and Fuel Pressure Adapter J-44321-6, release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".

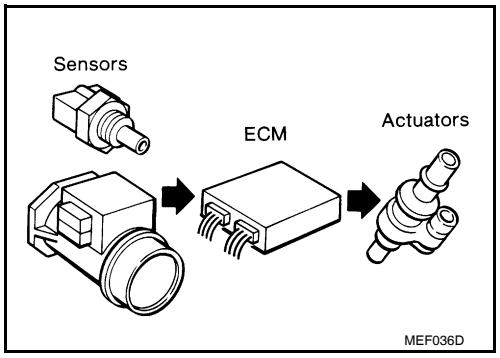
TROUBLE DIAGNOSIS

Trouble Diagnosis Introduction

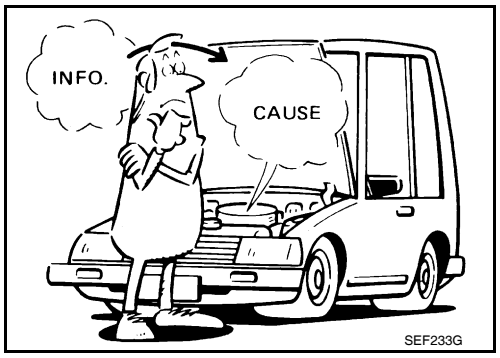
INFOID:0000000004537051

INTRODUCTION

The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, fouled spark plugs, or other malfunctions with the engine.



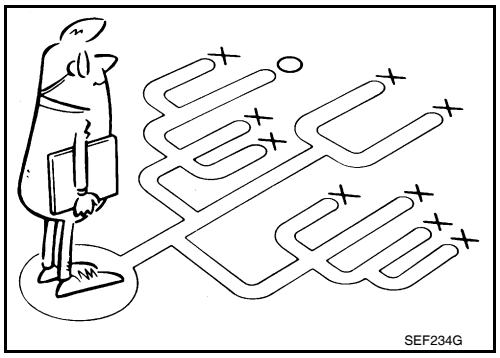
It is much more difficult to diagnose an incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



A visual check only may not find the cause of the incidents. A road test with CONSULT-III (or GST) or a circuit tester connected should be performed. Follow the Work Flow on "WORK FLOW".

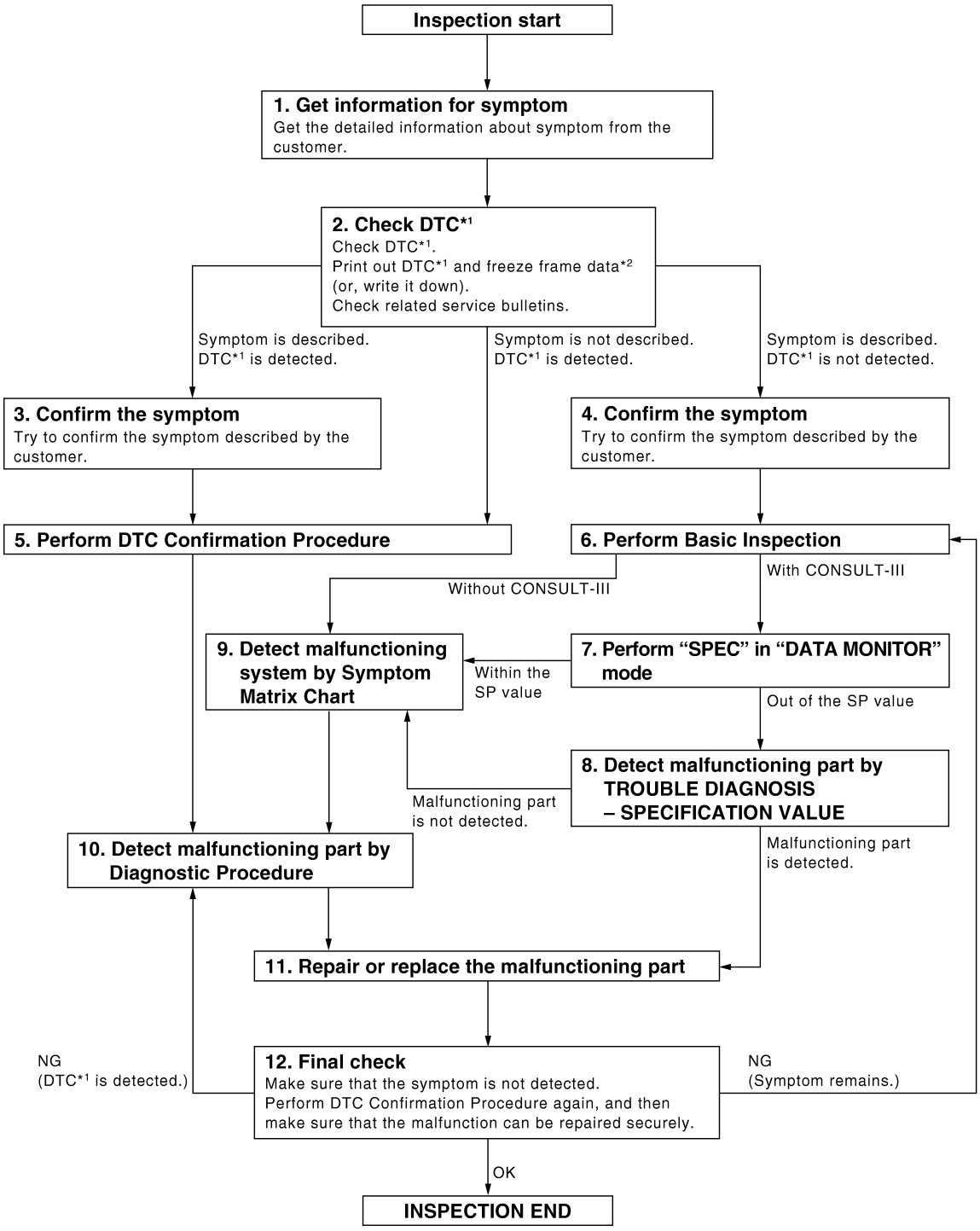
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic Worksheet like the example on "Worksheet Sample" should be used.

Start your diagnosis by looking for conventional malfunctions first. This will help troubleshoot driveability malfunctions on an electronically controlled engine vehicle.



WORK FLOW

Overall Sequence



*1: Include 1st trip DTC.
*2: Include 1st trip freeze frame data.

PBIB3456E

Detailed Flow

1. GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the "DIAGNOSTIC WORKSHEET".

>> GO TO 2.

2.CHECK DTC*1

1. Check DTC*1.
2. Perform the following procedure if DTC*1 is displayed.

- Record DTC*1 and freeze frame data*2. (Print them out with CONSULT-III or GST.)
- Erase DTC*1. (Refer to EC-542, "Emission-related Diagnostic Information")
- Study the relationship between the cause detected by DTC*1 and the symptom described by the customer. (Symptom Matrix Chart is useful. Refer to EC-583, "Symptom Matrix Chart".)

3. Check related service bulletins for information.

Is any symptom described and any DTC detected?

Symptom is described, DTC*1 is displayed>>GO TO 3.
Symptom is described, DTC*1 is not displayed>>GO TO 4.
Symptom is not described, DTC*1 is displayed>>GO TO 5.

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).
DIAGNOSIS 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.
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*1, and then make sure that DTC*1 is detected again.

If two or more DTCs*1 are detected, refer to EC-581, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

NOTE:

- Freeze frame data*2 is useful if the DTC*1 is not detected.
- Perform Overall Function Check if DTC Confirmation Procedure is not included on Service Manual. This simplified check procedure is an effective alternative though DTC*1 cannot be detected during this check.
  If the result of Overall Function Check is NG, it is the same as the detection of DTC*1 by DTC Confirmation Procedure.

Is DTC*1 detected?

Yes >> GO TO 10.
No >> Check according to EC-626.

6.PERFORM BASIC INSPECTION

Perform EC-566, "Basic Inspection".

With CONSULT-III>>GO TO 7.
Without CONSULT-III>>GO TO 9.

7.PERFORM SPEC IN DATA MONITOR (SPEC) 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 “SPEC” in “DATA MONITOR” mode. Refer to EC-618, "Inspection Procedure".

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-618, "Diagnosis Procedure".

Is malfunctioning part detected?

Yes >> GO TO 11.
No >> GO TO 9.

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM MATRIX CHART

Detect malfunctioning system according to EC-583, "Symptom Matrix Chart" 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-25, "How to Perform Efficient Diagnosis for an Electrical Incident".

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-597, "ECM Terminal and Reference Value", EC-614, "CONSULT-III Reference Value in Data Monitor Mode".

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-542, "Emission-related Diagnostic Information".

>> GO TO 12.

12. FINAL CHECK

When DTC was detected in step 2, perform DTC Confirmation Procedure or Overall Function Check again, and then 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.

OK or NG

NG (DTC*1 is detected)>>GO TO 10.
NG (Symptom remains)>>GO TO 6.
OK >> 1. Before returning the vehicle to the customer, make sure to erase unnecessary DTC*1 in ECM and TCM (Transmission Control Module). (Refer to EC-542, "Emission-related Diagnostic Information" and AT-39, "OBD-II Diagnostic Trouble Code (DTC)", CVT-209, "OBD-II Diagnostic Trouble Code (DTC)".)
2. If the completion of SRT is needed, drive vehicle under the specific driving pattern. Refer to EC-542, "Emission-related Diagnostic Information".
3. **INSPECTION END**

*1: Include 1st trip DTC.
*2: Include 1st trip freeze frame data.

DIAGNOSTIC WORKSHEET

Description

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.
Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

SEF907L

Worksheet Sample

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Fuel and fuel filler cap		☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions		☐ Not affected	
	Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions		☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions		☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp		☐ Turned on ☐ Not turned on	

MTBL0017

DTC Inspection Priority Chart

INFOID:0000000004537052

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
1	• U1000 U1001 CAN communication line • U1010 CAN communication • P0101 P0102 P0103 Mass air flow sensor • P0112 P0113 P0127 Intake air temperature sensor • P0117 P0118 P0125 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor • P0128 Thermostat function • P0181 P0182 P0183 Fuel tank temperature sensor • P0327 P0328 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 Camshaft position sensor (PHASE) • P0460 P0461 P0462 P0463 Fuel level sensor • P0500 Vehicle speed sensor • P0605 ECM • P0643 Sensor power supply • P0705 P0850 Park/neutral position (PNP) switch • P1610 - P1615 NATS • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	• P0031 P0032 Air fuel ratio (A/F) sensor 1 heater • P0037 P0038 Heated oxygen sensor 2 heater • P0075 Intake valve timing control solenoid valve • P0130 P0131 P0132 P0133 P2A00 Air fuel ratio (A/F) sensor 1 • P0137 P0138 P0139 Heated oxygen sensor 2 • P0441 EVAP control system purge flow monitoring • P0443 P0444 P0445 EVAP canister purge volume control solenoid valve • P0447 P0448 EVAP canister vent control valve • P0451 P0452 P0453 EVAP control system pressure sensor • P1217 Engine over temperature (OVERHEAT) • P1805 Brake switch • P2100 P2103 Throttle control motor relay • P2101 Electric throttle control function • P2118 Throttle control motor
3	• P0011 Intake valve timing control • P0171 P0172 Fuel injection system function • P0300 - P0304 Misfire • P0420 Three way catalyst function • P0442 P0456 EVAP control system (SMALL LEAK, VERY SMALL LEAK) • P0455 EVAP control system (GROSS LEAK) • P0506 P0507 Idle speed control system • P0710 P0715 P0720 P0725 P0731 P0732 P0733 P0734 P0740 P0744 P0745 P0746 P0750 P0755 P0776 P0778 P0840 P0845 P1705 P1740 P1760 P1777 P1778 A/T or CVT related sensors, solenoid valves and switches • P1148 Closed loop control • P1421 Cold start control • P1564 ASCD steering switch • P1572 ASCD brake switch • P1574 ASCD vehicle speed sensor • P1715 Turbine revolution sensor (A/T), Primary speed sensor (CVT) • P2119 Electric throttle control actuator

Fail-Safe Chart

INFOID:0000000004537053

When the DTC listed below is detected, the ECM enters fail-safe mode and the MIL lights up.

DTC No.	Detected items	Engine operating condition in fail-safe mode
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 sarting. — 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.
P0643	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P2100 P2103	Throttle control 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 (A/T, 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.

- 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.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Symptom Matrix Chart

INFOID:0000000004537054

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-991
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-574
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-986
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-527
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-538
	Incorrect idle speed adjustment						1	1	1	1		1			EC-566
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-929, EC-940
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-566
	Ignition circuit	1	1	2	2	2		2	2			2			EC-996
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-627
Mass air flow sensor circuit		1	1	2	2	2		2	2			2			EC-655, EC-663
Engine coolant temperature sensor circuit					3		3			3					EC-674, EC-684
Air fuel ratio (A/F) sensor 1 circuit															EC-692, EC-698, EC-704, EC-710, EC-966
Throttle position sensor circuit							2			2					EC-679, EC-760, EC-895, EC-897, EC-954
Accelerator pedal position sensor circuit				3	2	1									EC-874, EC-942, EC-947, EC-959
Knock sensor circuit				2								3			EC-771
Crankshaft position sensor (POS) circuit		2	2												EC-775
Camshaft position sensor (PHASE) circuit		3	2												EC-781
Vehicle speed signal circuit			2	3		3						3			EC-866
ECM		2	2	3	3	3	3	3	3	3	3	3			EC-872

	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	
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-650
Park/neutral position (PNP) switch circuit			3		3		3	3			3			EC-879
Refrigerant pressure sensor circuit		2				3			3		4			EC-1005
Electrical load signal circuit							3							EC-984
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	MTC-22
ABS actuator and electric unit (control unit)			4											BRC-8

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													FL-9
	Fuel piping			5	5	5		5	5			5			EM-156
	Vapor lock		5												—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—

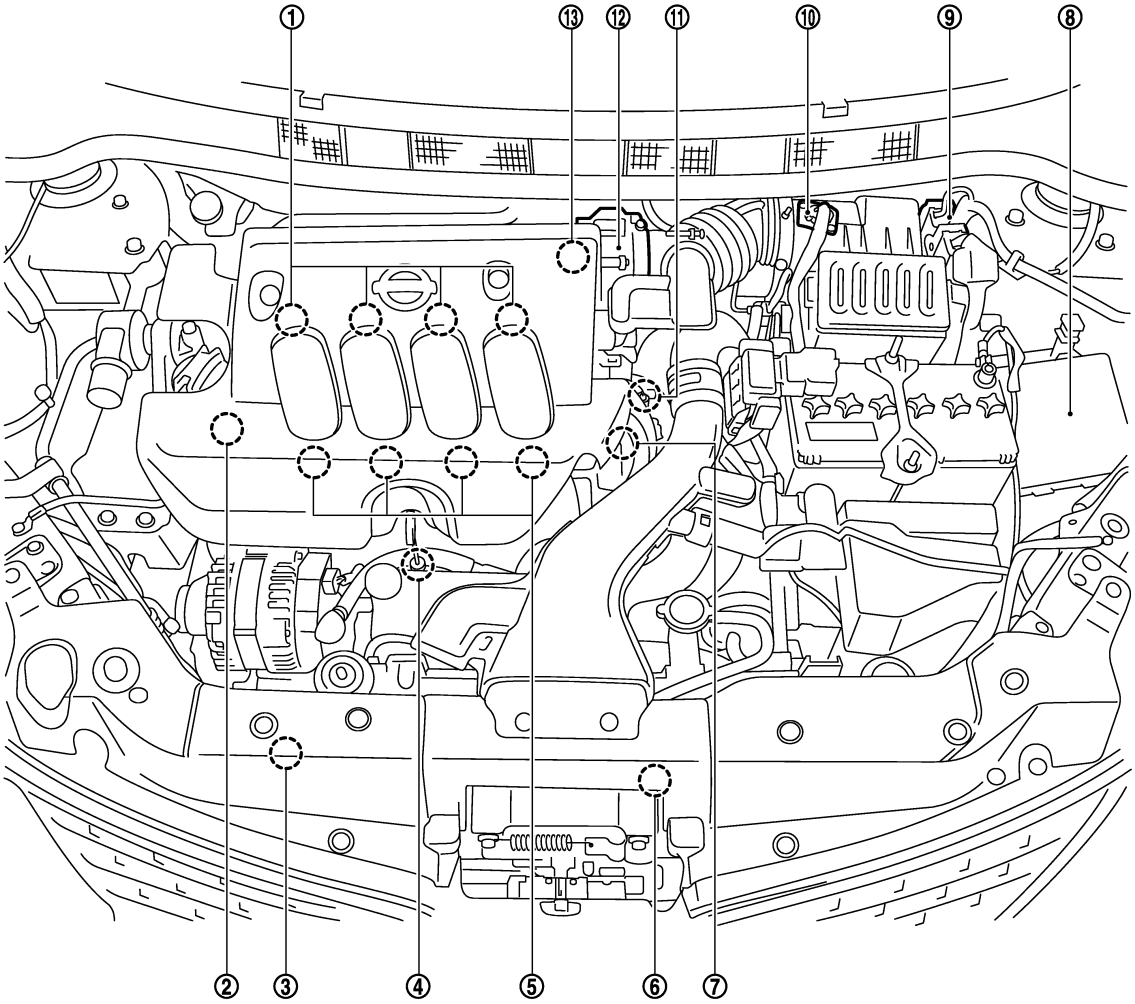
		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Air	Air duct		5	5		5		5	5			5			EM-139
	Air cleaner														EM-139
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)	5			5		5			5					EM-139
	Electric throttle control actuator														EM-141
	Air leakage from intake manifold/ Collector/Gasket														EM-141
Cranking	Battery	1	1	1		1		1	1			1		1	SC-5
	Generator circuit														SC-21
	Starter circuit	3													SC-9
	Signal plate	6													EM-199
	Park/neutral position (PNP) switch	4													MT-54, AT-91 or CVT-244
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-185
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-199
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mecha-nism	Timing chain	5	5	5	5	5		5	5			5			EM-160
	Camshaft														EM-170
	Intake valve timing control														EM-170
	Intake valve												3		EM-185
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			EM-144, EX-9
	Three way catalyst														
Lubrica-tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5			EM-147, LU-19
	Oil level (Low)/Filthy oil														LU-16

		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	
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-38
	Thermostat									5					CO-45
	Water control valve														CO-47
	Water pump														CO-43
	Water gallery														CO-34
	Cooling fan									5					CO-42
	Coolant level (Low)/Contaminated coolant														CO-35
NVIS (NISSAN Vehicle Immobilizer System-NATS)		1	1												BL-248

1 - 6: The numbers refer to the order of inspection.

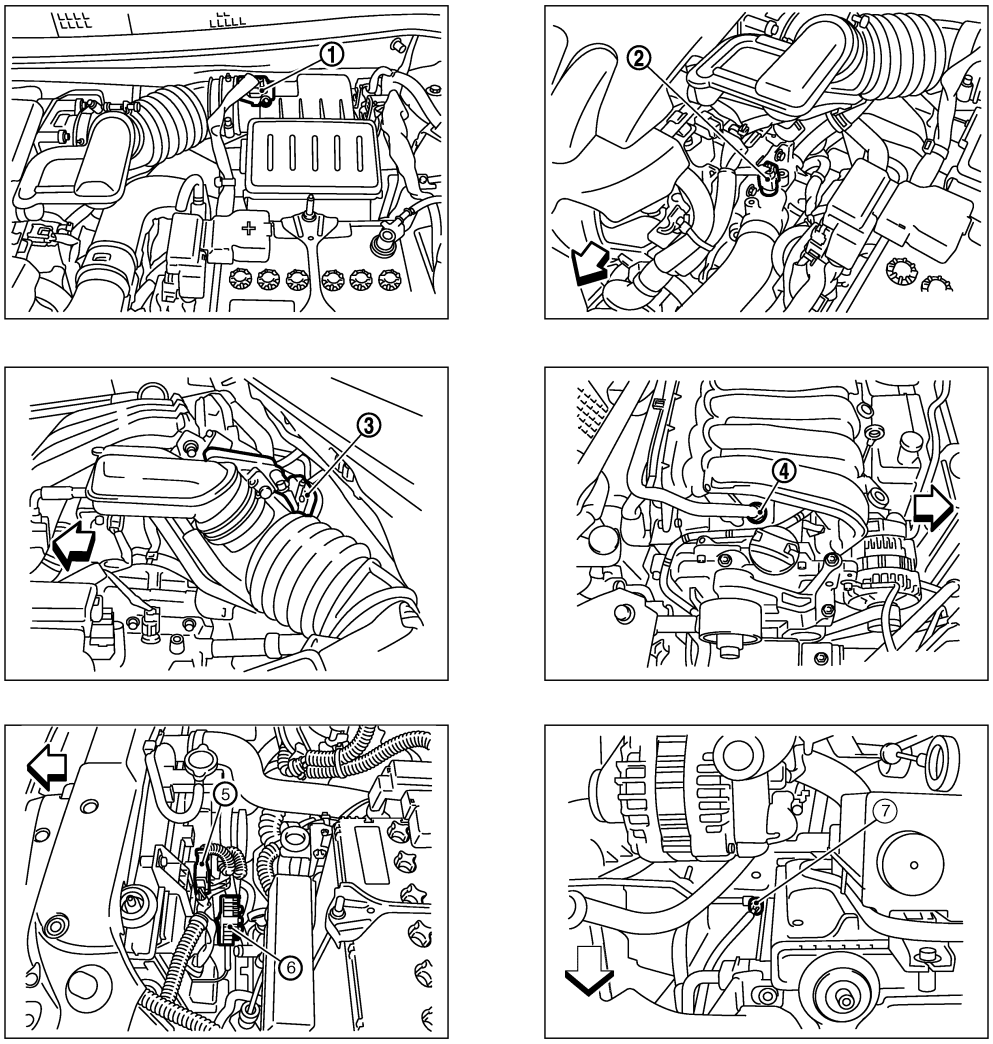
Engine Control Component Parts Location

INFOID:0000000004537055



PBIB3261E

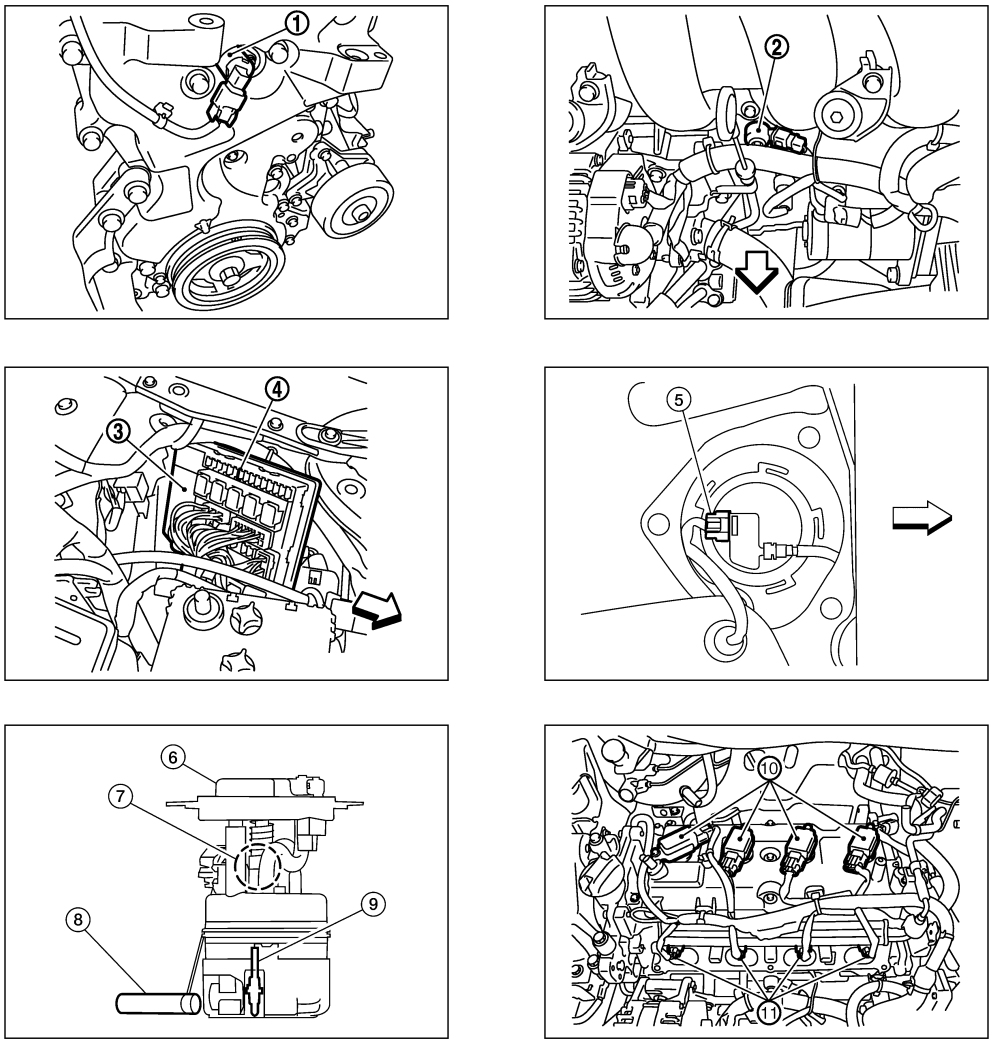
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)
11. Engine coolant temperature sensor
12. Electric throttle control actuator (with built-in throttle position sensor, throttle control motor)
13. EVAP canister purge volume control solenoid valve



BBIA0724E

: Vehicle front

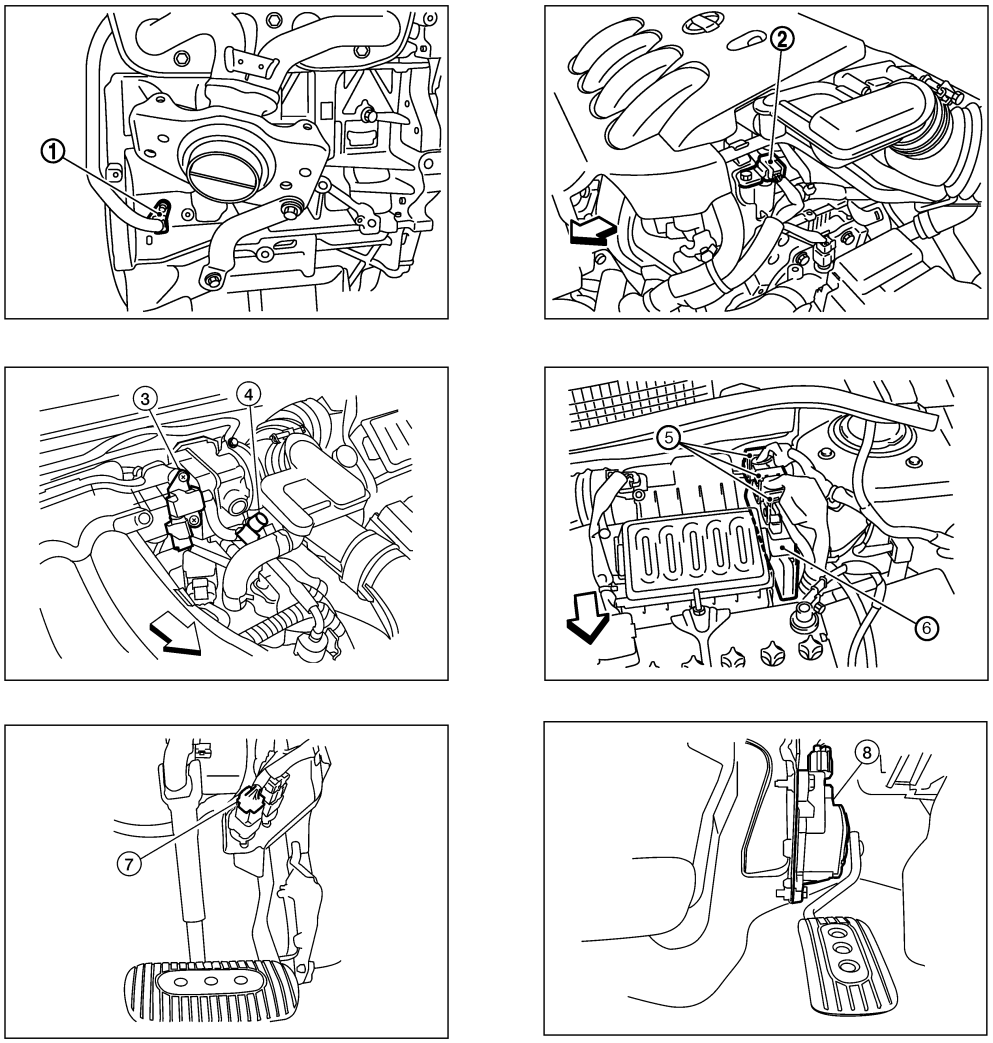
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator (with built in throttle position sensor, throttle control motor)
4. PCV valve
5. Cooling fan motor
6. Resistor
7. Refrigerant pressure sensor



BBIA0725E

: Vehicle front

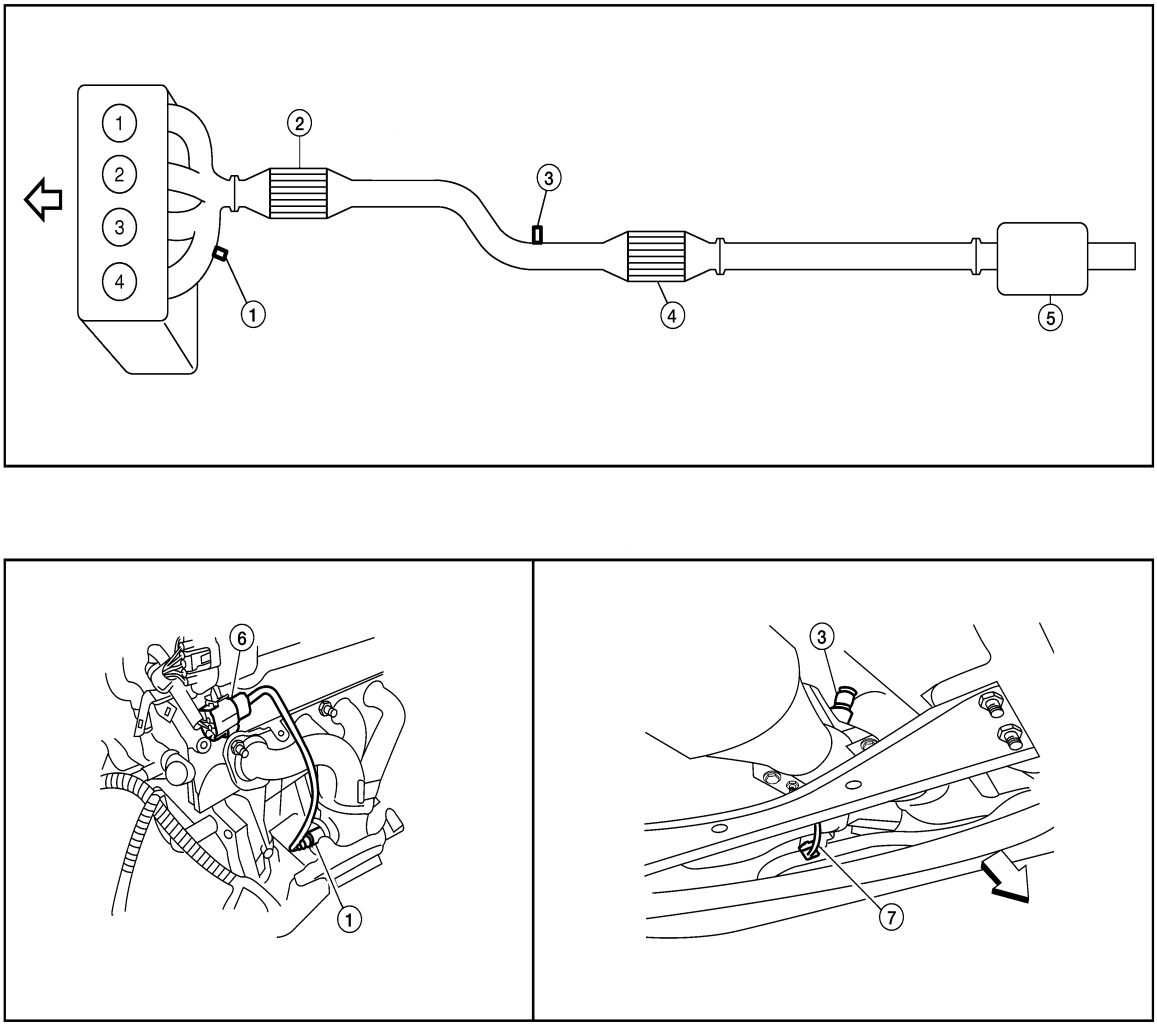
1. Intake valve timing control solenoid valve
2. Knock sensor
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
6. Fuel level sensor unit and fuel pump
7. Fuel pressure regulator
8. Fuel level sensor
9. Fuel tank temperature sensor
10. Ignition coil (with power transistor) and spark plug
11. Fuel injector



BBIA0727E

: Vehicle front

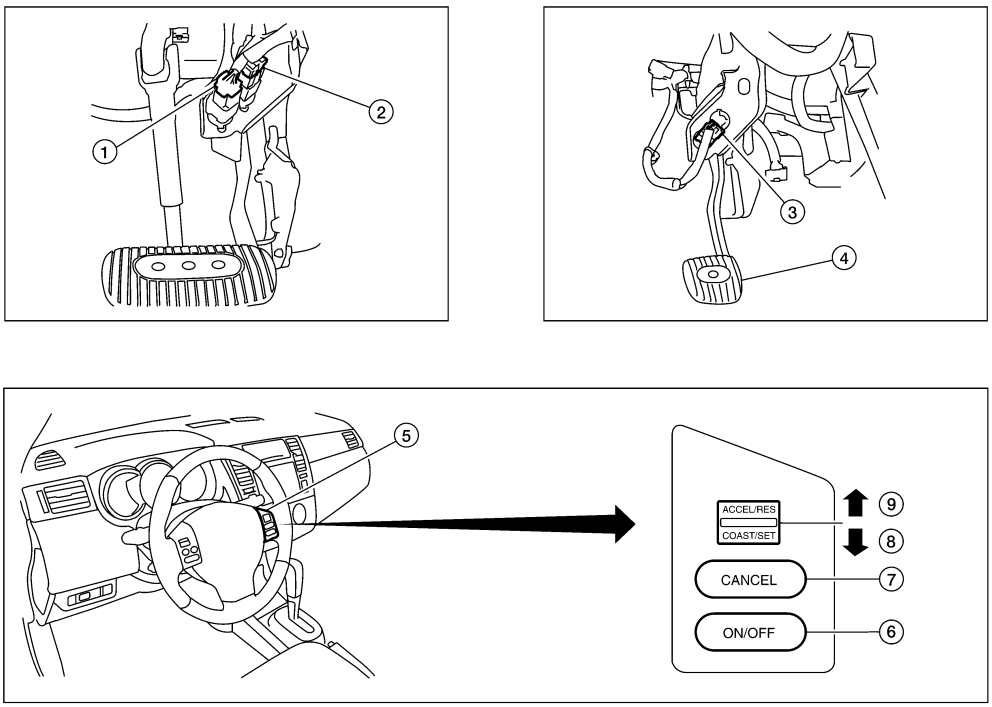
1.	Crankshaft position sensor (POS)	2.	Camshaft position sensor (PHASE)	3.	EVAP canister purge volume control solenoid valve
4.	EVAP service port	5.	ECM harness connector	6.	ECM
7.	Stop lamp switch	8.	Accelerator pedal position sensor		



BBIA0726E

: Vehicle front

1. Air fuel ratio (A/F) sensor 1
2. Three way catalyst (Manifold)
3. Heated oxygen sensor 2
4. Three way catalyst (Under floor)
5. Muffler
6. Air fuel ratio (A/F) sensor 1 harness connector
7. Heated oxygen sensor 2 harness connector

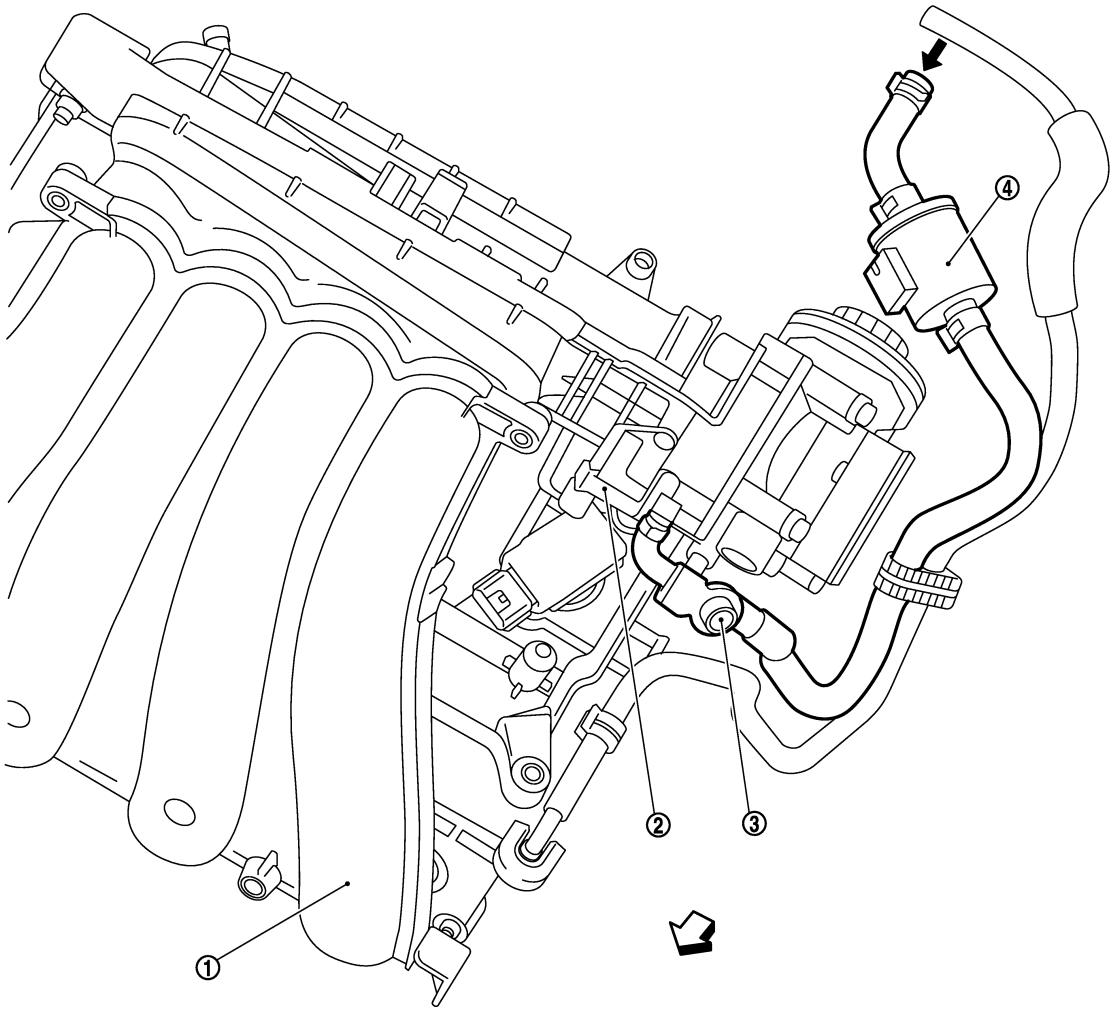


BBIA0728E

1. Stop lamp switch
2. ASCD brake switch
3. ASCD clutch switch
4. Clutch pedal
5. ASCD steering switch
6. MAIN switch
7. CANCEL switch
8. SET/COAST switch
9. RESUME/ACCELERATOR switch
10. EVAP control system pressure sensor
11. EVAP canister
12. EVAP canister vent control valve

Vacuum Hose Drawing

INFOID:0000000004537056



PBIB3330E

: Vehicle front

: From EVAP canister

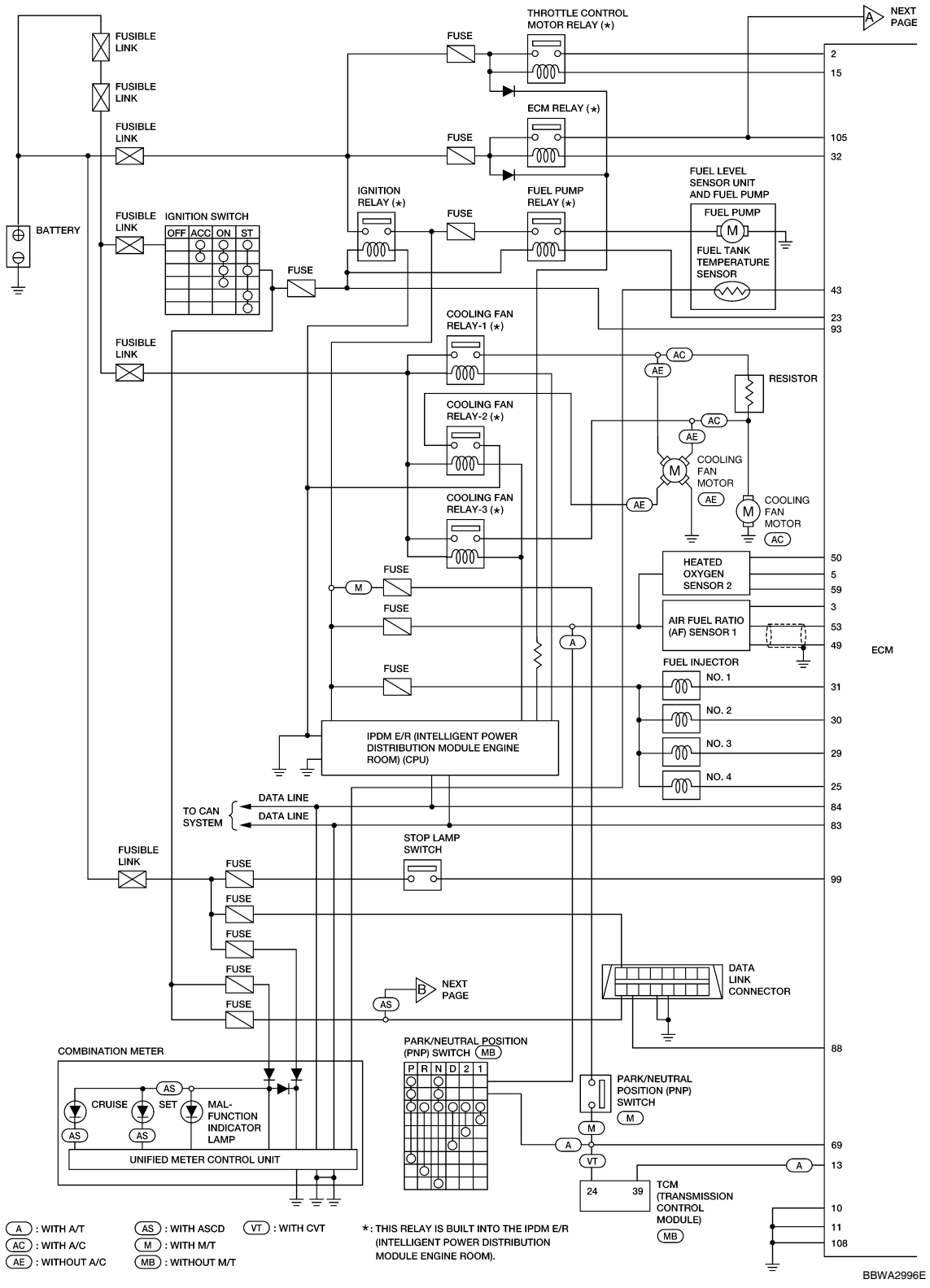
1. Intake manifold
2. EVAP canister purge volume control solenoid valve
3. EVAP service port
4. EVAP purge resonator

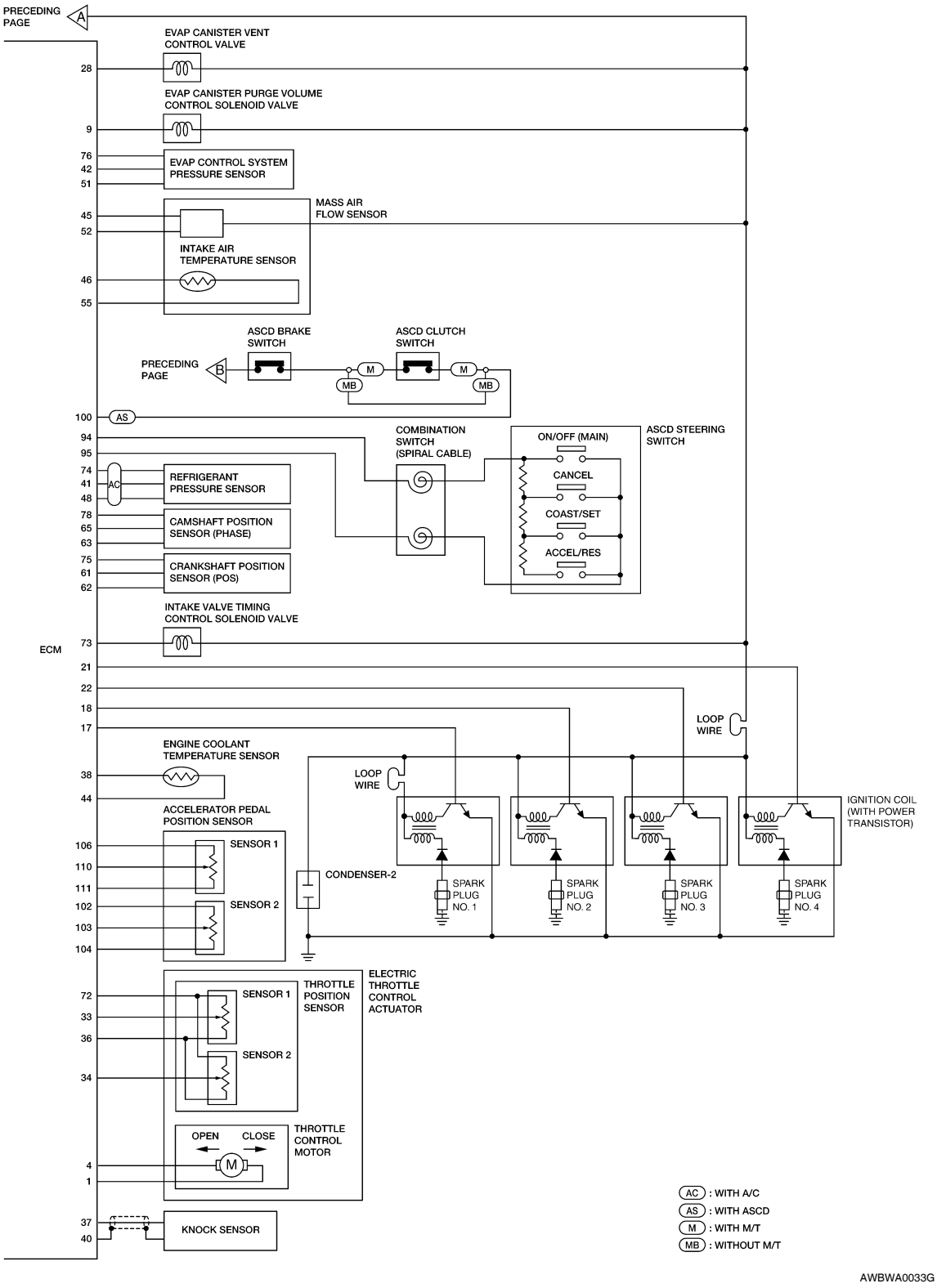
NOTE:
Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

Refer to EC-518, "Schematic" for Vacuum Control System.

Circuit Diagram

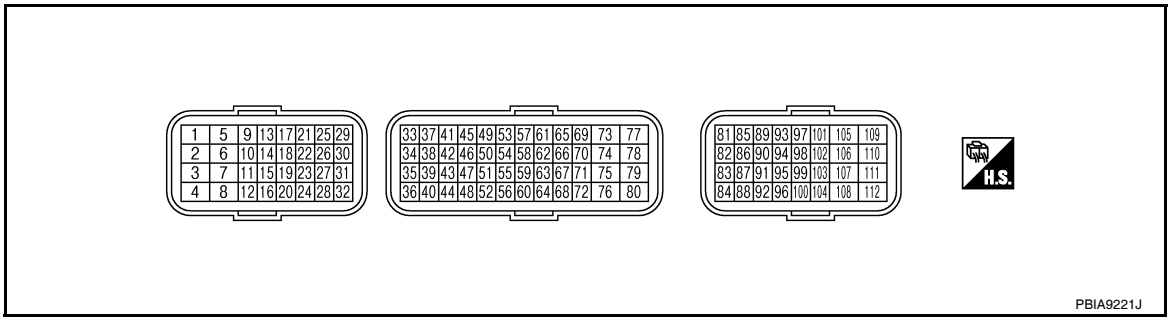
INFOID:0000000004537057




PRECEDING PAGE
A
EVAP CANISTER VENT CONTROL VALVE
28
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
9
76
42
51
EVAP CONTROL SYSTEM PRESSURE SENSOR
MASS AIR FLOW SENSOR
45
52
INTAKE AIR TEMPERATURE SENSOR
46
55
ASCD BRAKE SWITCH
ASCD CLUTCH SWITCH
PRECEDING PAGE
B
M
MB
100
AS
94
95
COMBINATION SWITCH (SPIRAL CABLE)
ON/OFF (MAIN)
CANCEL
COAST/SET
ACCEL/RES
ASCD STEERING SWITCH
74
41
48
AC
REFRIGERANT PRESSURE SENSOR
78
65
63
CAMSHAFT POSITION SENSOR (PHASE)
75
61
62
CRANKSHAFT POSITION SENSOR (POS)
INTAKE VALVE TIMING CONTROL SOLENOID VALVE
ECM
73
21
22
18
17
LOOP WIRE
ENGINE COOLANT TEMPERATURE SENSOR
38
44
LOOP WIRE
IGNITION COIL (WITH POWER TRANSISTOR)
ACCELERATOR PEDAL POSITION SENSOR
106
110
111
102
103
104
SENSOR 1
SENSOR 2
CONDENSER-2
SPARK PLUG NO. 1
SPARK PLUG NO. 2
SPARK PLUG NO. 3
SPARK PLUG NO. 4
ELECTRIC THROTTLE CONTROL ACTUATOR
72
33
36
34
SENSOR 1
SENSOR 2
THROTTLE POSITION SENSOR
OPEN
CLOSE
THROTTLE CONTROL MOTOR
4
1
37
40
KNOCK SENSOR
AC : WITH A/C
AS : WITH ASCD
M : WITH M/T
MB : WITHOUT M/T
AWBWA0033G

ECM Harness Connector Terminal Layout

INFOID:0000000004537058

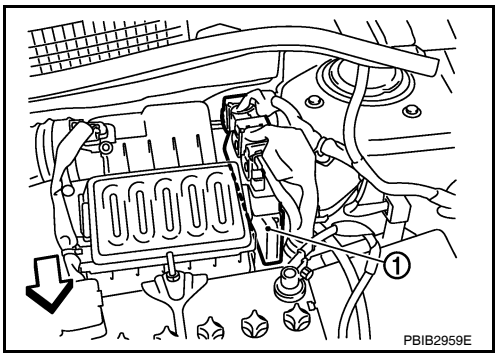


ECM Terminal and Reference Value

INFOID:0000000004537059

PREPARATION

1. ECM (1) is located in the engine room left side near battery.
   - : Vehicle front

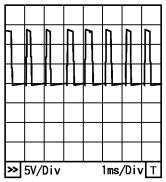
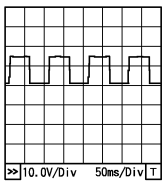


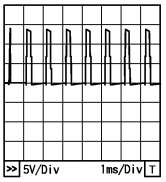
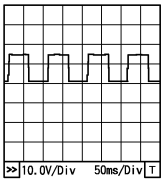
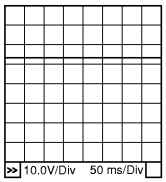
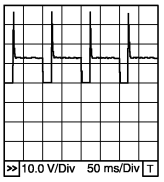
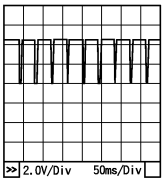
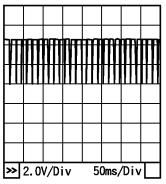
ECM INSPECTION TABLE

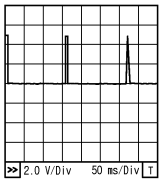
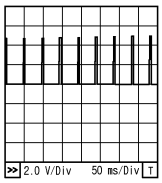
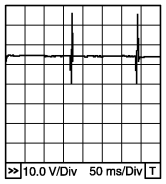
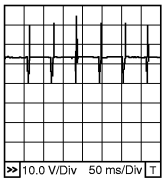
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

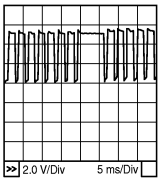
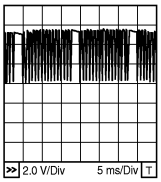
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

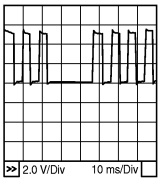
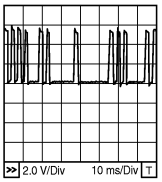
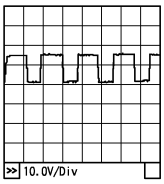
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L	Throttle control motor (Open)	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Approximately 3.2V  PBIA8150J
2	SB	Throttle control motor power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
3	G	A/F sensor 1 heater	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V  PBIA8148J

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	P	Throttle control motor (Close)	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	Approximately 1.8V  PBIA8149J
5	G	Heated oxygen sensor 2 heater	**[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.	Approximately 10V  PBIA8148J
			[Ignition switch: ON] • Engine stopped **[Engine is running]** • Engine speed: Above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
9	P	EVAP canister purge volume control solenoid valve	**[Engine is running]** • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting.	BATTERY VOLTAGE (11 - 14V)  PBIB0050E
			[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V  PBIB0520E
10 11	B B	ECM ground	**[Engine is running]** • Idle speed	Body ground
13	L	Tachometer signal	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	3 - 5V  PBIA8164J
			[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm.	3 - 5V  PBIA8165J

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
15	Y	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V
17 18 21 22	R LG G SB	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 4 Ignition signal No. 3	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 0.3V  PBIA9265J
			[Engine is running] • **Warm-up condition** • Engine speed: 2,500 rpm.	0.2 - 0.5V  PBIA9266J
23	GR	Fuel pump relay	**[Ignition switch: ON]** • For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.0V
			[Ignition switch: ON] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)
25 29 30 31	V Y O L	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 2 Fuel injector No. 1	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14V)  PBIB0529E
			[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  PBIA4943J
28	W	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For a few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	LG	Throttle position sensor 1	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
34	O	Throttle position sensor 2	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
36	Y	Sensor ground (Throttle position sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
37	W	Knock sensor	**[Engine is running]** • Idle speed	Approximately 2.5V
38	P	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
40	—	Sensor ground (Knock sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
41	GR	Refrigerant pressure sensor	**[Engine is running]** • **Warm-up condition** • Both A/C switch and blower fan switch: ON (Compressor operates.)	1.0 - 4.0V
42	V	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8V
43	P	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel tank temperature
44	B	Sensor ground (Engine coolant temperature sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
45	G	Mass air flow sensor	**[Engine is running]** • **Warm-up condition** • Idle speed	0.8 - 1.1V
			[Engine is running] • **Warm-up condition** • Engine speed: 2,500 rpm	1.4 - 1.7V
46	V	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
48	BR	Sensor ground (Refrigerant pressure sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
49	W	A/F sensor 1	**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	W	Heated oxygen sensor 2	**[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 - Approximately 1.0V
51	O	Sensor ground (EVAP control system pressure sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
52	LG	Sensor ground (Mass air flow sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
53	B	A/F sensor 1	**[Ignition switch: ON]**	Approximately 2.2V
55	O	Sensor ground (Intake air temperature sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
59	O	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
61	W	Crankshaft position sensor (POS)	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	Approximately 4.0V  PBIB2998E
			[Engine is running] • Engine speed: 2,000 rpm	Approximately 4.0V  PBIB2999E
62	R	Sensor ground [Crankshaft position sensor (POS)]	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
63	BR	Sensor ground [Camshaft position sensor (PHASE)]	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
65	G	Camshaft position sensor (PHASE)	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	1.0 - 2.0V  PBIB2986E
			[Engine is running] • Engine speed: 2,000 rpm.	1.0 - 2.0V  PBIB2987E
69	L	Park/neutral position (PNP) switch	**[Ignition switch: ON]** • Shift lever: P or N (A/T, CVT), Neutral (M/T)	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] • Except above	Approximately 0V
72	V	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
73	P	Intake valve timing control solenoid valve	**[Engine is running]** • **Warm-up condition** • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • **Warm-up condition** • When revving engine up to 2,000 rpm quickly	7 - 10V  PBIA4937J
74	W	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
75	BR	Sensor power supply [Crankshaft position sensor (POS)]	**[Ignition switch: ON]**	Approximately 5V
76	W	EVAP control system pressure sensor power supply	**[Ignition switch: ON]**	Approximately 5V
78	O	Sensor power supply [Camshaft position sensor (PHASE)]	**[Ignition switch: ON]**	Approximately 5V
83	P	CAN communication line	—	—
84	L	CAN communication line	—	—
88	LG	DATA link connector	—	—
93	O	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
94	R	ASCD steering switch	**[Ignition switch: ON]** • ASCD steering switch: OFF	Approximately 4V
			[Ignition switch: ON] • MAIN switch: Pressed	Approximately 0V
			[Ignition switch: ON] • CANCEL switch: Pressed	Approximately 1V
			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	Approximately 3V
			[Ignition switch: ON] • SET/COAST switch: Pressed	Approximately 2V
95	B	Sensor ground (ASCD steering switch)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
99	R	Stop lamp switch	**[Ignition switch: OFF]** • Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
100	G	ASCD brake switch	**[Ignition switch: ON]** • Brake pedal: Slightly depressed (A/T, CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	Approximately 0V
			[Ignition switch: ON] • Brake pedal: Fully released (A/T, CVT) • Brake pedal and clutch pedal: Fully released (M/T)	BATTTERY VOLTAGE (11 - 14V)
102	SB	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V
103	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4V
104	Y	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
106	P	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V
108	B	ECM ground	**[Engine is running]** • Idle speed	Body ground
110	G	Accelerator pedal position sensor 1	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7V
111	R	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

CONSULT-III Function (ENGINE)

INFOID:0000000004537060

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.
DTC & SRT Confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
ECU Identification	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

		Item	DIAGNOSTIC TEST MODE						
			WORK SUP-PORT	SELF DIAGNOSTIC RESULT		DATA MONI-TOR	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2			SRT STATUS	DTC WORK SUP-PORT
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 signal		×	×	×			
		Accelerator pedal position sensor		×		×			
		Throttle position sensor		×	×	×			
		Fuel tank temperature sensor		×		×	×		
		EVAP control system pressure sensor		×		×			
		Intake air temperature sensor		×	×	×			
		Knock sensor		×					
		Refrigerant pressure sensor				×			
		Closed throttle position switch (Accelerator pedal position sensor signal)				×			
		Air conditioner switch				×			
		Park/neutral position (PNP) switch		×		×			
		Stop lamp switch		×		×			
		Battery voltage				×			
		Load signal				×			
		Fuel level sensor		×		×			
		ASCD steering switch		×		×			
		ASCD brake switch		×		×			
		ASCD clutch switch		×		×			
		Power steering operation signal				×			

Item			DIAGNOSTIC TEST MODE						
			WORK SUP-PORT	SELF DIAGNOSTIC RESULT		DATA MONI-TOR	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2			SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Fuel injector				×	×		
		Power transistor (Ignition timing)				×	×		
		Throttle control motor relay		×		×			
		Throttle control motor		×					
		EVAP canister purge volume control solenoid valve		×		×	×		×
		Air conditioner relay				×			
		Fuel pump relay	×			×	×		
		Cooling fan relay		×		×	×		
		Air fuel ratio (A/F) sensor 1 heater		×		×		×*3	
		Heated oxygen sensor 2 heater		×		×		×*3	
		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-542, "Emission-related Diagnostic Information".

*3: Always “COMPLT” is displayed.

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
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 the coefficient of self-learning control value

WORK ITEM	CONDITION	USAGE
EVAP SYSTEM CLOSE	CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. • IGN SW “ON” • ENGINE NOT RUNNING • AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). • NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM • FUEL TANK TEMP. IS MORE THAN 0°C (32°F). • WITHIN 10 MINUTES AFTER STARTING “EVAP SYSTEM CLOSE” • WHEN TRYING TO EXECUTE “EVAP SYSTEM CLOSE” UNDER THE CONDITION EXCEPT ABOVE, CONSULT-III WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. **NOTE:** **WHEN STARTING ENGINE, CONSULT-III MAY DISPLAY “BATTERY VOLTAGE IS LOW. CHARGE BATTERY”, EVEN IN USING CHARGED BATTERY.**	When detecting EVAP vapor leak point of EVAP system
TARGET IDLE RPM ADJ*	• IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	• IDLE CONDITION	When adjusting target ignition timing
VIN REGISTRATION	• IN THIS MODE, VIN IS REGISTERED IN ECM.	When registering VIN in ECM

*: 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-542, "Emission-related Diagnostic Information".

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	• The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to EC-506)
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 are 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

Monitored item [Unit]	Description	Remarks
ENG SPEED [rpm]	• Indicates the engine speed computed from the signals of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	• Accuracy becomes poor if engine speed drops below the idle rpm. • If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1 [V]	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated. • When engine is running, specification range is indicated in "SPEC".
B/FUEL SCHDL [msec]	• “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	• When engine is running, specification range is indicated in "SPEC".
A/F ALPHA-B1 [%]	• The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • This data also includes the data for the air/fuel ratio learning control. • When engine is running, specification range is indicated in "SPEC".
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 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 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
FUEL T/TMP SE [°C] or [°F]	• The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.	
INT/A TEMP SE [°C] or [°F]	• The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
EVAP SYS PRES [V]	• The signal voltage of EVAP control system pressure sensor is displayed.	
FUEL LEVEL SE [V]	• The signal voltage of the fuel level sensor is displayed.	
START SIGNAL [ON/OFF]	• Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	• After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS [ON/OFF]	• Indicates idle position [ON/OFF] computed by the ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG [ON/OFF]	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	• Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL [ON/OFF]	• [ON/OFF] condition of the power steering system (determined by the signal sent from EPS control unit) is indicated.	
LOAD SIGNAL [ON/OFF]	• Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW [ON/OFF]	• Indicates [ON/OFF] condition from ignition switch.	
HEATER FAN SW [ON/OFF]	• Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW [ON/OFF]	• Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1 [msec]	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
IGN TIMING [BTDC]	• Indicates the ignition timing computed by ECM according to the input signals.	• When the engine is stopped, a certain value is indicated.
CAL/LD VALUE [%]	• “Calculated load value” indicates the value of the current airflow divided by peak airflow.	
MASS AIRFLOW [g·m/s]	• Indicates the mass airflow computed by ECM according to the signal voltage of the mass air flow sensor.	
PURG VOL C/V [%]	• Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
INT/V TIM (B1) [°CA]	• Indicates [°CA] of intake camshaft advanced angle.	
INT/V SOL (B1) [%]	• The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signal) 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.	

Monitored item [Unit]	Description	Remarks
VENT CONT/V [ON/OFF]	• The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. ON: Closed OFF: Open	
THRTL RELAY [ON/OFF]	• Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
COOLING FAN [HI/LOW/OFF]	• Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI: High speed operation LOW: Low speed operation OFF: Stop	
HO2S2 HTR (B1) [ON/OFF]	• Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
I/P PULLY SPD [rpm]	• Indicates the engine speed computed from the turbine revolution sensor signal.	
VEHICLE SPEED [km/h] or [MPH]	• The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
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) [%]	• Indicates 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 TCM 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 increased to excessively high 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 compared with the ASCD set speed, 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.	• For M/T models always “OFF” is displayed

Monitored item [Unit]	Description	Remarks
AT OD CANCEL [ON/OFF]	• Indicates [ON/OFF] condition of A/T O/D cancel signal sent from the TCM.	• For M/T models always “OFF” is displayed
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.	
A/F ADJ-B1	• Indicates the correction 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 air fuel ratio (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	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Fuel injector • Air fuel ratio (A/F) sensor 1
IGNITION TIMING	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Perform Idle Air Volume Learning.
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • Cut off each fuel injector signal one at a time using CONSULT-III.	Engine runs rough or dies.	• Harness and connectors • Compression • Fuel injector • Power transistor • Spark plug • Ignition coil
COOLING FAN*	• Ignition switch: ON • Turn the cooling fan “LOW”, “HI” and “OFF” with CONSULT-III.	Cooling fan moves and stops.	• Harness and connectors • 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 • EVAP canister purge volume control solenoid valve
FUEL/T TEMP SEN	• Change the fuel tank temperature using CONSULT-III.		

TEST ITEM	CONDITION	JUDGEMENT	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 • EVAP canister vent control valve
V/T ASSIGN ANGLE	• Engine: Return to the original trouble condition • Change intake valve timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Intake valve timing control solenoid valve

*: Leaving cooling fan OFF with CONSULT-III while engine is running may cause the engine to overheat.

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode
For details, refer to EC-542, "Emission-related Diagnostic Information".

SRT WORK SUPPORT Mode
This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

DTC WORK SUPPORT Mode

Test mode	Test item	Corresponding DTC No.	Reference page
EVAPORATIVE SYSTEM	PURG FLOW P0441	P0441	EC-792
	EVP SML LEAK P0442/P1442*	P0442	EC-797
		P0455	EC-847
	EVP V/S LEAK P0456/P1456*	P0456	EC-853
	PURG VOL CN/V P1444	P0443	EC-804
A/F SEN1	A/F SEN1 (B1) P1276	P0130	EC-692
	A/F SEN1 (B1) P1278/P1279	P0133	EC-710
HO2S2	HO2S2 (B1) P0139	P0139	EC-733
	HO2S2 (B1) P1146	P0138	EC-724
	HO2S2 (B1) P1147	P0137	EC-717

*: DTC P1442 and P1456 does not apply to C11 models but appears in DTC Work Support Mode screens.

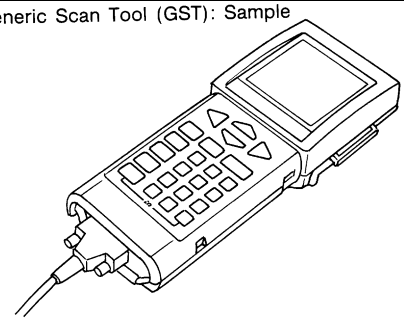
Generic Scan Tool (GST) Function

INFOID:0000000004537061

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 different functions explained below.
ISO 15765-4 is used as the protocol.
The name GST or Generic Scan Tool is used in this service manual.

Generic Scan Tool (GST): Sample



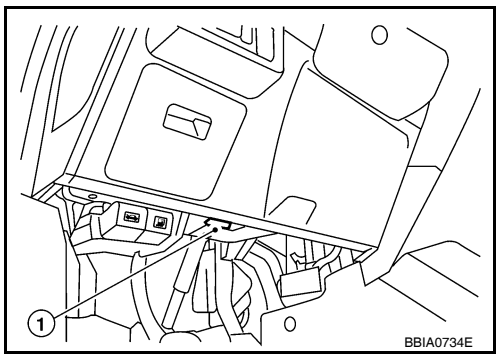
SEF139P

FUNCTION

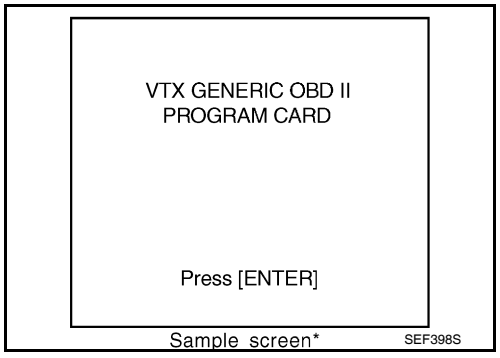
Diagnostic test mode		Function
Service $01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
Service $02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-604, "CONSULT-III Function (ENGINE)".
Service $03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.
Service $04	CLEAR DIAG INFO	This diagnostic service can clear all emission-related diagnostic information. This includes: • Clear number of diagnostic trouble codes (Service $01) • Clear diagnostic trouble codes (Service $03) • Clear trouble code for freeze frame data (Service $01) • Clear freeze frame data (Service $02) • Reset status of system monitoring test (Service $01) • Clear on board monitoring test results (Service $06 and $07)
Service $06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
Service $07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
Service $08	—	This diagnostic service can close EVAP system in ignition switch ON position (Engine stopped). When this diagnostic service is performed, EVAP canister vent control valve can be closed. In the following conditions, this diagnostic service cannot function. • Low ambient temperature • Low battery voltage • Engine running • Ignition switch OFF • Low fuel temperature • Too much pressure is applied to EVAP system
Service $09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

INSPECTION PROCEDURE

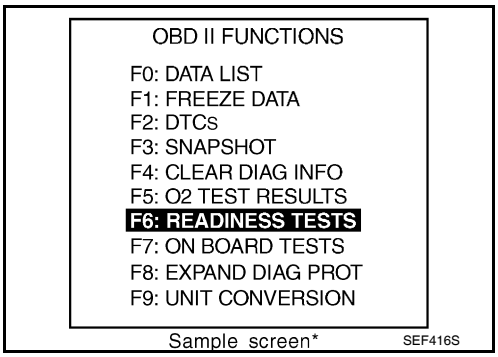
1. Turn ignition switch OFF.
2. Connect GST to data link connector (1), which is located under LH dash panel.



3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.
(*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic service according to each service procedure.
For further information, see the GST Operation Manual of the tool maker.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537062

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		SPECIFICATION
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-618.		
B/FUEL SCHDL	See EC-618.		
A/F ALPHA-B1	See EC-618.		
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 2.2V
HO2S2 (B1)	• 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 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ←→ RICH
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication.
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2*	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
EVAP SYS PRES	• Ignition switch: ON		Approx. 1.8 - 4.8V
TP SEN 1-B1 TP SEN 2-B1*	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T, CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	• Ignition switch: ON	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		SPECIFICATION
P/N POSI SW	• Ignition switch: ON	Shift lever: P or N (A/T, CVT), Neutral (M/T)	ON
		Shift lever: Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd	ON
		Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	• Ignition switch: ON	Heater fan: Operating	ON
		Heater fan: Not operating	OFF
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle	8° - 18° BTDC
		2,000 rpm	25° - 45° BTDC
CAL/LD VALUE	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	2.0 - 10.0 g·m/s
PURG VOL C/V	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle (Accelerator pedal is not depressed even slightly, after engine starting)	0%
		2,000 rpm	0 - 50%
INT/V TIM (B1)	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle	–5° - 5°CA
		When revving engine up to 2,000 rpm quickly	Approx. 0° - 40°CA
INT/V SOL (B1)	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle	0% - 2%
		When revving engine up to 2,000 rpm quickly	Approx. 0% - 90%
AIR COND RLY	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	• For 1 second after turning ignition switch ON • Engine running or cranking		ON
	• Except above conditions		OFF

MONITOR ITEM	CONDITION		SPECIFICATION
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 (207°F) or less	OFF
		Engine coolant temperature: Between 98°C (208°F) and 99°C (210°F)	LOW
		Engine coolant temperature: 100°C (212°F) or more	HIGH
HO2S2 HTR (B1)	• 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
TRVL AFTER MIL	• Ignition switch: ON	Vehicle has traveled after MIL has turned ON.	0 - 65,535 km (0 - 40,723 mile)
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 • Air conditioner switch: ON (Compressor operates)		1.0 - 4.0V
VHCL SPEED SE	• Turn drive wheels and compare speedometer indication with the CONSULT-III value.		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	• Ignition switch: ON	• Brake pedal: Fully released (A/T, CVT) • Brake pedal and clutch pedal: Fully released (M/T)	ON
		• Brake pedal: Slightly depressed (A/T, CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	OFF
BRAKE SW2	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
CRUISE LAMP	• Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF

MONITOR ITEM	CONDITION		SPECIFICATION
SET LAMP	• MAIN switch: ON • Vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ACSD: Operating	ON
		ASCD: Not operating	OFF

*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:0000000004537063

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)

Testing Condition

INFOID:0000000004537064

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm^2, 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up
  - A/T and CVT models: After the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T or CVT) fluid temperature sensor signal) indicates more than 60°C (140°F).
  - M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied
  - Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.
- Engine speed: Idle

Inspection Procedure

INFOID:0000000004537065

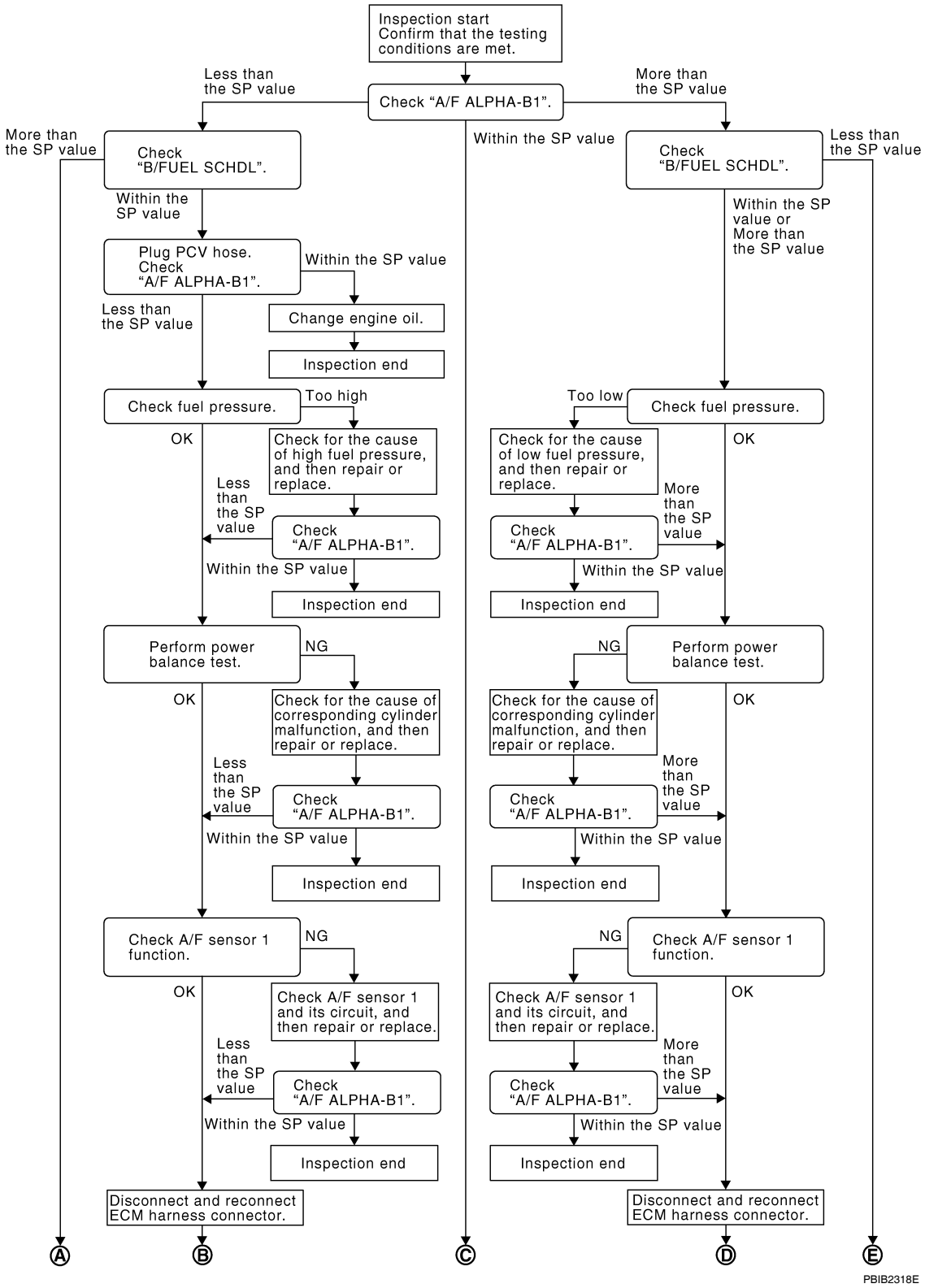
NOTE:
Perform “SPEC” of “DATA MONITOR” mode in maximum scale display.

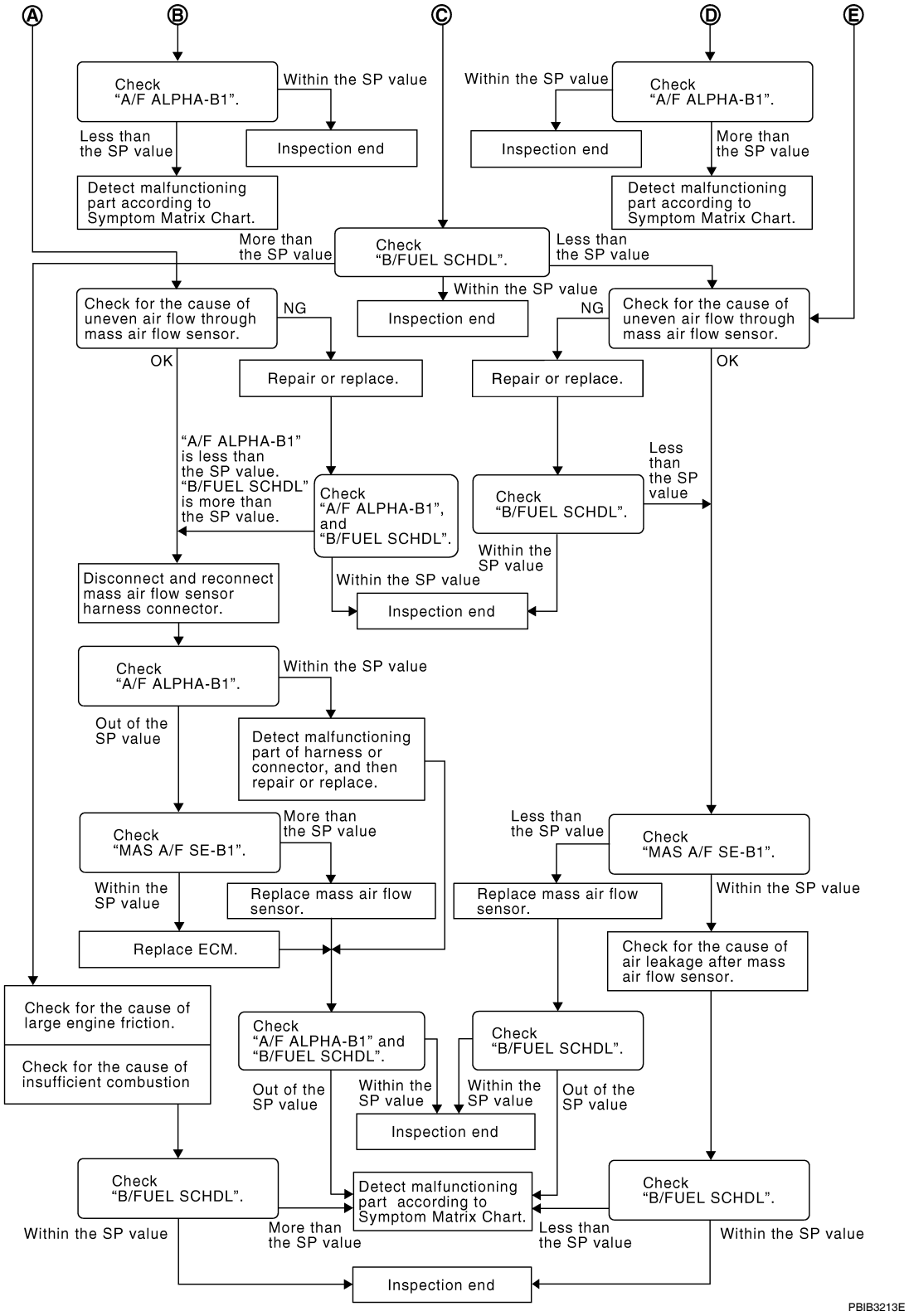
1. Perform EC-566, "Basic Inspection".
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode with CONSULT-III.
4. Make sure that monitor items are within the SP value.
5. If NG, go to EC-618, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004537066

OVERALL SEQUENCE


Inspection start
Confirm that the testing conditions are met.
Check “A/F ALPHA-B1”.
Less than the SP value
More than the SP value
Within the SP value
Check “B/FUEL SCHDL”.
More than the SP value
Less than the SP value
Within the SP value
Within the SP value or More than the SP value
Plug PCV hose. Check “A/F ALPHA-B1”.
Within the SP value
Less than the SP value
Change engine oil.
Inspection end
Check fuel pressure.
Too high
Too low
OK
Check for the cause of high fuel pressure, and then repair or replace.
Check for the cause of low fuel pressure, and then repair or replace.
Less than the SP value
More than the SP value
Check “A/F ALPHA-B1”.
Within the SP value
Inspection end
Perform power balance test.
NG
OK
Check for the cause of corresponding cylinder malfunction, and then repair or replace.
Check A/F sensor 1 function.
Check A/F sensor 1 and its circuit, and then repair or replace.
Disconnect and reconnect ECM harness connector.
Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
PBIB2318E



DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1"

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-618, "Testing Condition".
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

NOTE:

Check “A/F ALPHA-B1” for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.

OK or NG

OK >> GO TO 17.
NG (Less than the SP value)>>GO TO 2.
NG (More than the SP value)>>GO TO 3.

2. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 4.
NG (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.

OK or NG

OK >> GO TO 6.
NG (More than the SP value)>>GO TO 6.
NG (Less than the SP value)>>GO TO 25.

4. CHECK “A/F ALPHA-B1”

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.

OK or NG

OK >> GO TO 5.
NG >> GO TO 6.

5. CHANGE ENGINE OIL

1. Stop the engine.
2. Change engine oil. Refer to LU-17, "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-574, "Fuel Pressure Check".)

OK or NG

OK >> GO TO 9.
NG (Fuel pressure is too high)>>Replace fuel pressure regulator, refer to EC-574, "Fuel Pressure Check". GO TO 8.
NG (Fuel pressure is too low)>>GO TO 7.

7. DETECT MALFUNCTIONING PART

1. Check the following.
- Clogged and bent fuel hose and fuel tube
- Clogged fuel filter
- Fuel pump and its circuit (Refer to EC-991.)
2. If NG, repair or replace the malfunctioning part. (Refer to EC-574, "Fuel Pressure Check".)
If OK, replace fuel pressure regulator.

>> 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.

OK or NG

OK >> **INSPECTION END**
NG >> 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.

OK or NG

OK >> GO TO 12.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

1. Check the following.
- Ignition coil and its circuit (Refer to EC-996.)
- Fuel injector and its circuit (Refer to EC-986.)
- Intake air leakage
- Low compression pressure (Refer to EM-185, "On-Vehicle Service".)
2. If NG, repair or replace the malfunctioning part.
   If OK, replace fuel injector. (It may be caused by leakage from fuel injector or clogging.)

>> 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.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 12.

12. CHECK A/F SENSOR 1 FUNCTION

Perform all DTC Confirmation Procedure related with A/F sensor 1.
- For DTC P0130, refer to EC-692, "DTC Confirmation Procedure".
- For DTC P0131, refer to EC-698, "DTC Confirmation Procedure".
- For DTC P0132, refer to EC-704, "DTC Confirmation Procedure".
- For DTC P0133, refer to EC-710, "DTC Confirmation Procedure".
- For DTC P2A00, refer to EC-966, "DTC Confirmation Procedure".

OK or NG

OK >> GO TO 15.
NG >> GO TO 13.

13. CHECK A/F SENSOR 1 CIRCUIT

Perform Diagnostic Procedure according to corresponding DTC.

>> GO TO 14.

14. CHECK “A/F ALPHA-B1”

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.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 15.

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect ECM harness connector. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 16.

16. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-583, "Symptom Matrix Chart".

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.

OK or NG

OK >> **INSPECTION END**
NG (More than the SP value)>>GO TO 18.
NG (Less than the SP value)>>GO TO 25.

18. DETECT MALFUNCTIONING PART

1. Check for the cause of large engine friction. Refer to the following.
- Engine oil level is too high
- Engine oil viscosity
- Belt tension of alternator, A/C compressor, etc. is excessive
- Noise from engine
- Noise from transmission, etc.
2. Check for the cause of insufficient combustion. Refer to the following.
- Valve clearance malfunction
- Intake valve timing control function malfunction
- Camshaft sprocket installation malfunction, etc.

>> Repair or replace malfunctioning part, and then GO TO 30.

19. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

OK or NG

OK >> GO TO 21.
NG >> Repair or replace malfunctioning part, and then GO TO 20.

20. CHECK “A/F ALPHA-B1” AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1” and “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG (“B/FUEL SCHDL” is more, “A/F ALPHA-B1” is less than the SP value)>>GO TO 21.

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.

2. Disconnect mass air flow sensor harness connector. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 22.

22. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> 1. Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-655.
2. GO TO 29.
NG >> GO TO 23.

23. CHECK “MAS A/F SE-B1”

Select “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 24.
NG (More than the SP value)>>Replace mass air flow sensor, and then GO TO 29.

24. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS(NATS) system and registration of all NVIS(NATS) ignition key IDs. Refer to BL-249, "ECM Re-communicating Function".
3. Perform EC-572, "VIN Registration".
4. Perform EC-572, "Accelerator Pedal Released Position Learning".
5. Perform EC-572, "Throttle Valve Closed Position Learning".
6. Perform EC-572, "Idle Air Volume Learning".

>> 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

OK or NG

OK >> GO TO 27.
NG >> Repair or replace malfunctioning part, and then GO TO 26.

26. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG (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.

OK or NG

OK >> GO TO 28.
NG (Less than the SP value)>>Replace mass air flow sensor, and then GO TO 30.

28. CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.

- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts
- Malfunctioning seal of intake air system, etc.

>> GO TO 30.

29. CHECK “A/F ALPHA-B1” AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1” and “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-583, "Symptom Matrix Chart".

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.

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-583, "Symptom Matrix Chart".

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

Description

INFOID:0000000004537067

Intermittent incidents may occur. In many cases, the malfunction resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of Intermittent Incidents occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

Common Intermittent Incidents Report Situations

STEP in Work Flow	Situation
2	The CONSULT-III is used. The SELF-DIAG RESULTS screen shows time data other than 0 or [1t].
3 or 4	The symptom described by the customer does not recur.
5	(1st trip) DTC does not appear during the DTC Confirmation Procedure.
10	The Diagnostic Procedure for PXXXX does not indicate the malfunctioning area.

Diagnosis Procedure

INFOID:0000000004537068

1.INSPECTION START

Erase (1st trip) DTCs.
Refer to EC-542, "Emission-related Diagnostic Information".

>> GO TO 2.

2.CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.
Refer to EC-632, "Ground Inspection".

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3.SEARCH FOR ELECTRICAL INCIDENT

Perform GI-25, "How to Perform Efficient Diagnosis for an Electrical Incident", “INCIDENT SIMULATION TESTS”.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4.CHECK CONNECTOR TERMINALS

Refer to GI-22, "How to Check Terminal", “HOW TO PROBE CONNECTORS”, “How to Check Enlarged Contact Spring of Terminal”.

OK or NG

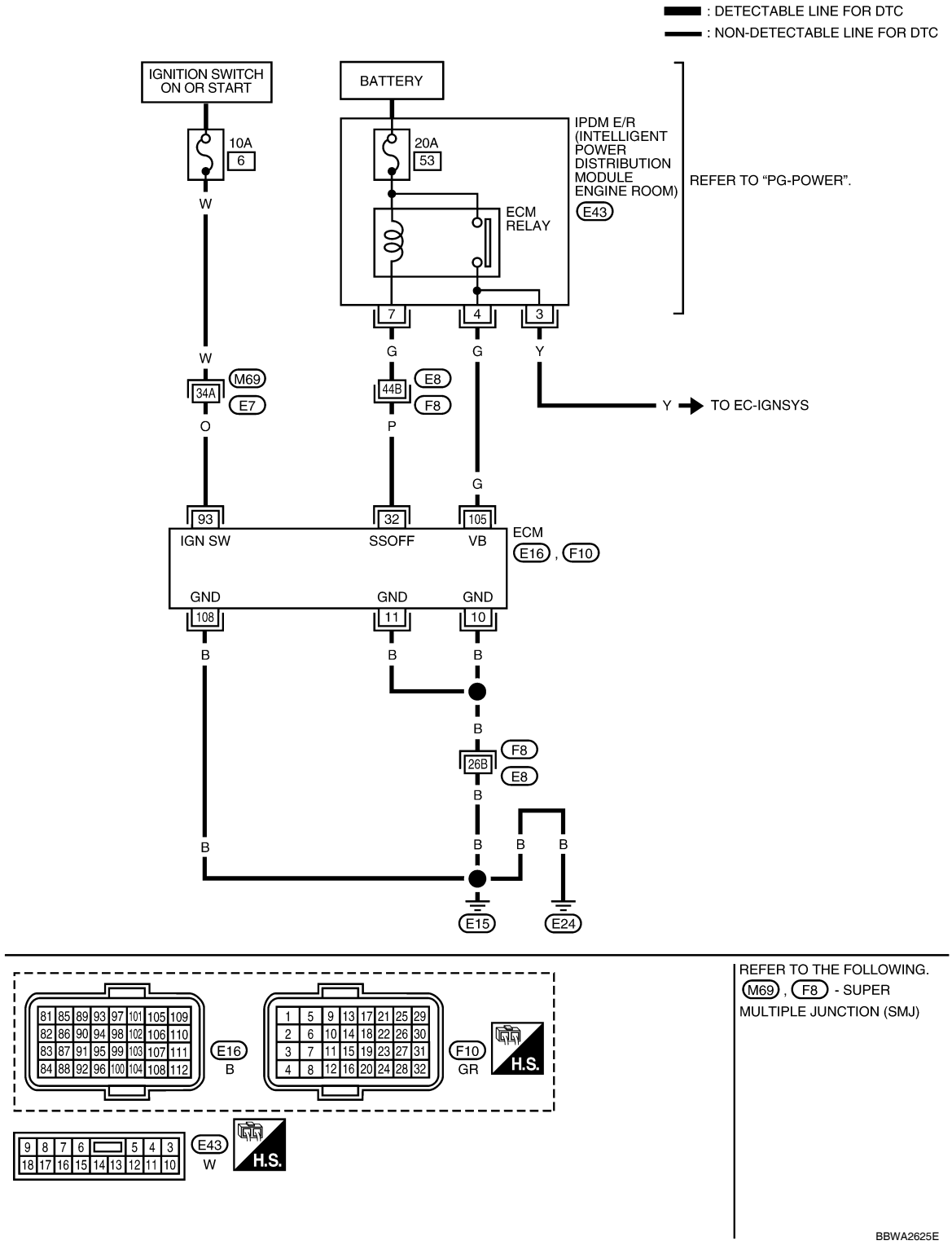
OK >> **INSPECTION END**
NG >> Repair or replace connector.

POWER SUPPLY AND GROUND CIRCUIT

Wiring Diagram

INFOID:0000000004537069

EC-MAIN-01



Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
10 11	B B	ECM ground	**[Engine is running]** • Idle speed	Body ground
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For 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)
93	O	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
108	B	ECM ground	**[Engine is running]** • Idle speed	Body ground

Diagnosis Procedure

INFOID:0000000004537070

1.INSPECTION START

Start engine.
Is engine running?

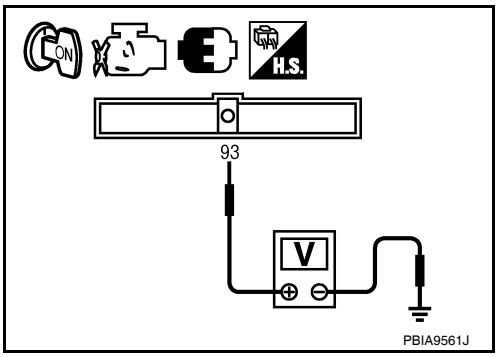
Yes or No

Yes >> GO TO 8.
No >> GO TO 2.

2.CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF and then ON.
2. Check voltage between ECM terminal 93 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

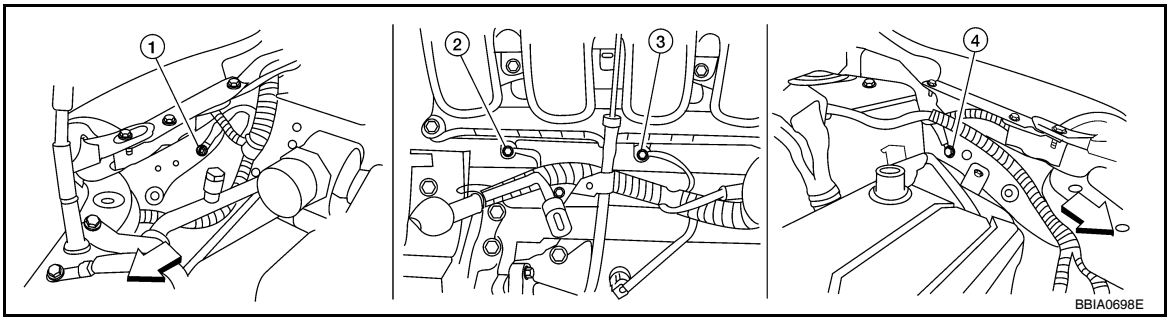
3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 5.
NG >> Repair or replace ground connections.

5. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 10, 11, 108 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

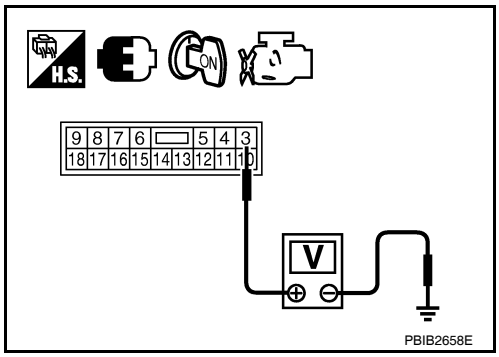
Check the following.
- Harness connectors F8, E8
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

7. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connector.
2. Turn ignition switch ON.
3. Check voltage between IPDM E/R terminal 3 and ground with CONSULT-III or tester.

Voltage: Battery voltage



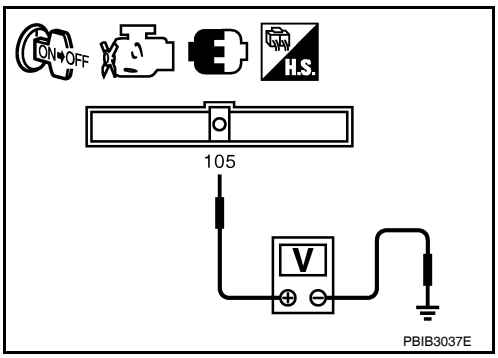
OK or NG

OK >> Go to EC-996.
NG >> GO TO 8.

8. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON and then OFF.

3. Check voltage between ECM terminal 105 and ground with CONSULT-III or tester.



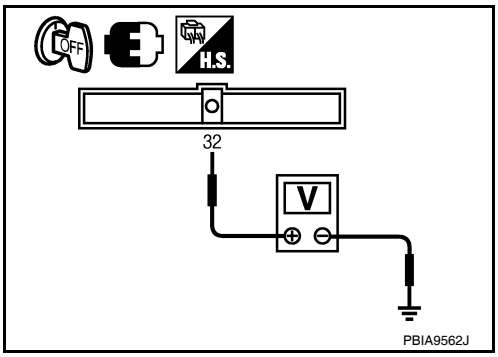
Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.

OK or NG

OK >> GO TO 14.
NG (Battery voltage does not exist.)>>GO TO 9.
NG (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 voltage between ECM terminal 32 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 10.
NG >> GO TO 11.

10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E43.
3. Check harness continuity between ECM terminal 105 and IPDM E/R terminal 4. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 17.
NG >> 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 E43.
3. Check harness continuity between ECM terminal 32 and IPDM E/R terminal 7. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK 20A FUSE

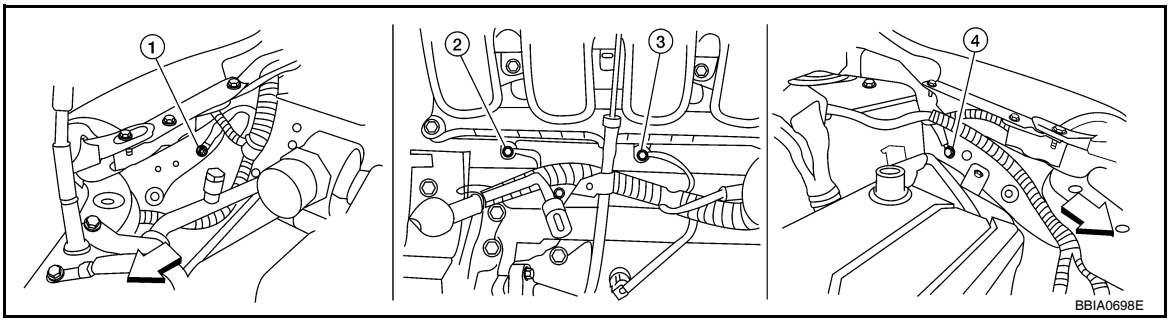
1. Disconnect 20A fuse from IPDM E/R.
2. Check 20A fuse.

OK or NG

OK >> GO TO 17.
NG >> Replace 20A fuse.

14. CHECK GROUND CONNECTIONS

1. Loosen and retighten ground screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 15.
NG >> Repair or replace ground connections.

15. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 10, 11, 108 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 17.
NG >> GO TO 16.

16. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F8, E8
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

17. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

OK or NG

OK >> Replace IPDM E/R. Refer to PG-26, "IPDM E/R Power/Ground Circuit Inspection".
NG >> Repair open circuit or short to power in harness or connectors.

Ground Inspection

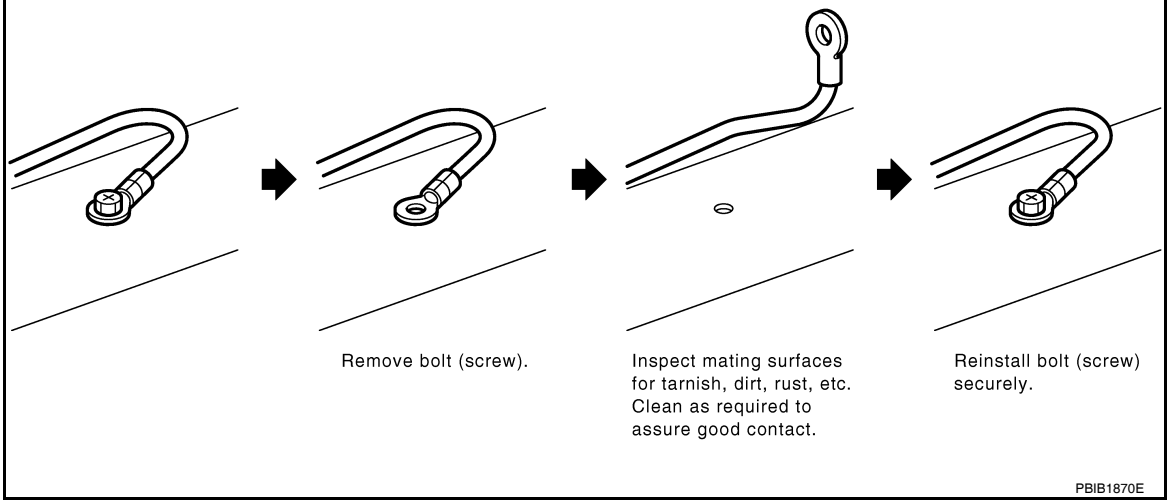
INFOID:0000000004537071

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.
When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for “add-on” accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to PG-29, "Ground Distribution".

Ground Inspection



DTC U1000, U1001 CAN COMMUNICATION LINE

Description

INFOID:0000000004537072

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

INFOID:0000000004537073

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000*1 1000*1	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*2 1001*2		When ECM is not transmitting or receiving CAN communication signal other than OBD (emission-related diagnosis) for 2 seconds or more.	

*1: **This self-diagnosis has the one trip detection logic (A/T, CVT).**
The MIL will not light up for this self-diagnosis (M/T).

*2: **The MIL will not light up for this self-diagnosis.**

DTC Confirmation Procedure

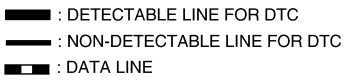
INFOID:0000000004537074

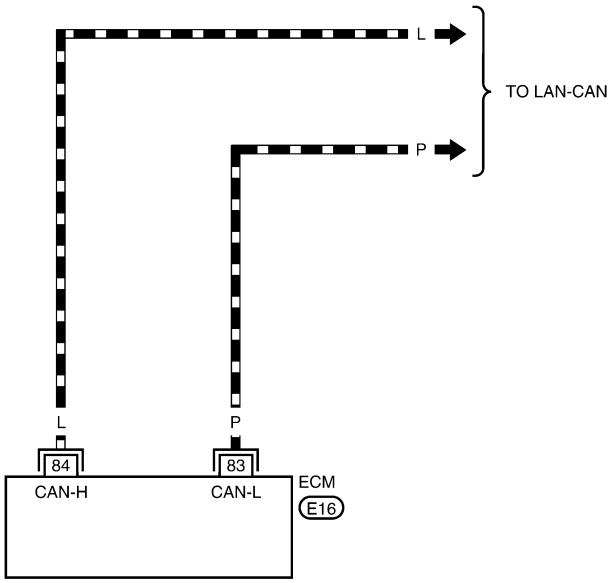
1. Turn ignition switch ON and wait at least 3 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-634, "Diagnosis Procedure".

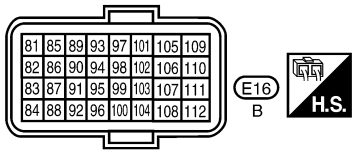
Wiring Diagram

INFOID:0000000004537075

EC-CAN-01







BBWA2626E

Diagnosis Procedure

INFOID:0000000004537076

Go to LAN-17, "Trouble Diagnosis Flow Chart".

DTC U1010 CAN COMMUNICATION

Description

INFOID:0000000004537077

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

INFOID:0000000004537078

This self-diagnosis has the one trip detection logic (A/T, CVT).
The MIL will not light up for this self-diagnosis (M/T).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1010 1010	CAN communication bus	When detecting error during the initial diagnosis for CAN controller of each control unit.	• ECM

DTC Confirmation Procedure

INFOID:0000000004537079

1. Turn ignition switch ON.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-635, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004537080

1.INSPECTION START

1. Erase DTC.
2. **Perform DTC Confirmation Procedure.**
   See EC-635, "DTC Confirmation Procedure".
3. Is the 1st trip DTC U1010 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2.REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs.
   Refer to BL-249, "ECM Re-communicating Function".
3. Perform EC-572, "VIN Registration".
4. Perform EC-572, "Accelerator Pedal Released Position Learning".
5. Perform EC-572, "Throttle Valve Closed Position Learning".
6. Perform EC-572, "Idle Air Volume Learning".

>> **INSPECTION END**

DTC P0011 IVT CONTROL

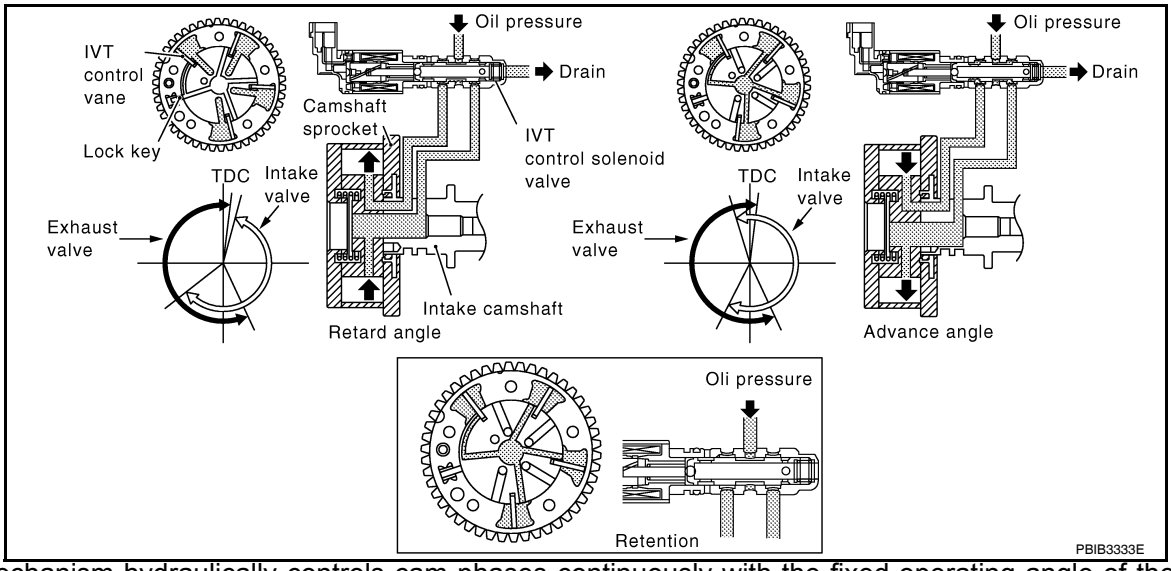
Description

INFOID:0000000004537081

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed and piston position	Intake valve timing control	Intake valve timing control solenoid valve
Engine coolant temperature sensor	Engine coolant temperature		
ABS actuator and electric unit (control unit)	Vehicle speed*		
Combination meter			

*: This signal is sent to the ECM through CAN communication line.



This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve. The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing 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.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537082

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM (B1)	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle	−5° - 5°CA
		When revving engine up to 2,000 rpm quickly	Approx. 0° - 40°CA
INT/V SOL (B1)	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle	0% - 2%
		When revving engine up to 2,000 rpm quickly	Approx. 0% - 90%

On Board Diagnosis Logic

INFOID:0000000004537083

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0011 0011	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 timing 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

FAIL-SAFE MODE

ECM enters in fail-safe mode when the malfunction is detected.

Detected items	Engine operating condition in fail-safe mode
Intake valve timing control	The signal is not energized to the solenoid valve and the valve control does not function

DTC Confirmation Procedure

INFOID:0000000004537084

CAUTION:
Always drive at a safe speed.
NOTE:
- **If DTC P0011 is displayed with DTC P0075, first perform trouble diagnosis for DTC P0075. See EC-650.**
- 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.

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 (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 3.87 msec
Shift lever	P or N position (A/T, CVT) Neutral position (M/T)

4. Let engine idle for 10 seconds.
5. Check 1st trip DTC.
   If 1st trip DTC is detected, go to EC-638, "Diagnosis Procedure".
   If 1st trip DTC is not detected, go to next step.
6. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	2,000 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	70 - 105°C (158 - 221°F)
Shift lever	1st or 2nd position
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

7. Check 1st trip DTC.

If 1st trip DTC is detected, go to EC-638, "Diagnosis Procedure".

WITH GST

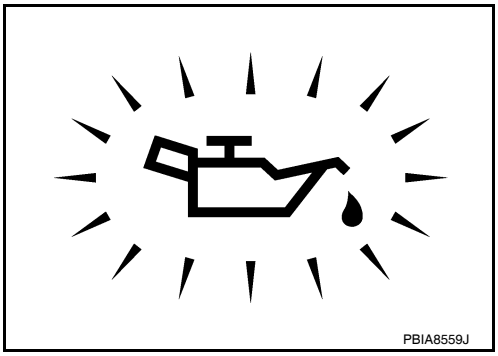
Follow the procedure “WITH CONSULT-III” above.

Diagnosis Procedure

INFOID:0000000004537085

1.CHECK OIL PRESSURE WARNING LAMP

1. Start engine.
2. Check oil pressure warning lamp and confirm it is not illuminated.



OK or NG

OK >> GO TO 2.
NG >> Go to LU-16, "Inspection".

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-639, "Component Inspection".

OK or NG

OK >> GO TO 3.
NG >> Replace intake valve timing control solenoid valve.

3.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-780, "Component Inspection".

OK or NG

OK >> GO TO 4.
NG >> Replace crankshaft position sensor (POS).

4.CHECK CAMSHAFT POSITION SENSOR (PHASE)

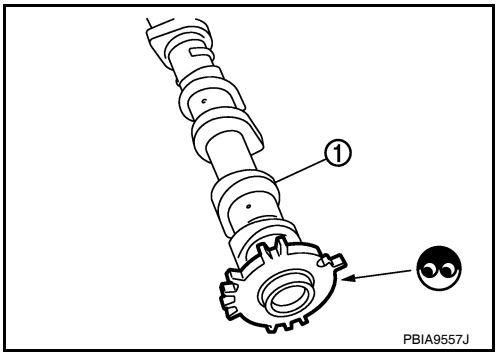
Refer to EC-785, "Component Inspection".

OK or NG

OK >> GO TO 5.
NG >> 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



OK or NG

OK >> GO TO 6.
NG >> 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 or No

Yes >> Check timing chain installation. Refer to EM-160.
No >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to EM-170, "Removal and Installation".

OK or NG

OK >> GO TO 8.
NG >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-626.
For Wiring Diagram, refer to EC-776, "Wiring Diagram" for CKP sensor (POS) and EC-782, "Wiring Diagram" for CMP sensor (PHASE).

>> **INSPECTION END**

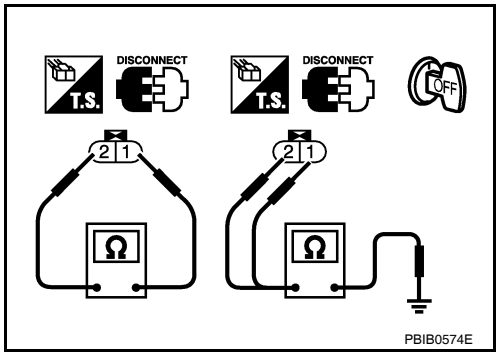
Component Inspection

INFOID:0000000004537086

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve as follows.

Terminal	Resistance
1 and 2	6.7 - 7.7Ω [at 20°C (68°F)]
1 or 2 and ground	∞Ω (Continuity should not exist.)

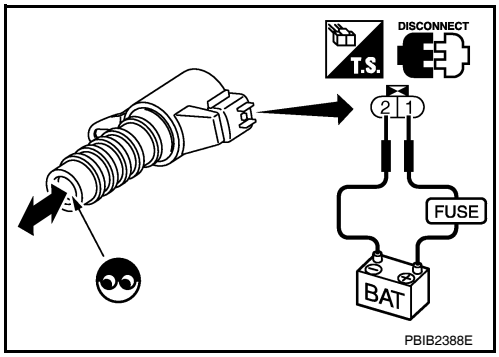


If NG, replace intake valve timing control solenoid valve.
If OK, go to next step.

3. Remove intake valve timing control solenoid valve.

4. Provide 12V DC between intake valve timing control solenoid valve terminals and then interrupt it. 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.



If NG, replace intake valve timing control solenoid valve.

NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.

Removal and Installation

INFOID:0000000004537087

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EM-160.

DTC P0031, P0032 A/F SENSOR 1 HEATER

Description

INFOID:0000000004537088

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.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537089

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F S1 HTR (B1)	• Engine: After warming up, idle the engine (More than 140 seconds after starting engine.)	4 - 100%

On Board Diagnosis Logic

INFOID:0000000004537090

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031 0031	Air fuel ratio (A/F) sensor 1 heater control circuit low	The current amperage in the air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. [An excessively low voltage signal is sent to ECM through the air fuel ratio (A/F) sensor 1 heater.]	• Harness or connectors [Air fuel ratio (A/F) sensor 1 heater circuit is open or shorted.] • Air fuel ratio (A/F) sensor 1 heater
P0032 0032	Air fuel ratio (A/F) sensor 1 heater control circuit high	The current amperage in the air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. [An excessively high voltage signal is sent to ECM through the air fuel ratio (A/F) sensor 1 heater.]	• Harness or connectors [Air fuel ratio (A/F) sensor 1 heater circuit is shorted.] • Air fuel ratio (A/F) sensor 1 heater

DTC Confirmation Procedure

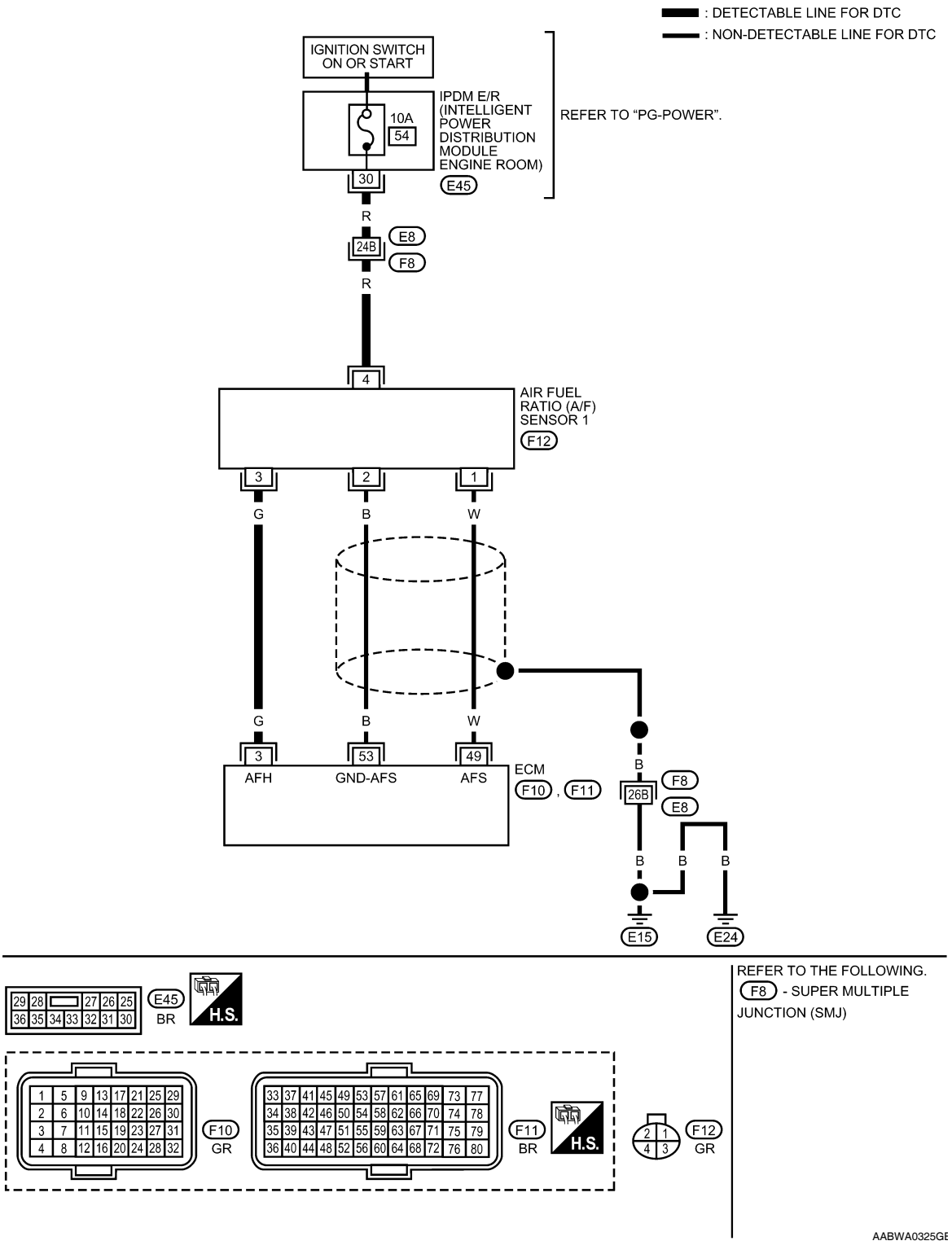
INFOID:0000000004537091

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.
1. Start engine and run it for at least 10 seconds at idle speed.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-642, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537092

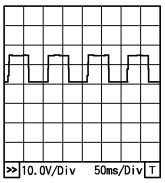
EC-A/FH-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V  PBIA8148J
49	W	A/F sensor 1	**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	**[Ignition switch: ON]**	Approximately 2.2V

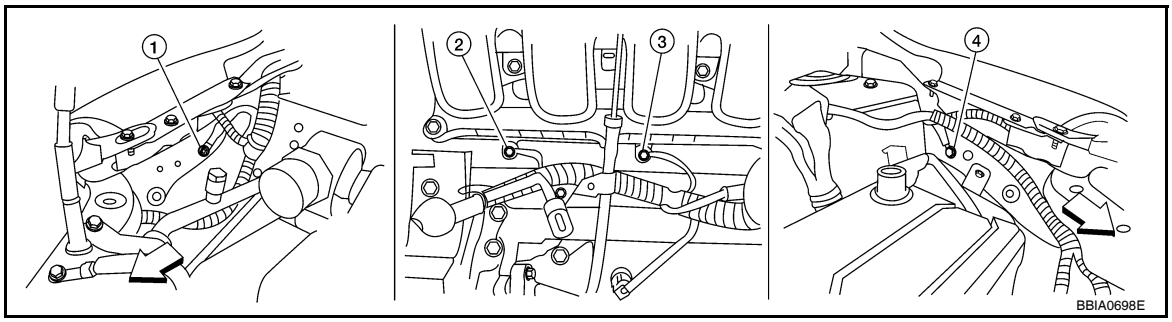
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004537093

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
Refer to EC-632, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

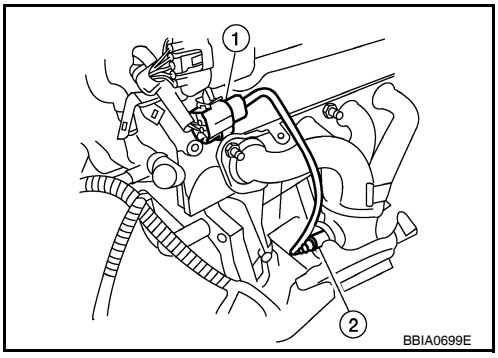
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

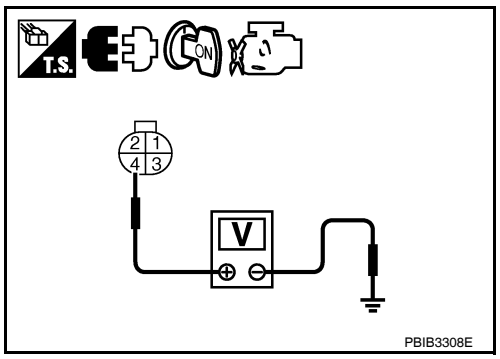
2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector (1).
2. Turn ignition switch ON.

- Air fuel ratio (A/F) sensor 1 (2)



3. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- 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 ECM terminal 3 and A/F sensor 1 terminal 3. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK A/F SENSOR 1 HEATER

Refer to EC-643, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace air fuel ratio (A/F) sensor 1.

6. CHECK INTERMITTENT INCIDENT

Perform EC-626.

>> **INSPECTION END**

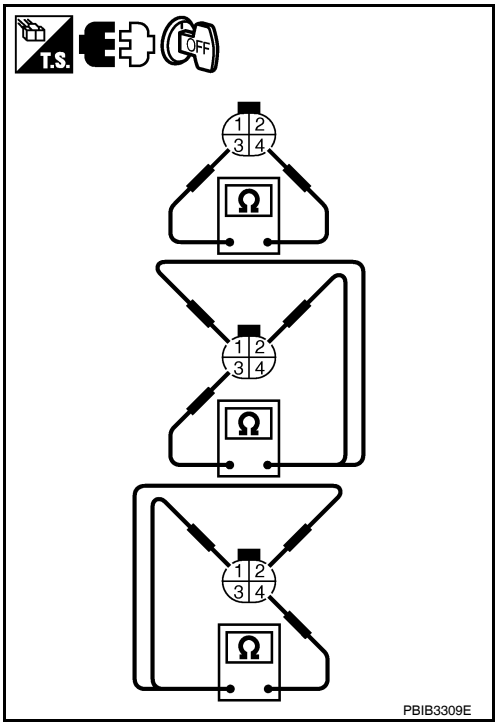
Component Inspection

INFOID:0000000004537094

AIR FUEL RATIO (A/F) SENSOR 1 HEATER

1. Check resistance between A/F sensor 1 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	



2. If NG, 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 Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

INFOID:0000000004537095

AIR FUEL RATIO SENSOR HEATER
Refer to EM-144.

DTC P0037, P0038 HO2S2 HEATER

Description

INFOID:0000000004537096

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Crankshaft position sensor (POS)			
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

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537097

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
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

On Board Diagnosis Logic

INFOID:0000000004537098

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037 0037	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	• Harness or connectors (Heated oxygen sensor 2 heater circuit is open or shorted.) • Heated oxygen sensor 2 heater
P0038 0038	Heated oxygen sensor 2 heater control circuit high	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	• Harness or connectors (Heated oxygen sensor 2 heater circuit is shorted.) • Heated oxygen sensor 2 heater

DTC Confirmation Procedure

INFOID:0000000004537099

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

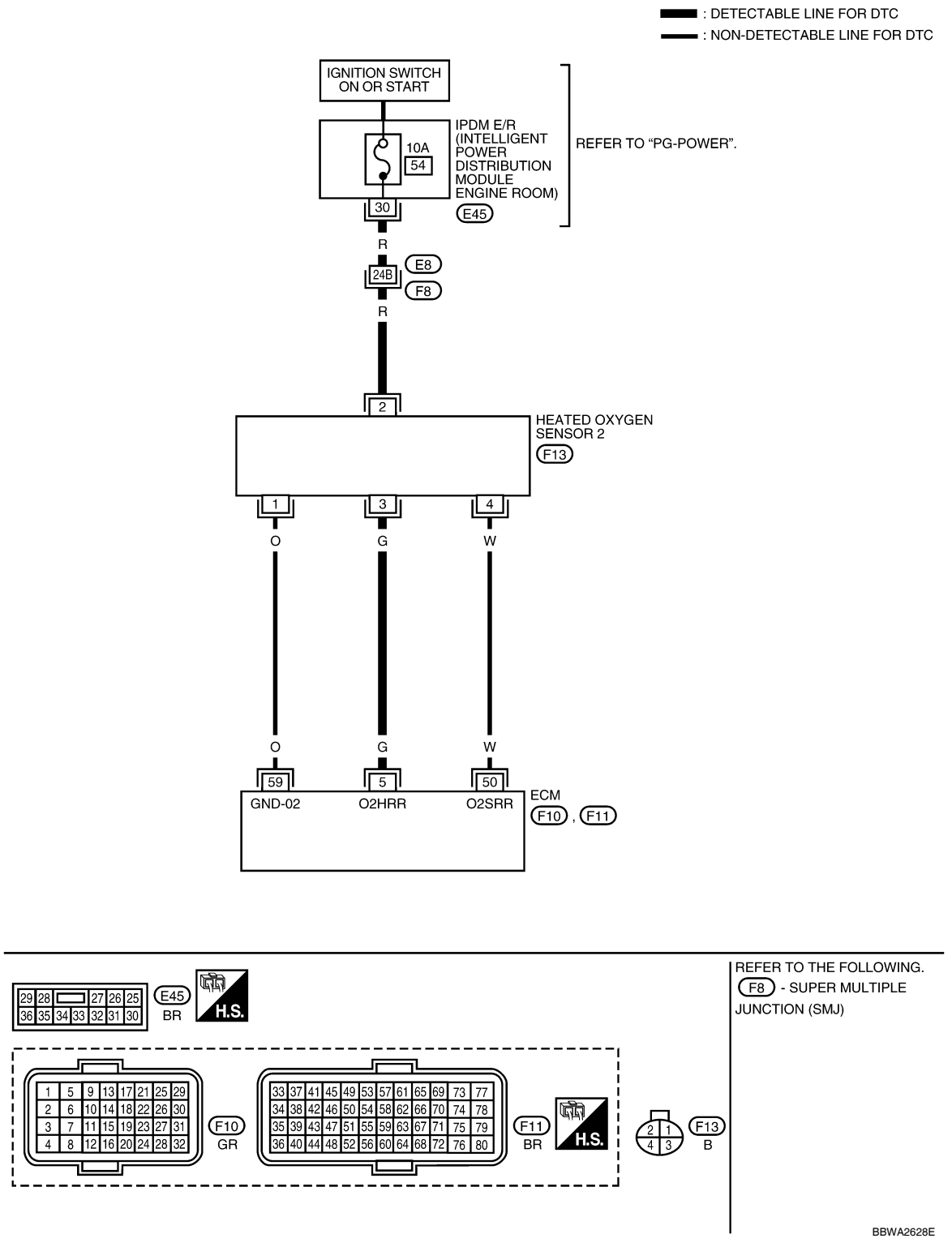
1. Start engine and warm it up to the normal operating temperature.

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.
6. If 1st trip DTC is detected, go to EC-647, "Diagnosis Procedure".

Wiring Diagram

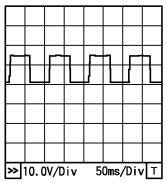
INFOID:0000000004537100

EC-HO2S2H-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	G	Heated oxygen sensor 2 heater	**[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.	Approximately 10V  PBIA8148J
			[Ignition switch: ON] • Engine stopped **[Engine is running]** • Engine speed: Above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
50	W	Heated oxygen sensor 2	**[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 - Approximately 1.0V
59	O	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

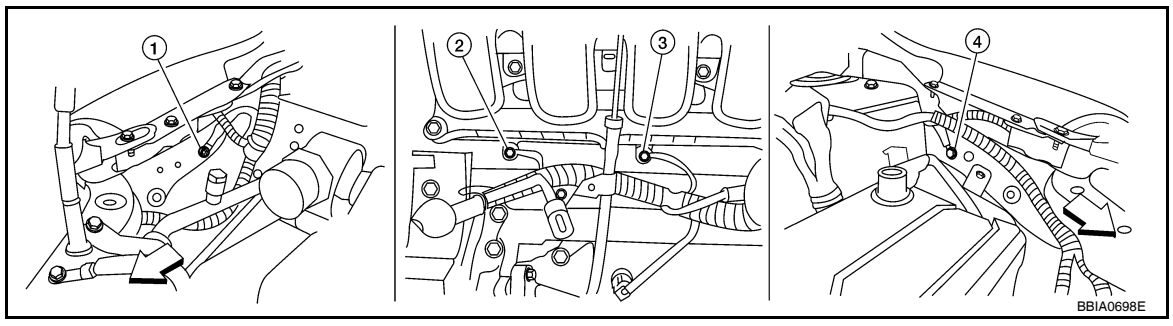
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004537101

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

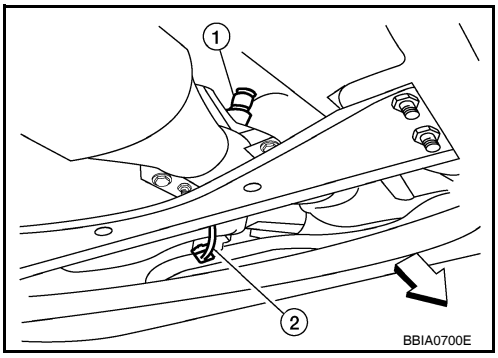
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

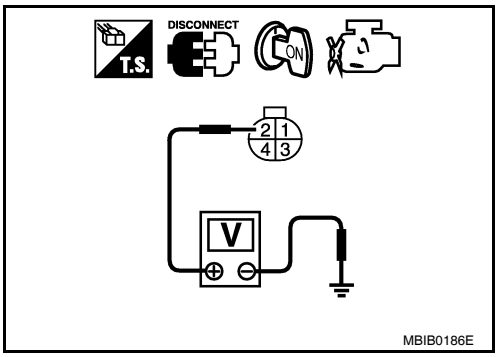
2.CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 2 harness connector (2).
- : Vehicle front
- Heated oxygen sensor 2 (1)
2. Turn ignition switch ON.



3. Check voltage between HO2S2 terminal 2 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- 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 harness continuity between ECM terminal 5 and HO2S2 terminal 3. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-649, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6.CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

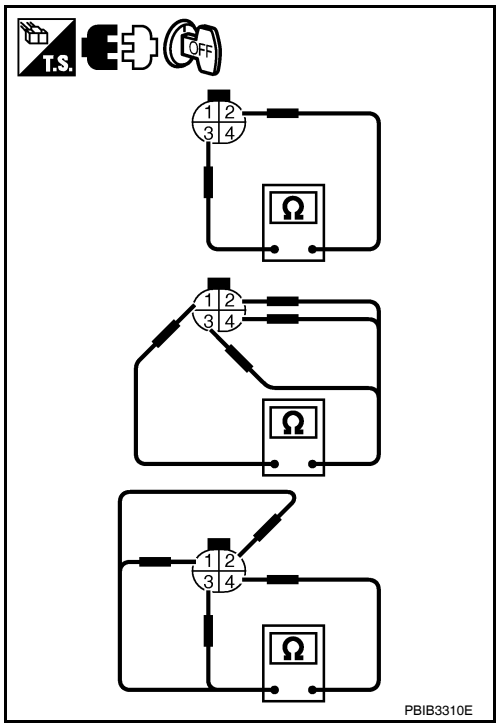
Component Inspection

INFOID:0000000004537102

HEATED OXYGEN SENSOR 2 HEATER

1. Check resistance between HO2S2 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	



2. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

INFOID:0000000004537103

HEATED OXYGEN SENSOR 2

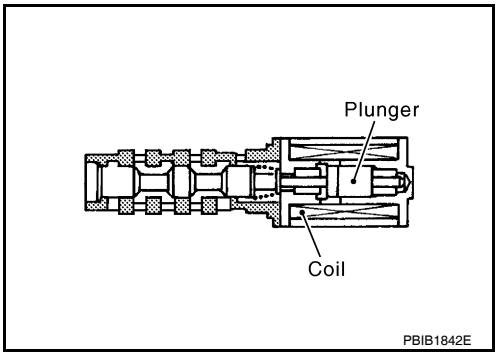
Refer to EM-144.

DTC P0075 IVT CONTROL SOLENOID VALVE

Component Description

INFOID:0000000004537104

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.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537105

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL (B1)	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle	0% - 2%
		When revving engine up to 2,000 rpm quickly	Approx. 0% - 90%

On Board Diagnosis Logic

INFOID:0000000004537106

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0075 0075	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

INFOID:0000000004537107

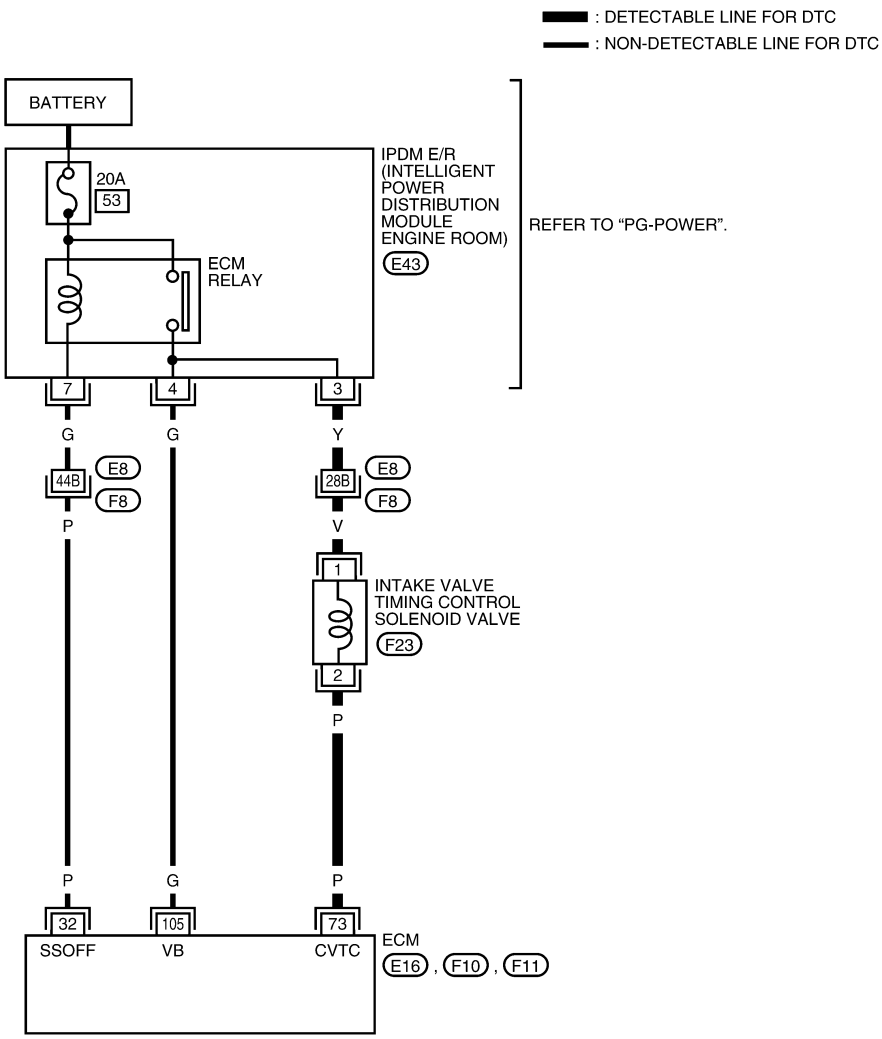
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

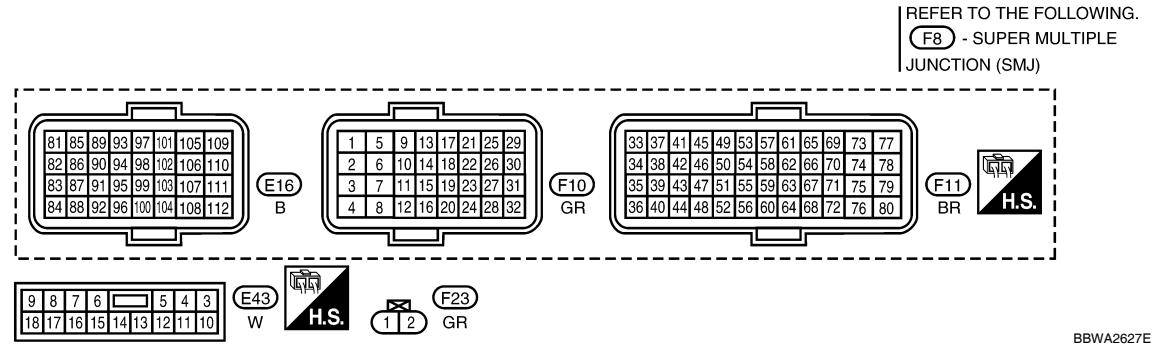
1. Start engine and let it idle for 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-652, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537108

EC-IVC-01

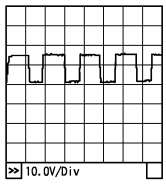




Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For 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)
73	P	Intake valve timing control solenoid valve	**[Engine is running]** • **Warm-up condition** • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • **Warm-up condition** • When revving engine up to 2,000 rpm quickly	7 - 10V  PBIA4937J
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

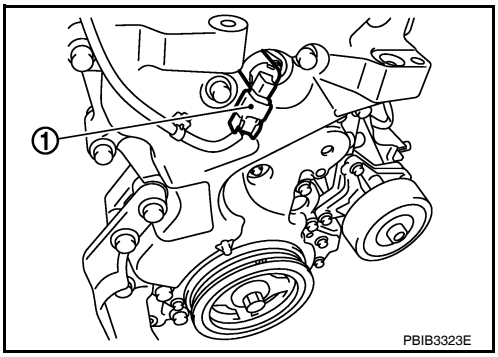
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004537109

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve (1) harness connector.
3. Turn ignition switch ON.



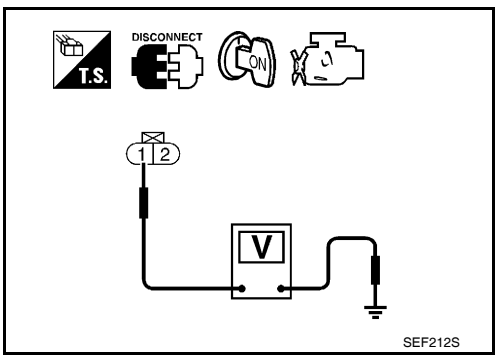
PBIB3323E

4. Check voltage between intake valve timing control solenoid valve terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



SEF212S

2.DETECT MALFUNCTION PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R

>> Repair or replace harness or connectors.

3. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 73 and intake valve timing control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-653, "Component Inspection".

OK or NG

OK >> GO TO 5.
NG >> Replace intake valve timing control solenoid valve.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

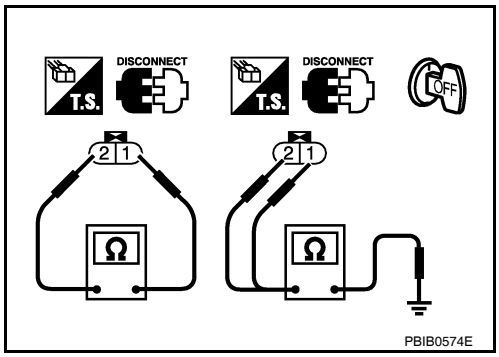
>> **INSPECTION END**

Component Inspection

INFOID:0000000004537110

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve as follows.



Terminal	Resistance
1 and 2	6.7 - 7.7Ω [at 20°C (68°F)]
1 or 2 and ground	∞Ω (Continuity should not exist.)

If NG, replace intake valve timing control solenoid valve.
If OK, go to next step.

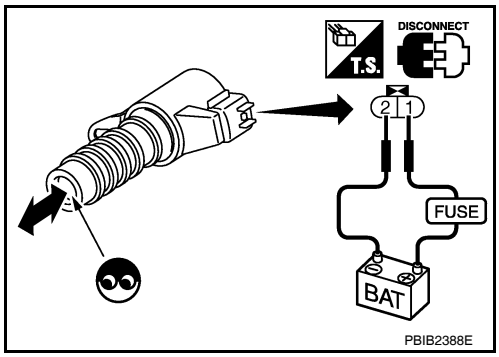
3. Remove intake valve timing control solenoid valve.

4. Provide 12V DC between intake valve timing control solenoid valve terminals and then interrupt it. 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.

If NG, replace intake valve timing control solenoid valve.

NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.



Removal and Installation

INFOID:0000000004537111

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

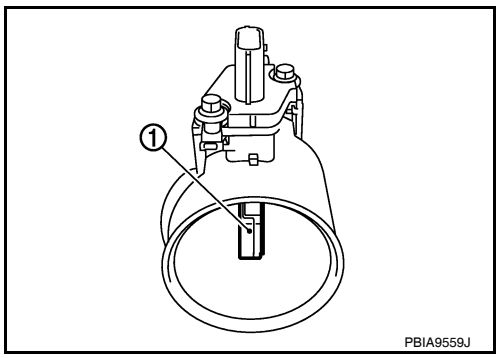
Refer to EM-160.

DTC P0101 MAF SENSOR

Component Description

INFOID:0000000004537112

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.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537113

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	• See EC-618.		
CAL/LD VALUE	• Engine: After warming up • Shift lever: P or N (A/T, CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	• Engine: After warming up • Shift lever: P or N (A/T, CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	4.0 - 10.0 g·m/s

On Board Diagnosis Logic

INFOID:0000000004537114

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0101 0101	Mass air flow sensor circuit range/performance	A)	A high voltage from the sensor is sent to ECM under light load driving condition.	• Harness or connectors (Mass air flow sensor circuit is open or shorted.) • Mass air flow sensor • EVAP control system pressure sensor • Intake air temperature sensor
		B)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	• Harness or connectors (Mass air flow sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor • EVAP control system pressure sensor • Intake air temperature sensor

DTC Confirmation Procedure

INFOID:0000000004537115

Perform PROCEDURE FOR MALFUNCTION A first.
If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

NOTE:

If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch ON) instead of running engine at idle speed.

1. Start engine and warm it up to normal operating temperature.
2. Run engine for at least 10 seconds at idle speed.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-659, "Diagnosis Procedure".

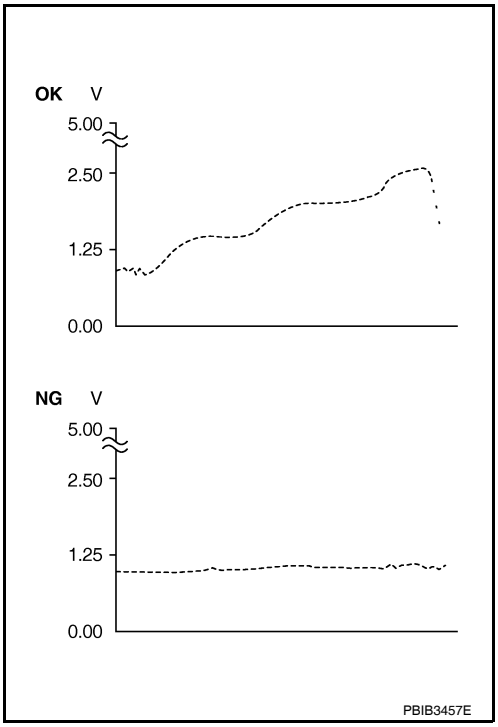
PROCEDURE FOR MALFUNCTION B

CAUTION:

Always drive vehicle at a safe speed.

With CONSULT-III

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
   If engine cannot be started, go to EC-659, "Diagnosis Procedure".
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Check the voltage of “MAS A/F SE-B1” with “DATA MONITOR”.
5. Increases engine speed to about 4,000 rpm.
6. Monitor the linear voltage rise in response to engine speed increases.
   If NG, go to EC-659, "Diagnosis Procedure".
   If OK, go to following step.



7. Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
THRTL SEN 1	More than 3V
THRTL SEN 2	More than 3V
Shift lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

8. Check 1st trip DTC.
9. If 1st trip DTC is detected, go to EC-659, "Diagnosis Procedure".

Overall Function Check

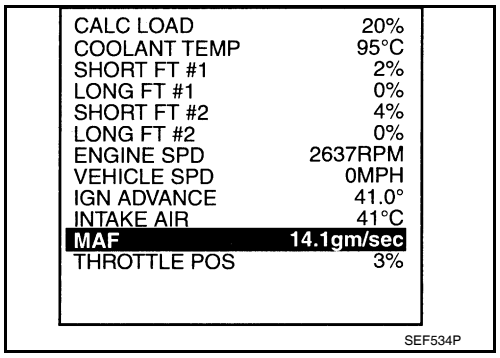
INFOID:0000000004537116

PROCEDURE FOR MALFUNCTION B

Use this procedure to check the overall function of the mass air flow sensor circuit. During this check, a 1st DTC might not be confirmed.

With GST

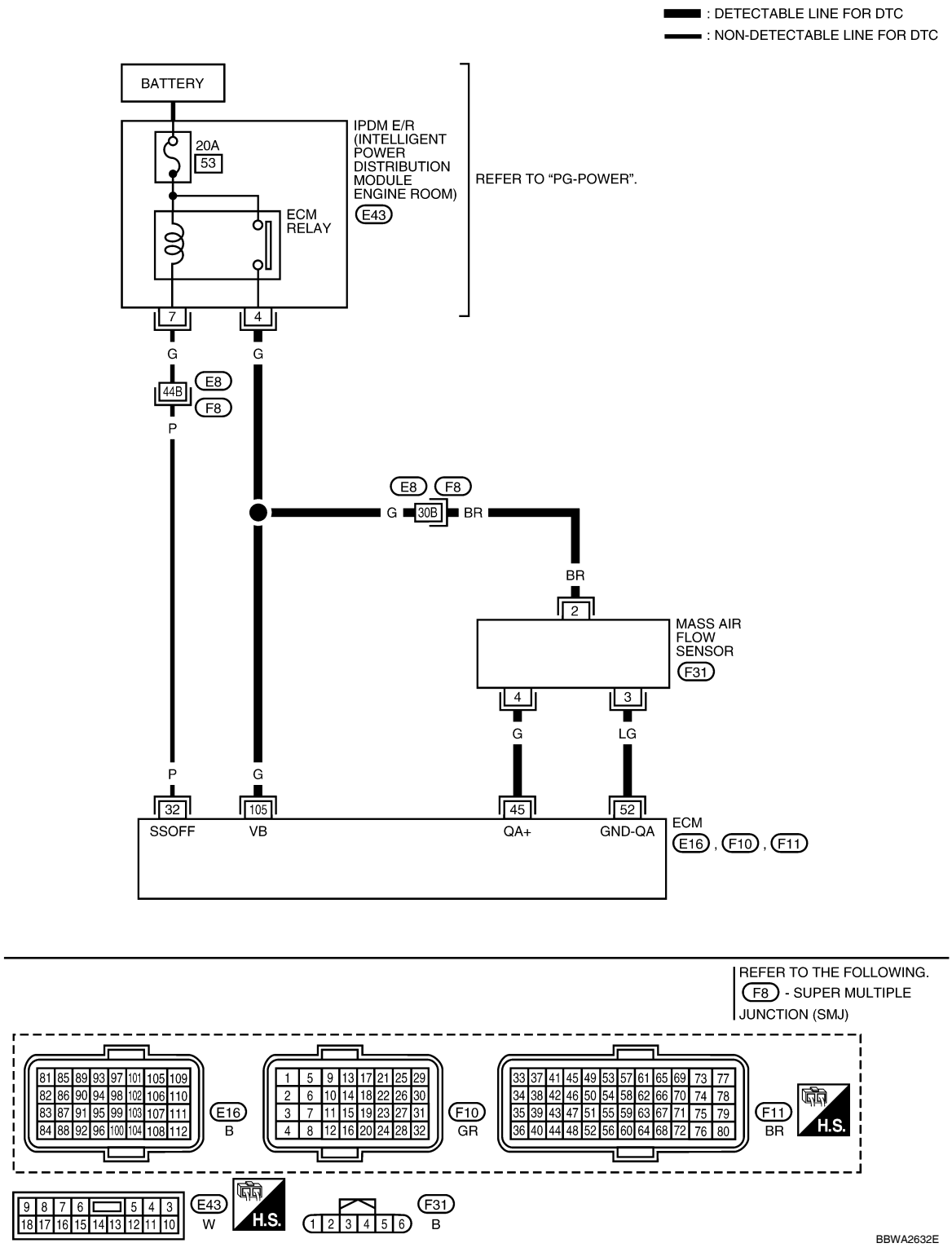
1. Start engine and warm it up to normal operating temperature.
2. Select Service $01 with GST.
3. Check the mass air flow sensor signal with Service $01.
4. Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
5. If NG, go to EC-659, "Diagnosis Procedure".



Wiring Diagram

INFOID:0000000004537117

EC-MAFS-01



Specification data are reference values and are measured between each terminal 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.

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For 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)
45	G	Mass air flow sensor	**[Engine is running]** • **Warm-up condition** • Idle speed	0.8 - 1.1V
			[Engine is running] • **Warm-up condition** • Engine speed: 2,500 rpm	1.4 - 1.7V
52	LG	Sensor ground (Mass air flow sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:0000000004537118

1.INSPECTION START

Which malfunction (A or B) is duplicated?

A or B

A >> GO TO 3.
B >> GO TO 2.

2.CHECK INTAKE AIR LEAK

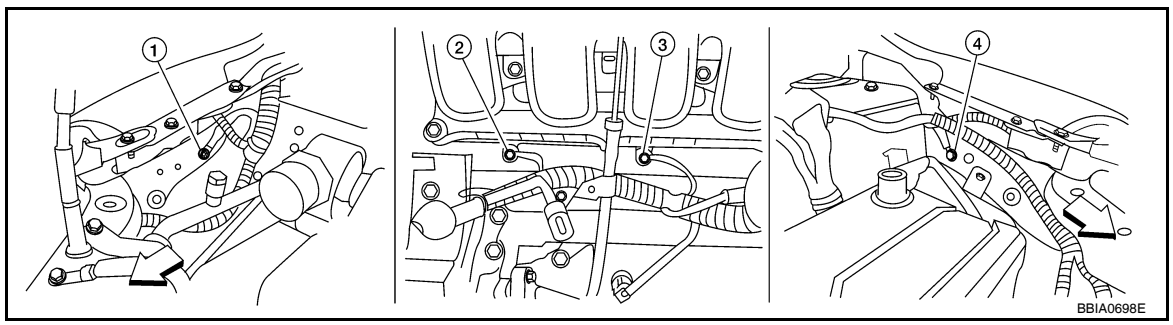
Check the following for connections.
- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

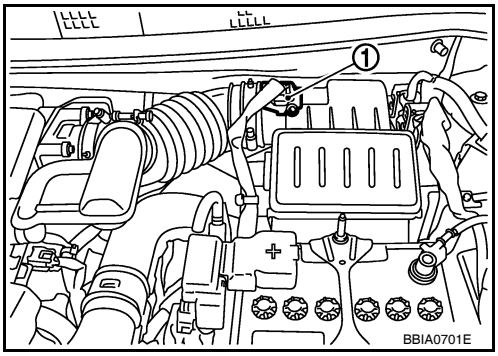
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 4.
NG >> Repair or replace ground connections.

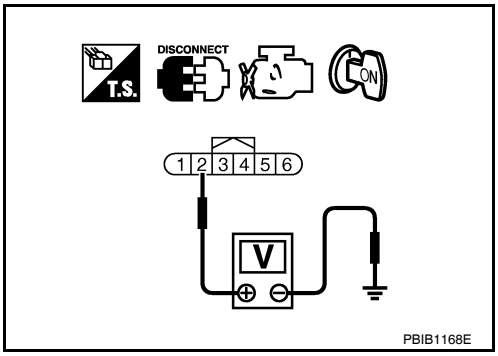
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between MAF sensor terminal 2 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between mass air flow sensor and IPDM E/R
- Harness for open or short between mass air flow sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 52. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAF sensor terminal 4 and ECM terminal 45. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short or short to power in harness or connectors.

8.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-688, "Component Inspection".

OK or NG

OK >> GO TO 9.
NG >> Replace intake air temperature sensor.

9.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-831, "Component Inspection".

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.

10.CHECK MASS AIR FLOW SENSOR

Refer to EC-661, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> Replace mass air flow sensor.

11.CHECK INTERMITTENT INCIDENT

Perform EC-626.

>> **INSPECTION END**

Component Inspection

INFOID:0000000004537119

MASS AIR FLOW SENSOR

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.

Condition	MAS A/F SE-B1 (V)
Ignition switch ON (Engine stopped.)	Approx 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.1
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.7
Idle to about 4,000 rpm	0.8 - 1.1 to 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

5. If the voltage is out of specification, proceed the following.

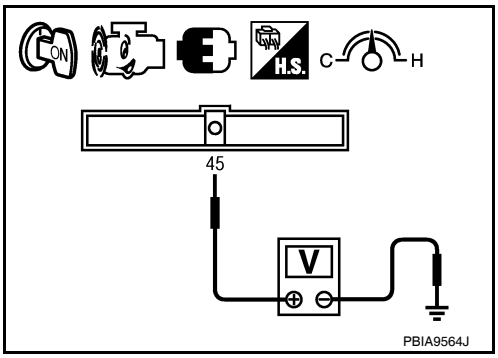
a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
If OK, go to next step.

6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

Without CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 45 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.1
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.7
Idle to about 4,000 rpm	0.8 - 1.1 to 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

4. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 and 3 again.
If OK, go to next step.

5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

Removal and Installation

INFOID:0000000004537120

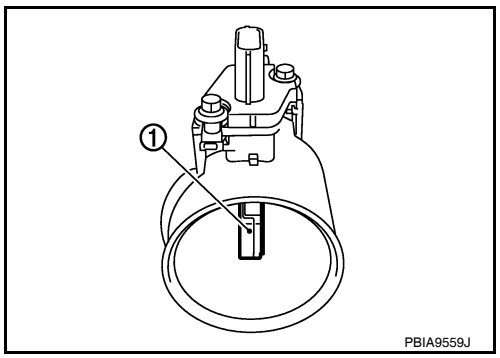
MASS AIR FLOW SENSOR
Refer to EM-139.

DTC P0102, P0103 MAF SENSOR

Component Description

INFOID:0000000004537121

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.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537122

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	See EC-618.		
CAL/LD VALUE	• Engine: After warming up • Shift lever: P or N (A/T, CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	• Engine: After warming up • Shift lever: P or N (A/T, CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	4.0 - 10.0 g·m/s

On Board Diagnosis Logic

INFOID:0000000004537123

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102 0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (Mass air flow sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
P0103 0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (Mass air flow sensor circuit is open or shorted.) • Mass air flow sensor

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DTC Confirmation Procedure

INFOID:0000000004537124

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P0102

1. Start engine and wait at least 5 seconds.
2. Check DTC.
3. If DTC is detected, go to EC-666, "Diagnosis Procedure".

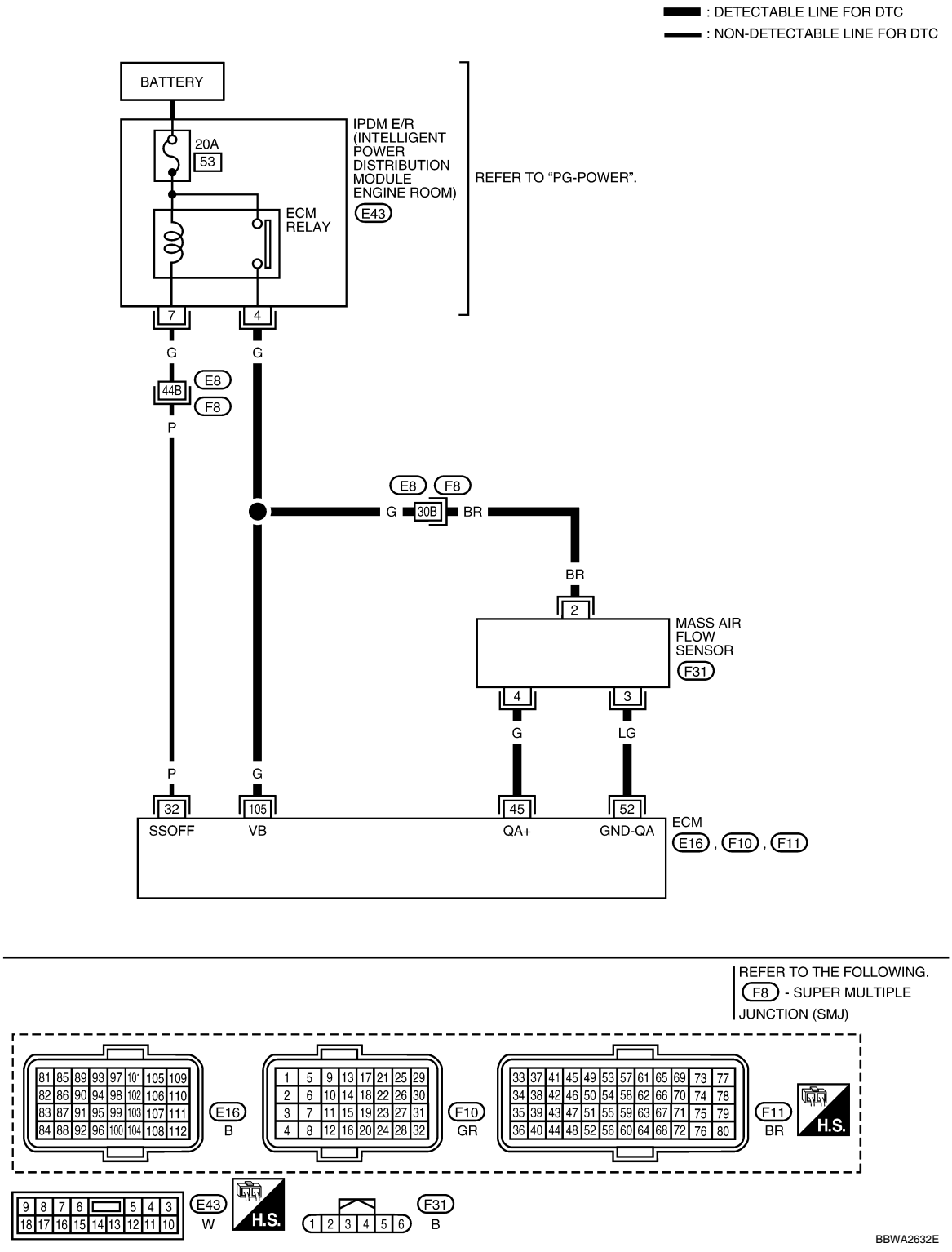
PROCEDURE FOR DTC P0103

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.
3. If DTC is detected, go to EC-666, "Diagnosis Procedure".
   If DTC is not detected, go to next step.
4. Start engine and wait at least 5 seconds.
5. Check DTC.
6. If DTC is detected, go to EC-666, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537125

EC-MAFS-01



Specification data are reference values and are measured between each terminal 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.

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For 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)
45	G	Mass air flow sensor	**[Engine is running]** • **Warm-up condition** • Idle speed	0.8 - 1.1V
			[Engine is running] • **Warm-up condition** • Engine speed: 2,500 rpm	1.4 - 1.7V
52	LG	Sensor ground (Mass air flow sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:0000000004537126

1.INSPECTION START

Which malfunction (P0102 or P0103) is duplicated?

P0102 or P0103

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2.CHECK INTAKE SYSTEM

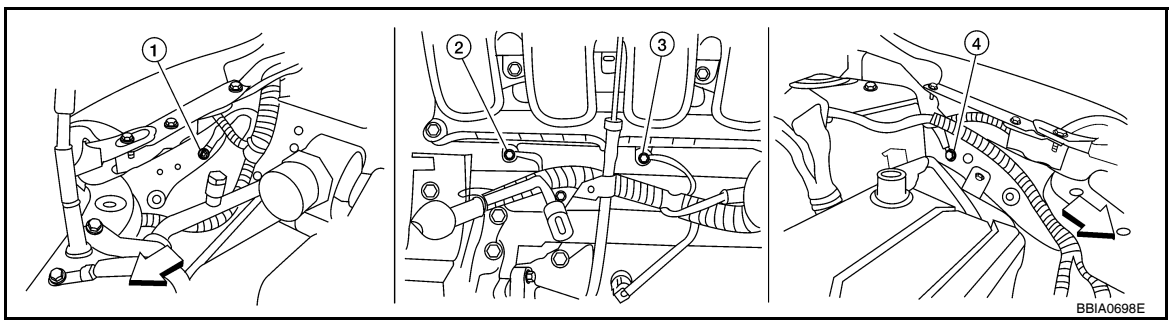
Check the following for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

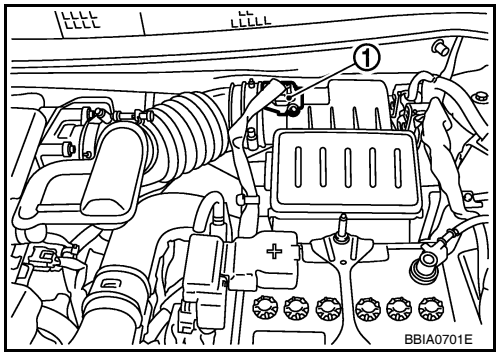
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 4.
NG >> Repair or replace ground connections.

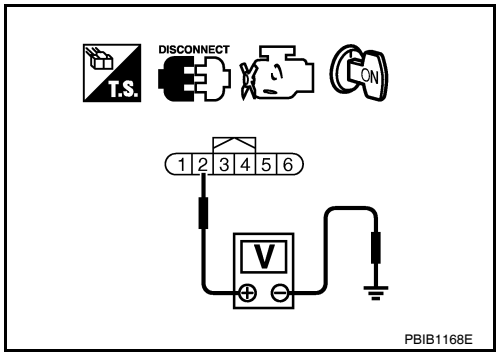
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between MAF sensor terminal 2 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 52. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAF sensor terminal 4 and ECM terminal 45. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK MASS AIR FLOW SENSOR

Refer to EC-668, "Component Inspection".

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9.CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

Component Inspection

INFOID:0000000004537127

MASS AIR FLOW SENSOR

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.

Condition	MAS A/F SE-B1 (V)
Ignition switch ON (Engine stopped.)	Approx 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.1
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.7
Idle to about 4,000 rpm	0.8 - 1.1 to 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

5. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

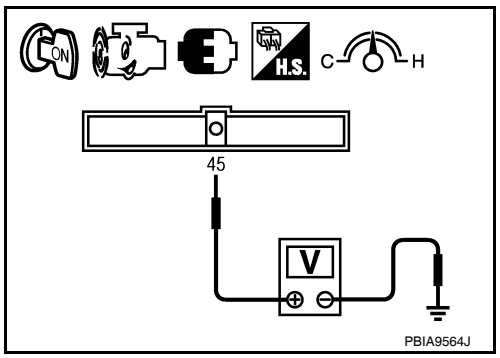
b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
   If OK, go to next step.

6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

Without CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.

3. Check voltage between ECM terminal 45 (Mass air flow sensor signal) and ground.



Condition	MAS A/F SE-B1 (V)
Ignition switch ON (Engine stopped.)	Approx 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.1
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.7
Idle to about 4,000 rpm	0.8 - 1.1 to 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

4. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 and 3 again.
If OK, go to next step.

5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

Removal and Installation

INFOID:0000000004537128

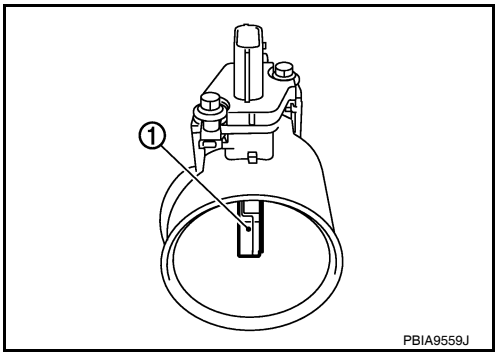
MASS AIR FLOW SENSOR
Refer to EM-139.

DTC P0112, P0113 IAT SENSOR

Component Description

INFOID:0000000004537129

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.

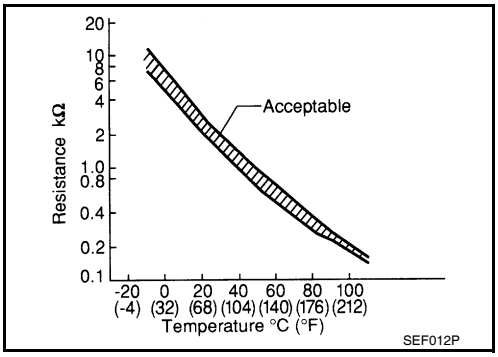


<Reference data>

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

*: This data is reference value and is measured between ECM terminal 46 (Intake air temperature sensor) and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



On Board Diagnosis Logic

INFOID:0000000004537130

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112 0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (Intake air temperature sensor circuit is open or shorted.) • Intake air temperature sensor
P0113 0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

INFOID:0000000004537131

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

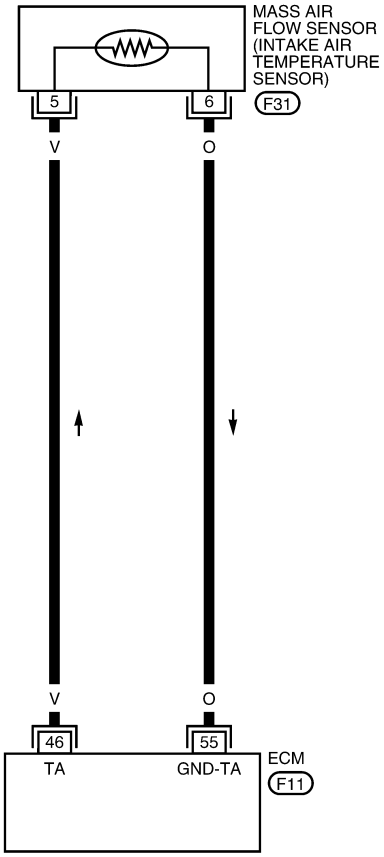
1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-671, "Diagnosis Procedure".

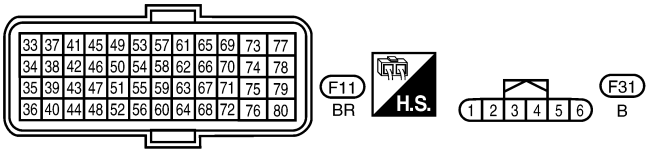
Wiring Diagram

INFOID:0000000004537132

EC-IATS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





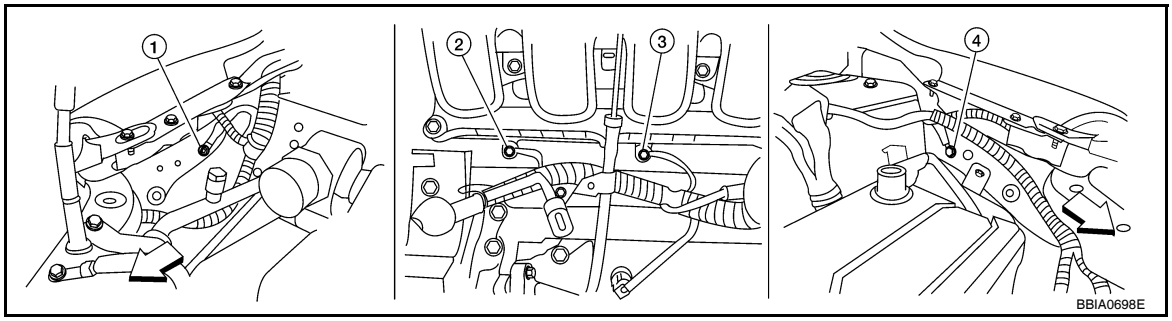
BBWA2633E

Diagnosis Procedure

INFOID:0000000004537133

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

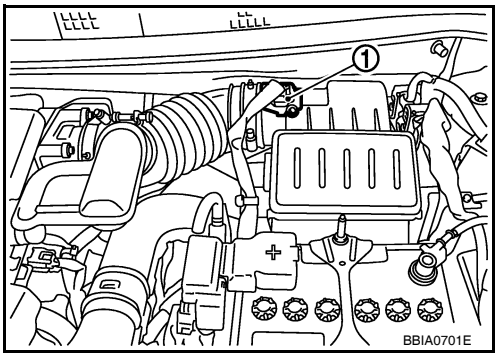
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

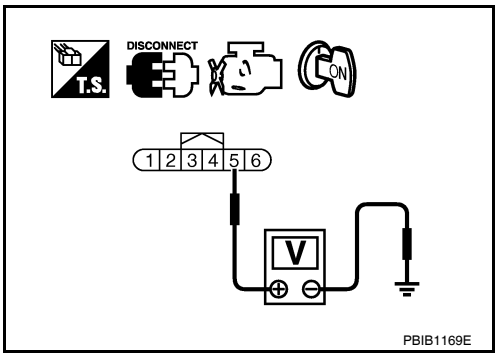
2.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (with intake air temperature sensor) (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between mass air flow sensor terminal 5 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor terminal 6 and ECM terminal 55. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-673, "Component Inspection".

OK or NG

OK >> GO TO 5.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

5. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

Component Inspection

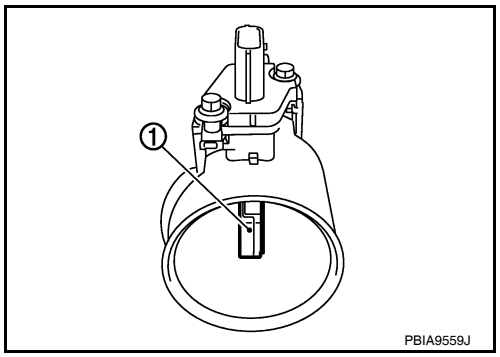
INFOID:0000000004537134

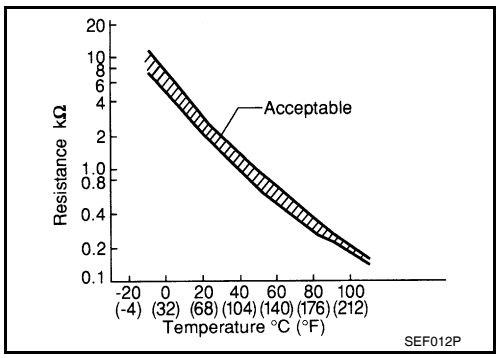
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor (1) terminals 5 and 6 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





Removal and Installation

INFOID:0000000004537135

MASS AIR FLOW SENSOR

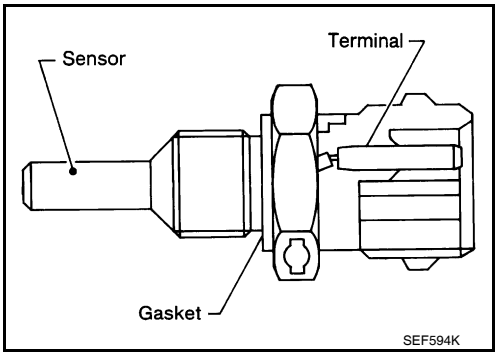
Refer to EM-139.

DTC P0117, P0118 ECT SENSOR

Component Description

INFOID:0000000004537136

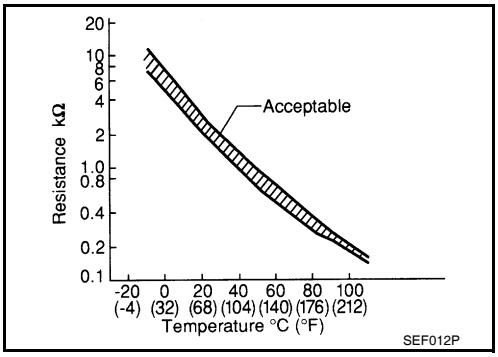
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The 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

*: This data is reference value and is measured between ECM terminal 38 (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.

On Board Diagnosis Logic

INFOID:0000000004537137

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0117 0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (Engine coolant temperature sensor circuit is open or shorted.) • Engine coolant temperature sensor
P0118 0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode	
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	Engine coolant temperature decided (CONSULT-III display)
	Just as ignition switch is turned ON or START	40°C (104°F)
	Approx. 4 minutes or more after engine starting.	80°C (176°F)
	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
	When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	

DTC Confirmation Procedure

INFOID:0000000004537138

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-III

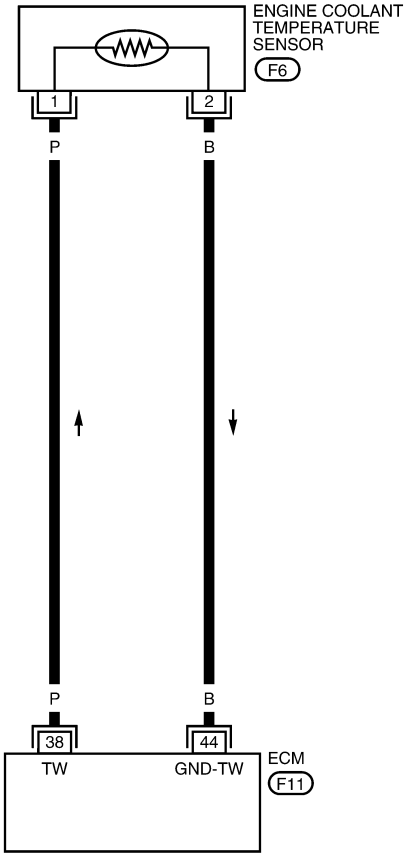
1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.
3. If DTC is detected, go to EC-676, "Diagnosis Procedure".

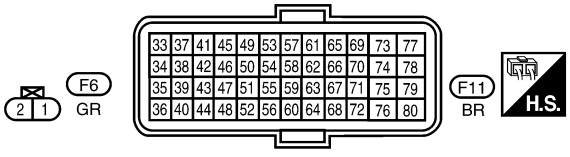
Wiring Diagram

INFOID:0000000004537139

EC-ECTS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





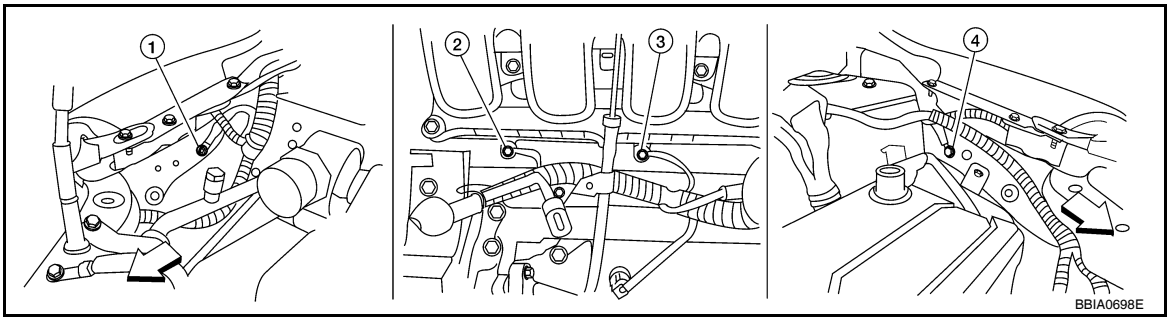
BBWA2634E

Diagnosis Procedure

INFOID:0000000004537140

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

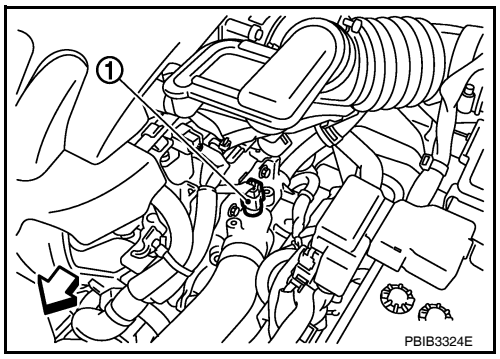
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor (1) harness connector.
- : Vehicle front
2. Turn ignition switch ON.

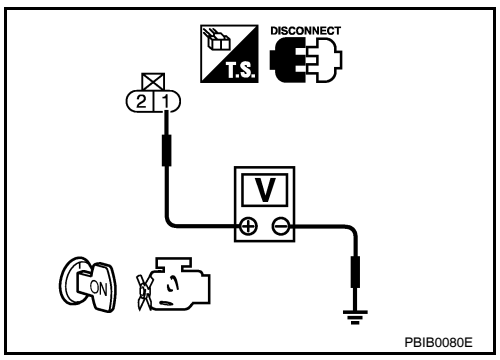


3. Check voltage between ECT sensor terminal 1 and ground with CONSULT-III or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 3.
NG >> 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 harness continuity between ECM terminal 44 and ECT sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-678, "Component Inspection".

OK or NG

OK >> GO TO 5.
NG >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

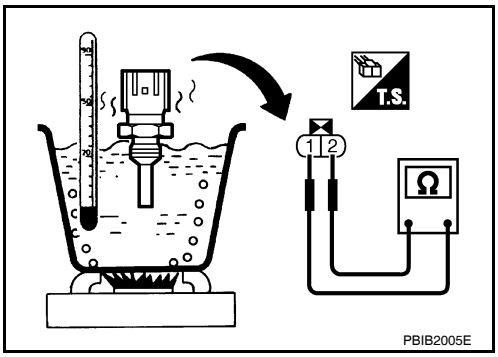
>> **INSPECTION END**

Component Inspection

INFOID:0000000004537141

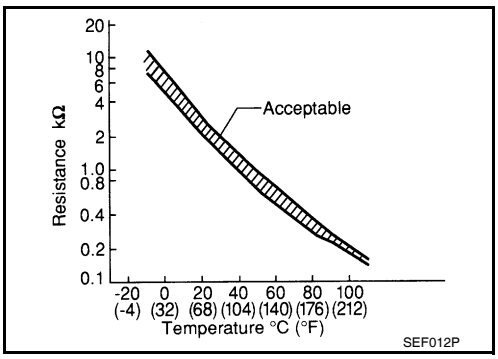
ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

INFOID:0000000004537142

ENGINE COOLANT TEMPERATURE SENSOR

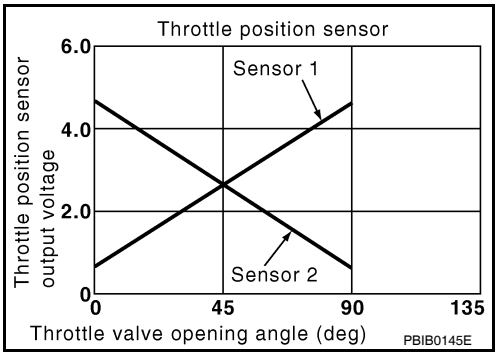
Refer to EM-185.

DTC P0122, P0123 TP SENSOR

Component Description

INFOID:0000000004537143

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.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537144

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
TP SEN 1-B1 TP SEN 2-B1*	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T, CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

INFOID:0000000004537145

These self-diagnoses have the one trip detection logic.
NOTE:
If DTC P0122 or P0123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-874.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122 0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	• Harness or connectors (TP sensor 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 2)
P0123 0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:0000000004537146

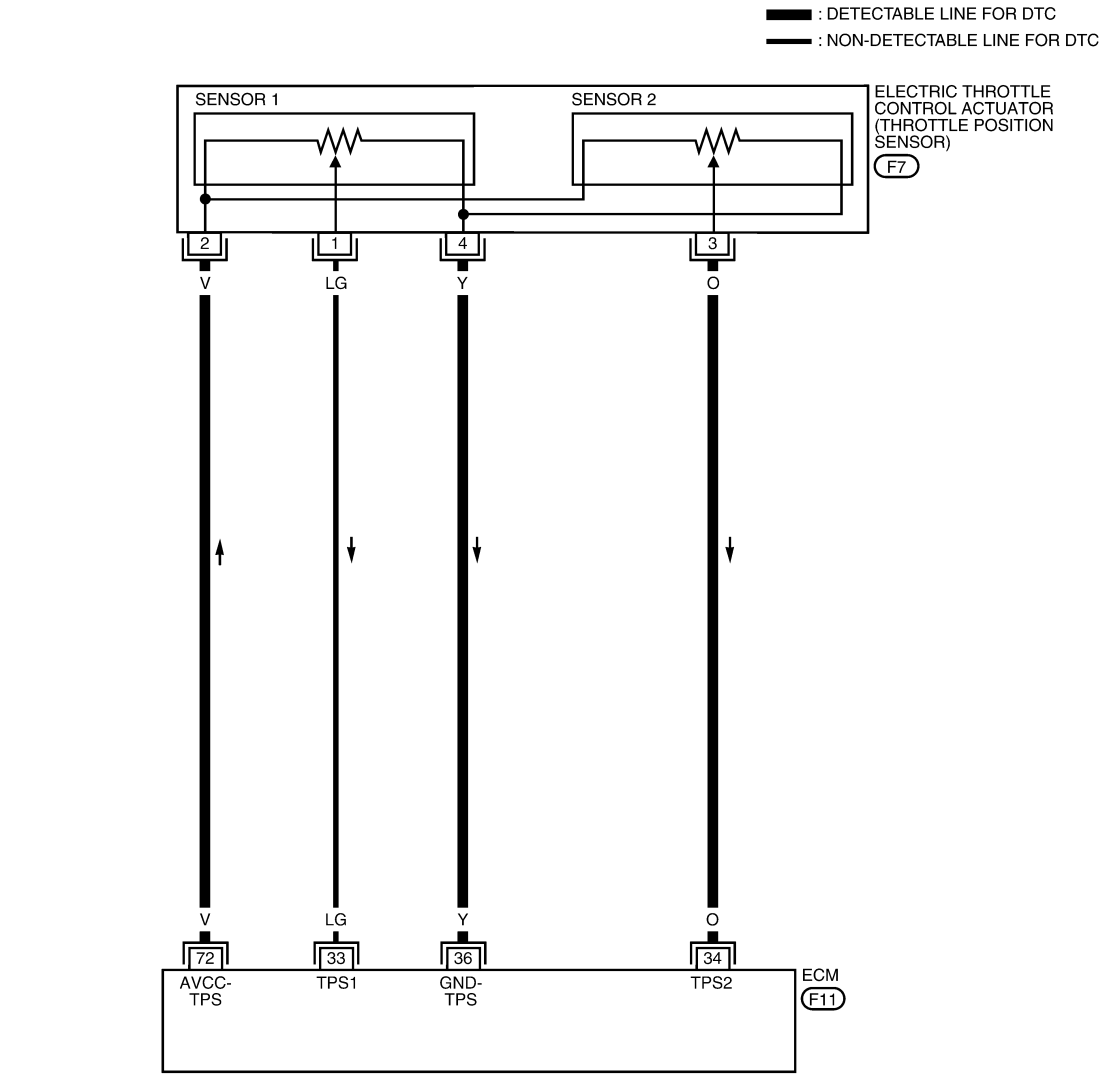
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

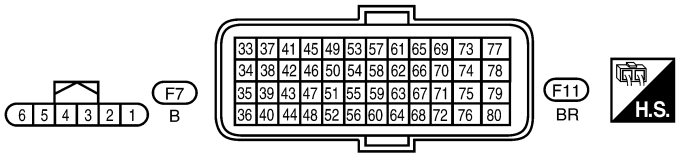
1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-681, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537147

EC-TPS2-01





BBWA2656E

Specification data are reference values and are measured between each terminal 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.

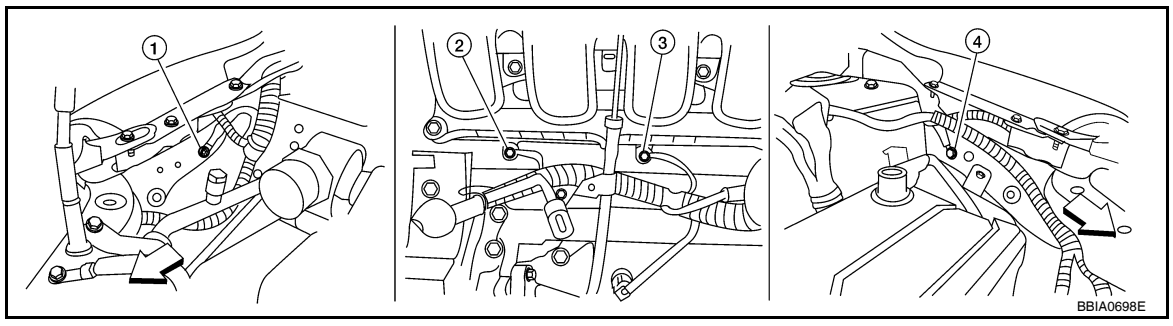
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	LG	Throttle position sensor 1	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
34	O	Throttle position sensor 2	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
36	Y	Sensor ground (Throttle position sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
72	V	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V

Diagnosis Procedure

INFOID:0000000004537148

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

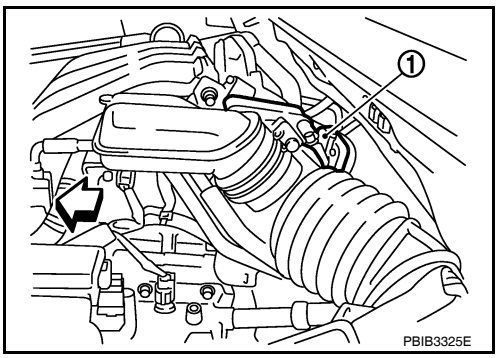
1. Body ground E24
2. Engine ground F9
3. Engine ground E16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator (1) harness connector.
- : Vehicle front
2. Turn ignition switch ON.

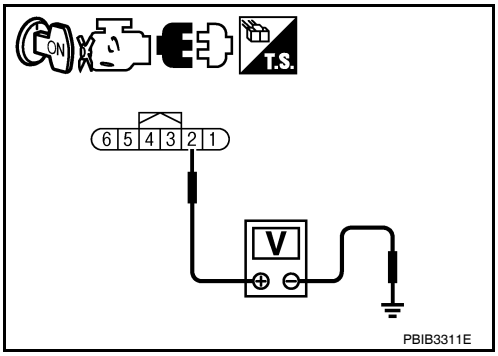


3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT-III or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 36. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 34 and electric throttle control actuator terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-683, "Component Inspection".

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-572, "Throttle Valve Closed Position Learning".
3. Perform EC-572, "Idle Air Volume Learning".

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

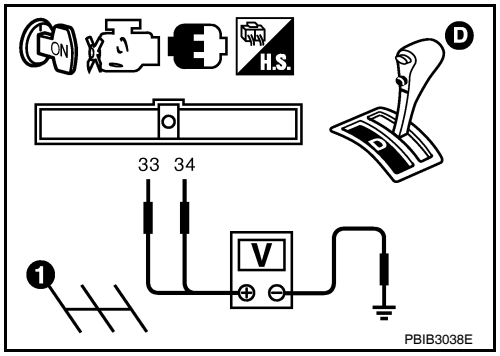
Component Inspection

INFOID:0000000004537149

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-572, "Throttle Valve Closed Position Learning".
3. Turn ignition switch ON.
4. Set shift lever to D position (A/T, CVT) or 1st position (M/T).
5. Check voltage between ECM terminals 33 (TP sensor 1 signal), 34 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
33 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
34 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-572, "Throttle Valve Closed Position Learning".
8. Perform EC-572, "Idle Air Volume Learning".

Removal and Installation

INFOID:0000000004537150

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-141.

DTC P0125 ECT SENSOR

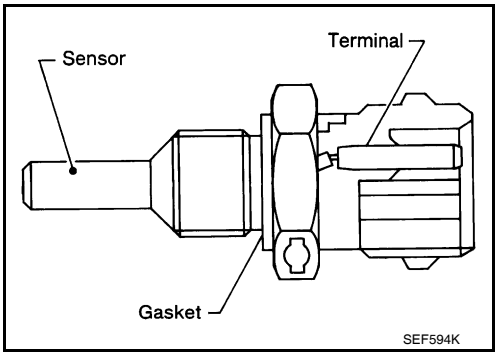
Description

INFOID:0000000004537151

NOTE:
If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to EC-674.

COMPONENT DESCRIPTION

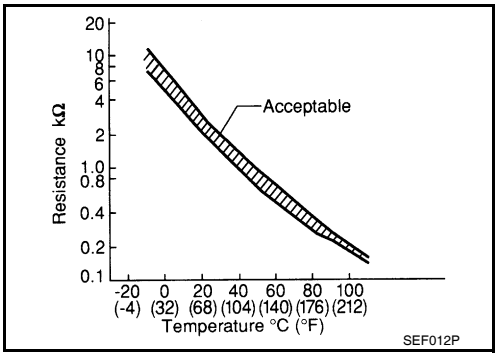
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
−10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: This data is reference values and is measured between ECM terminal 38 (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.

On Board Diagnosis Logic

INFOID:0000000004537152

This self-diagnosis ha one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0125 0125	Insufficient engine coolant temperature for closed loop fuel control	• Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. • Engine coolant temperature is insufficient for closed loop fuel control.	• Harness or connectors (High resistance in the circuit) • Engine coolant temperature sensor • Thermostat

DTC Confirmation Procedure

INFOID:0000000004537153

CAUTION:
Be careful not to overheat engine.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-III

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Check that “COOLAN TEMP/S” is above 10°C (50°F).

If it is above 10°C (50°F), the test result will be OK.
If it is below 10°C (50°F), go to following step.

4. Start engine and run it for 65 minutes at idle speed.
   If "COOLAN TEMP/S" increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.
5. Check DTC.
6. If DTC is detected, go to EC-685, "Diagnosis Procedure".

WITH GST

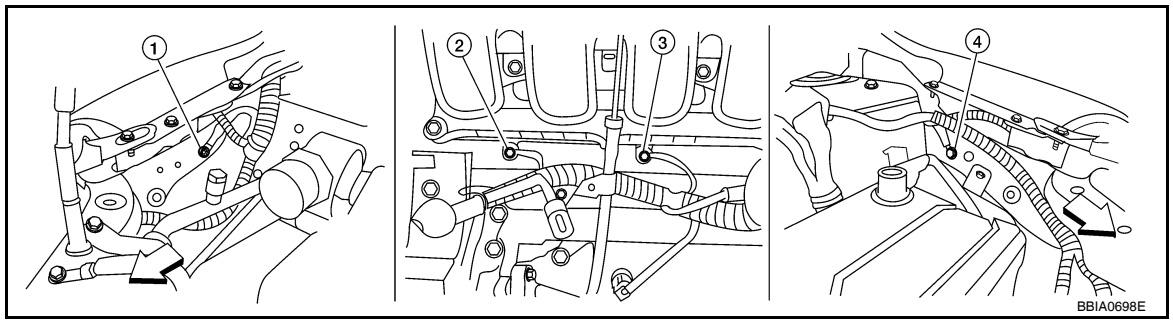
Follow the procedure "WITH CONSULT-III" above.

Diagnosis Procedure

INFOID:0000000004537154

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-686, "Component Inspection".

OK or NG

OK >> GO TO 3.
NG >> Replace engine coolant temperature sensor.

3.CHECK THERMOSTAT OPERATION

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace thermostat. Refer to CO-45.

4.CHECK INTERMITTENT INCIDENT

Refer to EC-626.
Refer to EC-676, "Wiring Diagram".

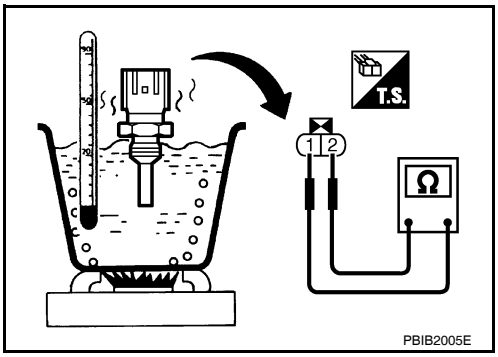
>> **INSPECTION END**

Component Inspection

INFOID:0000000004537155

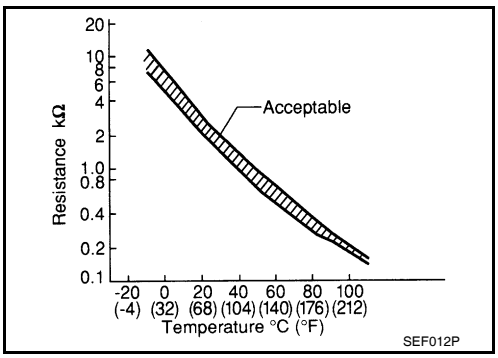
ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

INFOID:0000000004537156

ENGINE COOLANT TEMPERATURE SENSOR

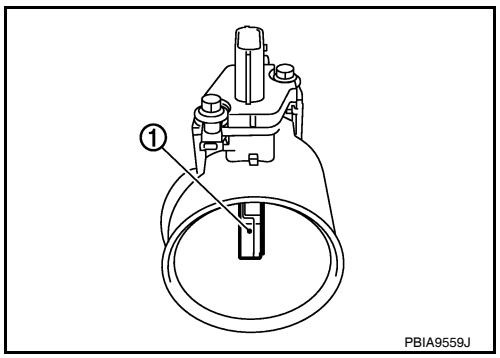
Refer to EM-186.

DTC P0127 IAT SENSOR

Component Description

INFOID:0000000004537157

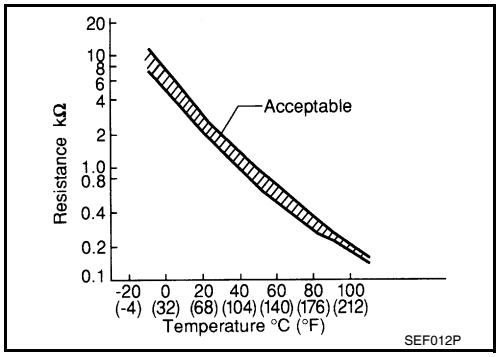
The intake air temperature sensor is built into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance K.Ω
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

*: This data is reference value and is measured between ECM terminal 46 (Intake air temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

INFOID:0000000004537158

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0127 0127	Intake air temperature too high	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	• Harness or connectors (Intake temperature sensor circuit is open or shorted) • Intake air temperature sensor

DTC Confirmation Procedure

INFOID:0000000004537159

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-III

1. Wait until engine coolant temperature is less than 90°C (194°F)

a. Turn ignition switch ON.
b. Select “DATA MONITOR” mode with CONSULT-III.
c. Check the engine coolant temperature.
d. If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch OFF and cool down engine.
   • Perform the following steps before engine coolant temperature is above 90°C (194°F).

2. Turn ignition switch ON.
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Start engine.
5. Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.
6. Check 1st trip DTC.
7. If 1st trip DTC is detected, go to EC-688, "Diagnosis Procedure".

WITH GST

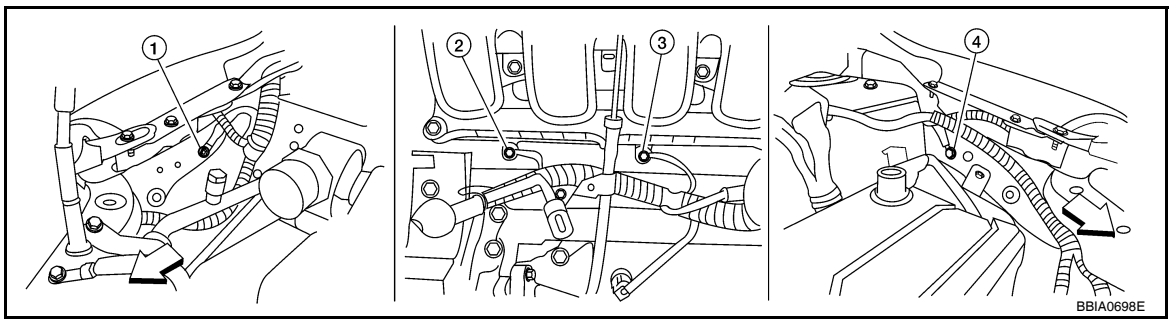
Follow the procedure “With CONSULT-III” above.

Diagnosis Procedure

INFOID:0000000004537160

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-688, "Component Inspection".

OK or NG

OK >> GO TO 3.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

3.CHECK INTERMITTENT INCIDENT

Refer to EC-626.
Refer to EC-671, "Wiring Diagram".

>> **INSPECTION END**

Component Inspection

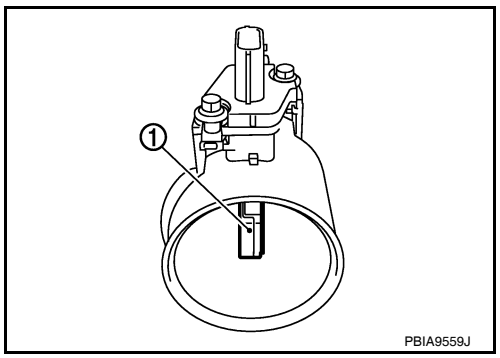
INFOID:0000000004537161

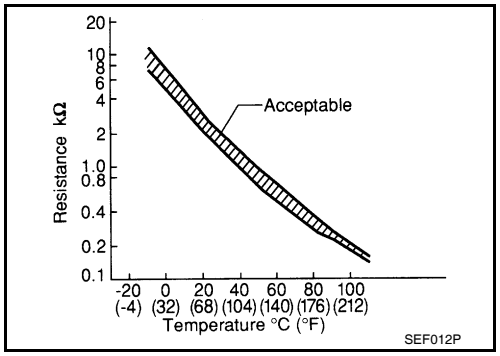
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between intake air temperature sensor (1) terminals 5 and 6 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





Removal and Installation

INFOID:0000000004537162

MASS AIR FLOW SENSOR
Refer to EM-139.

DTC P0128 THERMOSTAT FUNCTION

On Board Diagnosis Logic

INFOID:0000000004537163

NOTE:
If DTC P0128 is displayed with DTC P0300, P0301, P0302, P0303 or P0304, first perform the trouble diagnosis for DTC P0300, P0301, P0302, P0303, P0304. Refer to EC-765, "DTC Confirmation Procedure".
Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough. This is due to a leak in the seal or the thermostat stuck open.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0128 0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	• Thermostat • Leakage from sealing portion of thermostat • Engine coolant temperature sensor

DTC Confirmation Procedure

INFOID:0000000004537164

WITH CONSULT-III

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
- **For best results, perform at ambient temperature of –10°C (14°F) or higher.**
- **For best results, perform at engine coolant temperature of –10°C (14°F) to 52°C (126°F).**
- **Before performing the following procedure, do not fill with the fuel.**

1. Turn A/C switch OFF.
2. Turn blower fan switch OFF.
3. Turn ignition switch ON.
4. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-III.
5. Check the indication of “COOLAN TEMP/S”.
   If it is below 52°C (126°F), go to following step.
   If it is above 52°C (126°F), cool down the engine to less than 52°C (126°F). Then go to next steps.
6. Start engine and wait at idle for at least 30 minutes.
   If “COOLAN TEMP/S” increases to more than 71°C (160°F) within 30 minutes, turn ignition switch OFF because the test result will be OK.
7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to EC-690, "Diagnosis Procedure".

WITH GST

Follow the procedure “WITH CONSULT-III” above.

Diagnosis Procedure

INFOID:0000000004537165

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-691, "Component Inspection".

OK or NG

OK >> GO TO 2.
NG >> Replace engine coolant temperature sensor.

2.CHECK THERMOSTAT

Refer to CO-45, "Removal and Installation".

OK or NG

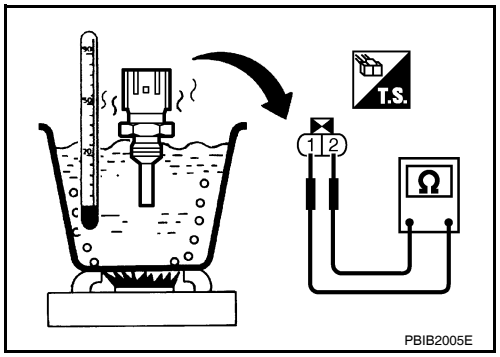
OK >> **INSPECTION END**
NG >> Replace thermostat.

Component Inspection

INFOID:0000000004537166

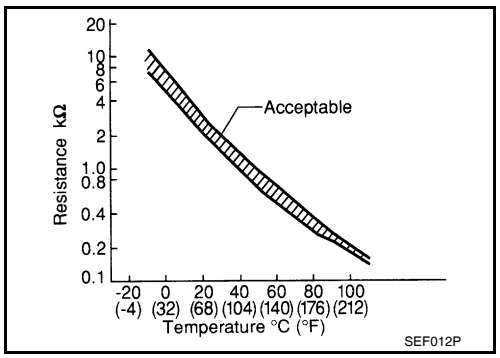
ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

INFOID:0000000004537167

ENGINE COOLANT TEMPERATURE SENSOR

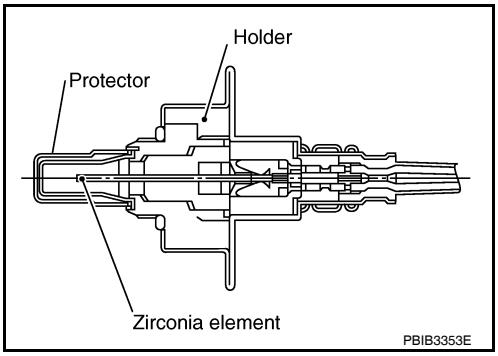
Refer to EM-186.

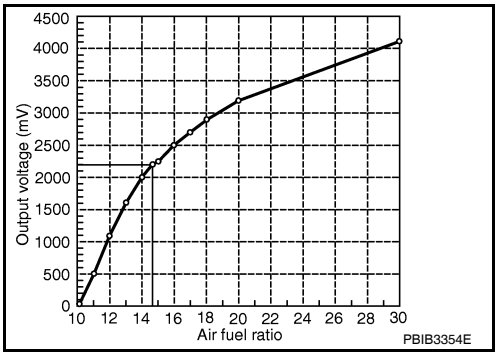
DTC P0130 A/F SENSOR 1

Component Description

INFOID:0000000004537168

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 = 1, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide 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).





CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537169

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2V

On Board Diagnosis Logic

INFOID:0000000004537170

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible Cause
P0130 0130	Air fuel ratio (A/F) sensor 1 circuit	A)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in the range other than approx. 2.2V.	• Harness or connectors [Air fuel ratio (A/F) sensor 1 circuit is open or shorted.] • Air fuel ratio (A/F) sensor 1
		B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2V.	

DTC Confirmation Procedure

INFOID:0000000004537171

Perform PROCEDURE FOR MALFUNCTION A first.
If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

PROCEDURE FOR MALFUNCTION A

1. Start engine and warm it up to normal operating temperature.

2. Let engine idle for 2 minutes.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-695, "Diagnosis Procedure".

PROCEDURE FOR MALFUNCTION B

CAUTION:
Always drive vehicle at a safe speed.

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode with CONSULT-III.
3. Check “A/F SEN1 (B1)” indication.
   If the indication is constantly approx. 2.2V and does not fluctuates, go to EC-695, "Diagnosis Procedure".
   If the indication fluctuates around 2.2V, go to next step.
4. Select “A/F SEN1 (B1) P1276” (for DTC P0130) of “A/F SEN1” in “DTC WORK SUPPORT” mode with CONSULT-III.
5. Touch “START”.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen.

ENG SPEED	1,600 - 3,200 rpm
VHCL SPEED SE	More than 64 km/h (40 MPH)
B/FUEL SCHDL	1.0 - 8.0 msec
Shift lever	D position with OD OFF (A/T) D position (CVT) 5th position (M/T)

   If “TESTING” is not displayed after 20 seconds, retry from step 2.
7. Release accelerator pedal fully.
   NOTE:
   Never apply brake during releasing the accelerator pedal.
8. Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, retry from step 6.
9. Make sure that “OK” is displayed after touching “SELF-DIAG RESULT”.
   If “NG” is displayed, go to EC-695, "Diagnosis Procedure".

Overall Function Check

INFOID:0000000004537172

PROCEDURE MALFUNCTION B

Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

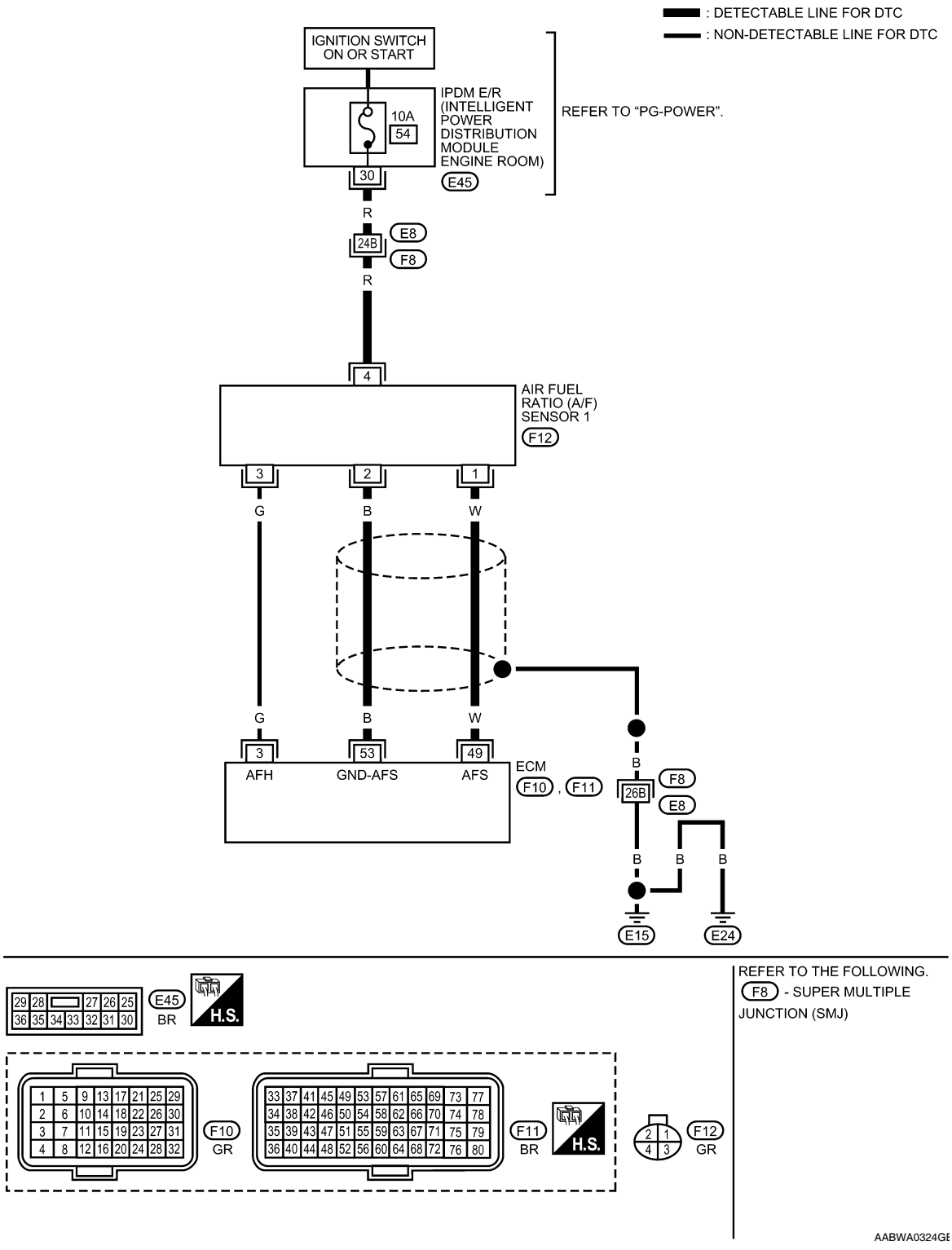
With GST

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
3. Set shift lever to D position with OD ON (A/T), D position (CVT) or 5th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).
   NOTE:
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 and 3 for five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 and 3 for five times.
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no 1st trip DTC is displayed.
   If the 1st trip DTC is displayed, go to EC-695, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537173

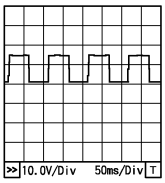
EC-A/F-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V  PBIA8148J
49	W	A/F sensor 1	**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	**[Ignition switch: ON]**	Approximately 2.2V

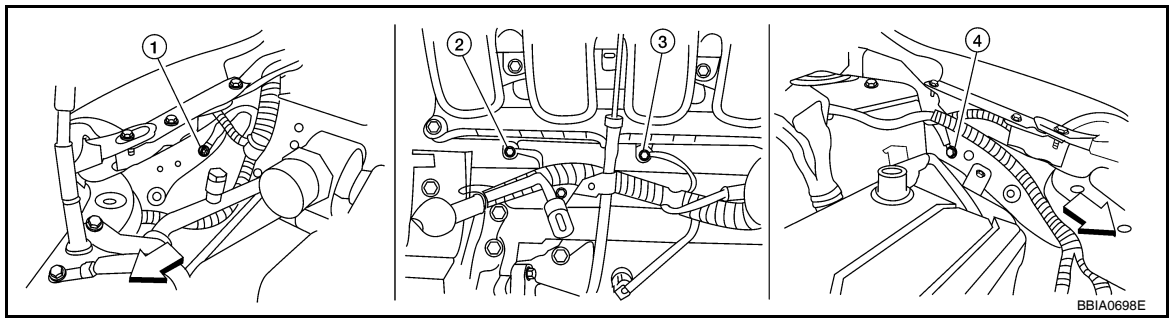
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004537174

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
Refer to EC-632, "Ground Inspection".



: Vehicle front

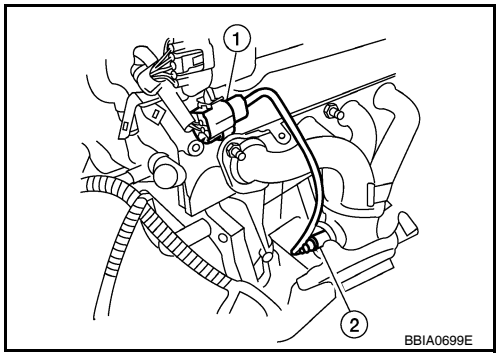
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

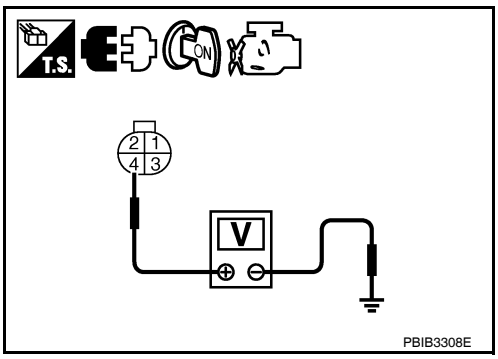
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect A/F sensor 1 harness connector (1).
2. Turn ignition switch ON.



3. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

4. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform EC-626.

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:
- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

>> **INSPECTION END**

Removal and Installation

INFOID:0000000004537175

AIR FUEL RATIO SENSOR

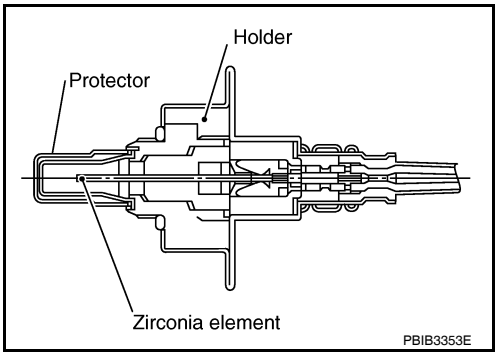
Refer to EM-144.

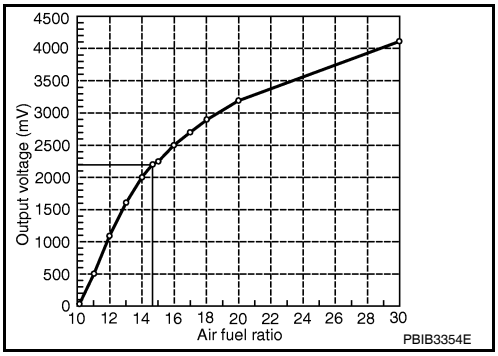
DTC P0131 A/F SENSOR 1

Component Description

INFOID:0000000004537176

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 = 1, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide 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).





CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537177

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2V

On Board Diagnosis Logic

INFOID:0000000004537178

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately low.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0131 0131	Air fuel ratio (A/F) sensor 1 circuit low voltage	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0V.	• Harness or connectors [Air fuel ratio (A/F) sensor circuit is open or shorted.] • Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

INFOID:0000000004537179

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode with CONSULT-III.
3. Check “A/F SEN1 (B1)” indication.
   If the indication is constantly approx. 0V, go to EC-701, "Diagnosis Procedure".

If the indication is not constantly approx. 0V, go to next step.
4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
6. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 MPH)
B/FUEL SCHDL	1.5 - 9.0 msec
Shift lever	Suitable position

NOTE:
- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.**

7. Check 1st trip DTC.
8. If 1st trip DTC is displayed, go to EC-701, "Diagnosis Procedure".

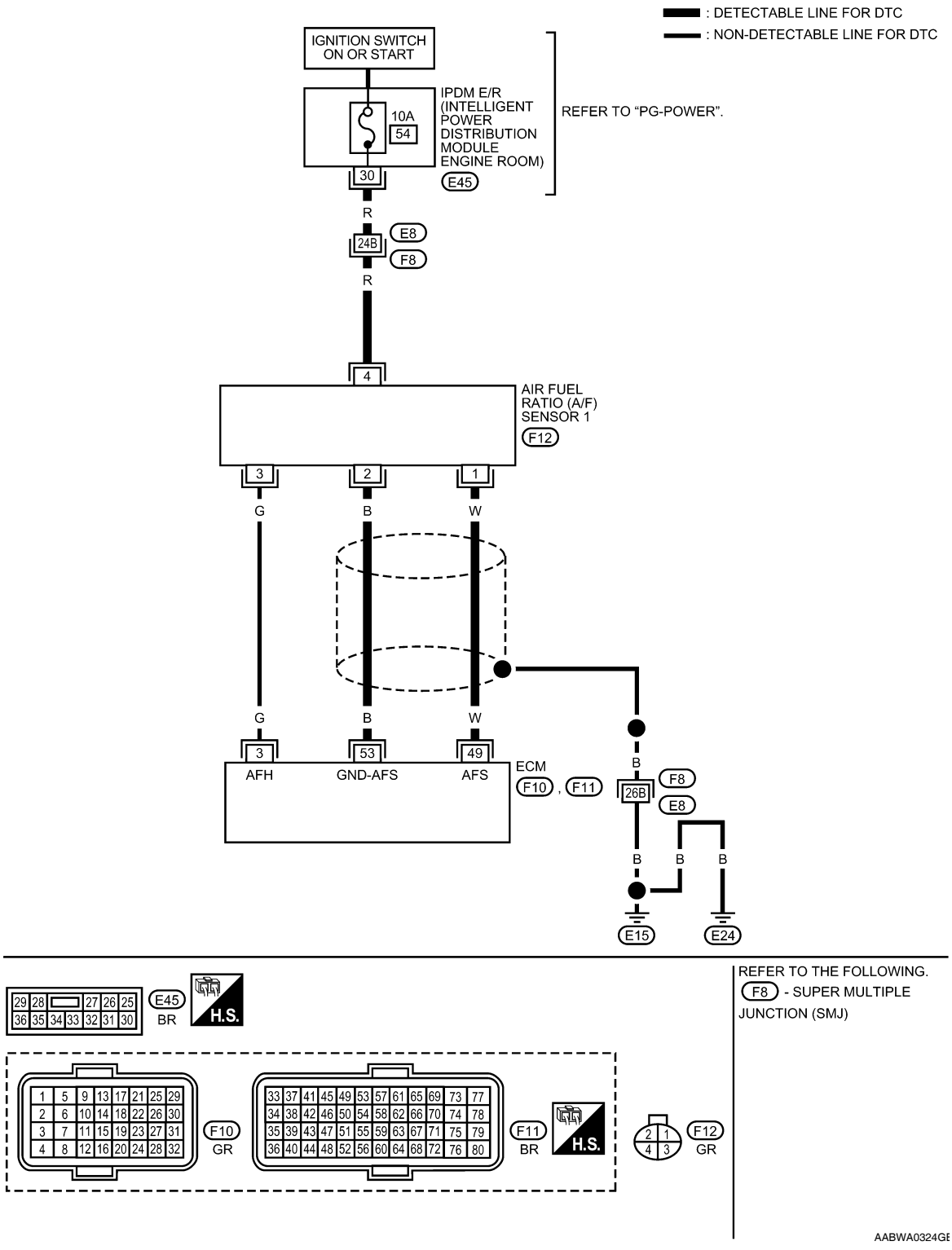
WITH GST

Follow the procedure “WITH CONSULT-III” above.

Wiring Diagram

INFOID:0000000004560762

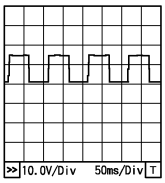
EC-A/F-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V  PBIA8148J
49	W	A/F sensor 1	**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	**[Ignition switch: ON]**	Approximately 2.2V

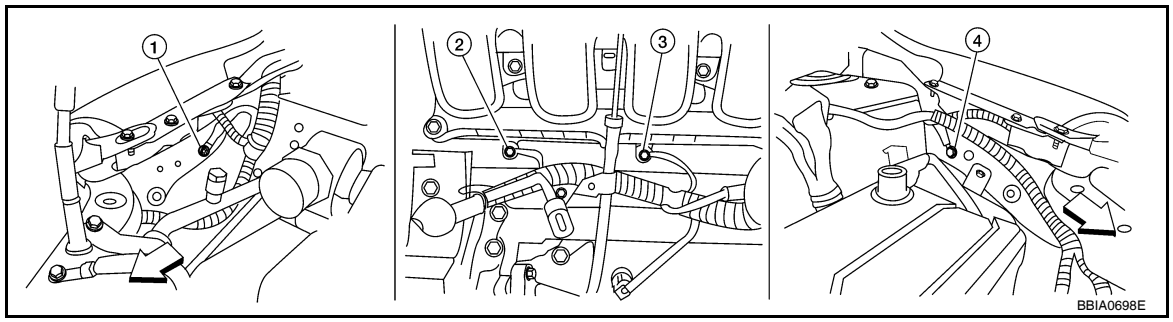
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004537181

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
Refer to EC-632, "Ground Inspection".



: Vehicle front

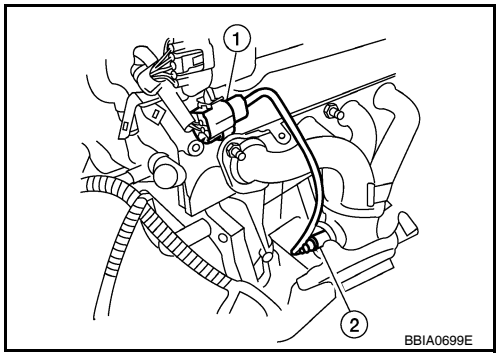
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

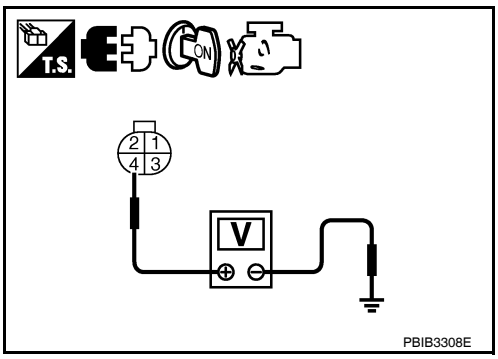
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect A/F sensor 1 harness connector (1).
2. Turn ignition switch ON.



3. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

4. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform EC-626.

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:
- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

>> **INSPECTION END**

Removal and Installation

INFOID:0000000004537182

AIR FUEL RATIO SENSOR

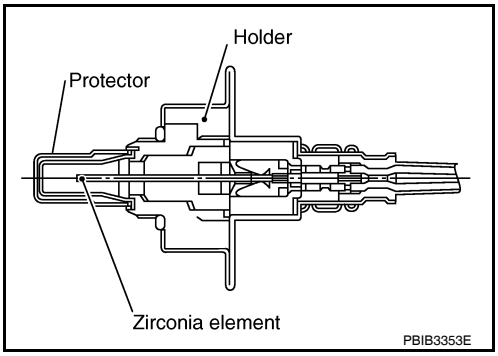
Refer to EM-144.

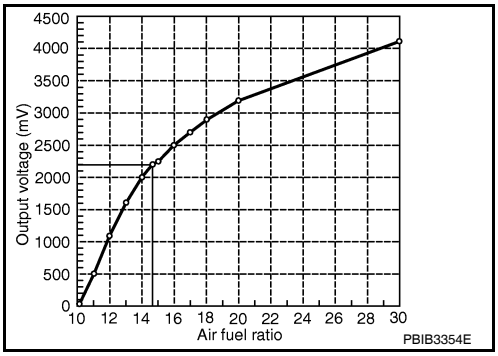
DTC P0132 A/F SENSOR 1

Component Description

INFOID:0000000004537183

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 = 1, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide 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).





CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537184

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2V

On Board Diagnosis Logic

INFOID:0000000004537185

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately high.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132 0132	Air fuel ratio (A/F) sensor 1 circuit high voltage	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5V.	• Harness or connectors [Air fuel ratio (A/F) sensor circuit is open or shorted.] • Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

INFOID:0000000004537186

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode with CONSULT-III.
3. Check “A/F SEN1 (B1)” indication.
   If the indication is constantly approx. 5V, go to EC-707, "Diagnosis Procedure".

If the indication is not constantly approx. 5V, go to next step.
4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
6. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 MPH)
B/FUEL SCHDL	1.5 - 9.0 msec
Shift lever	Suitable position

NOTE:
- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.**

7. Check 1st trip DTC.
8. If 1st trip DTC is displayed, go to EC-707, "Diagnosis Procedure".

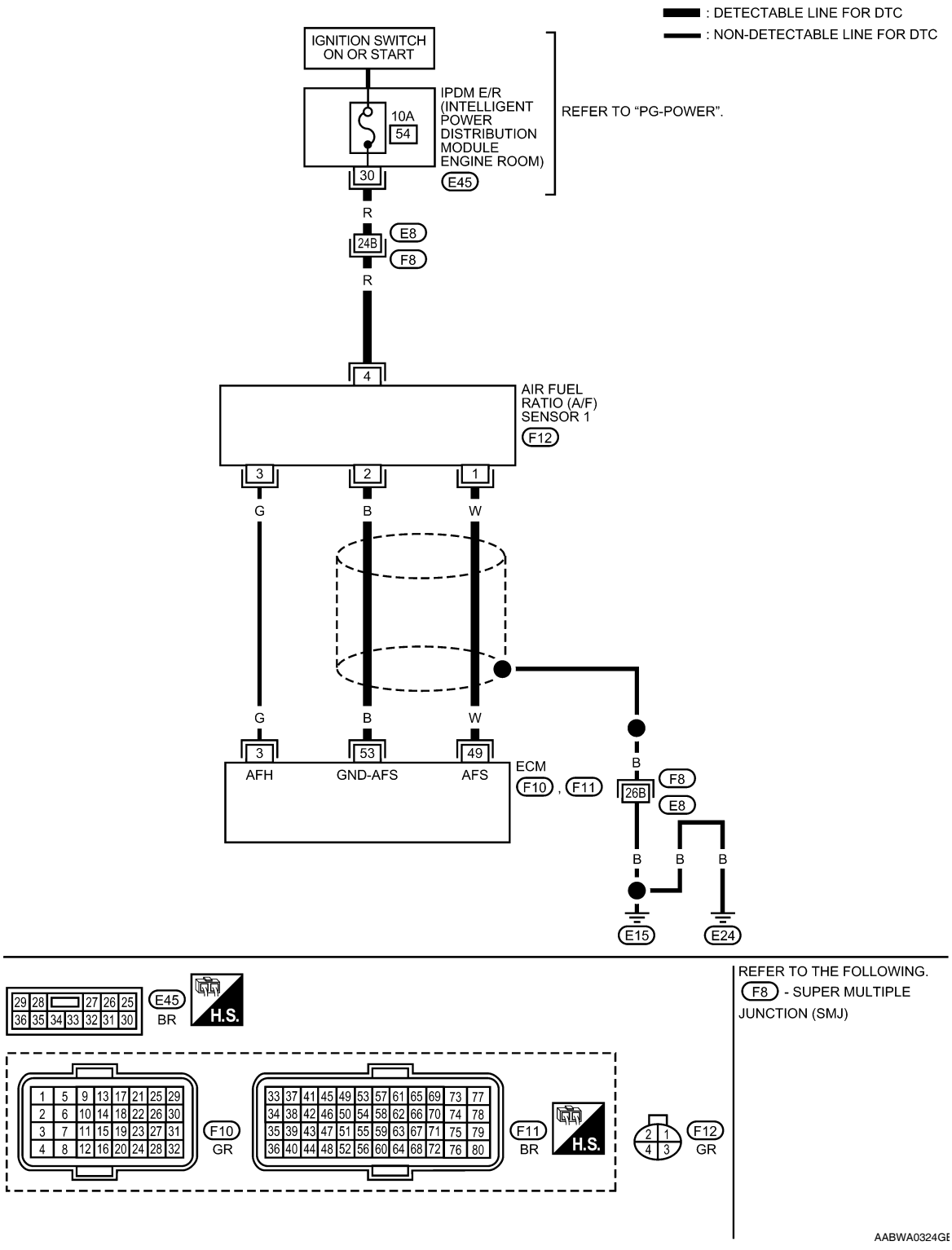
WITH GST

Follow the procedure “WITH CONSULT-III” above.

Wiring Diagram

INFOID:0000000004560763

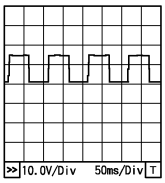
EC-A/F-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V  PBIA8148J
49	W	A/F sensor 1	**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	**[Ignition switch: ON]**	Approximately 2.2V

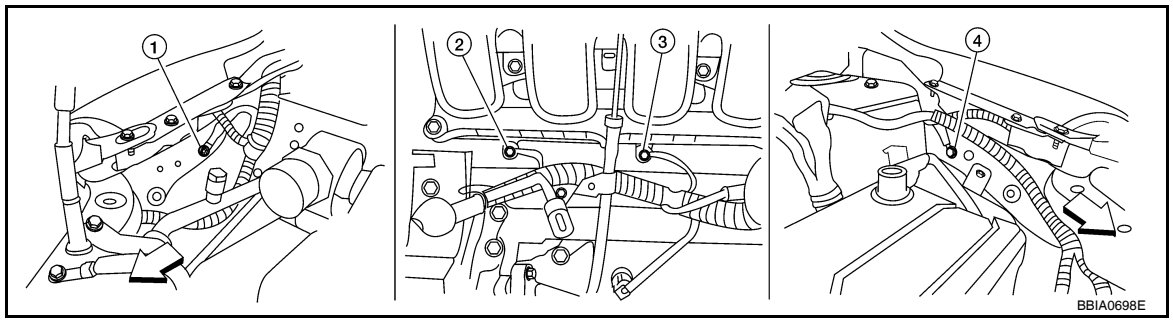
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004537188

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
Refer to EC-632, "Ground Inspection".



: Vehicle front

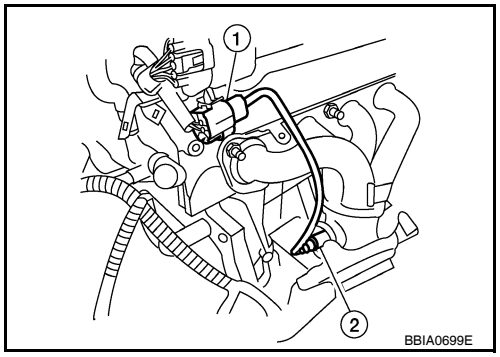
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

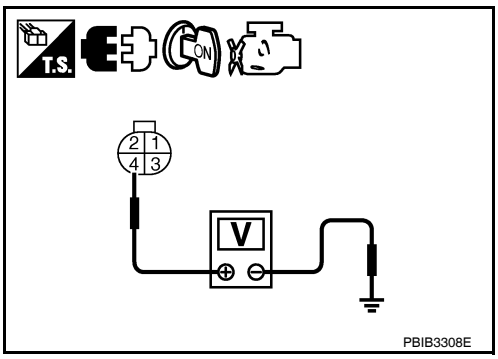
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect A/F sensor 1 harness connector (1).
2. Turn ignition switch ON.



3. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

4. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform EC-626.

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:
- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

>> **INSPECTION END**

Removal and Installation

INFOID:0000000004537189

AIR FUEL RATIO SENSOR

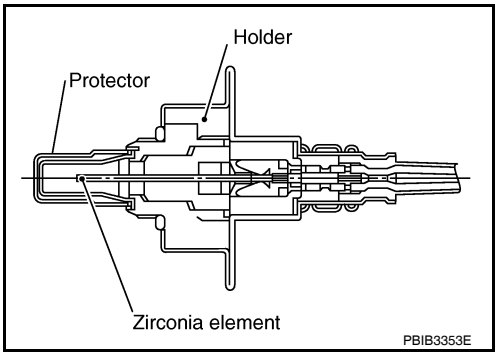
Refer to EM-144.

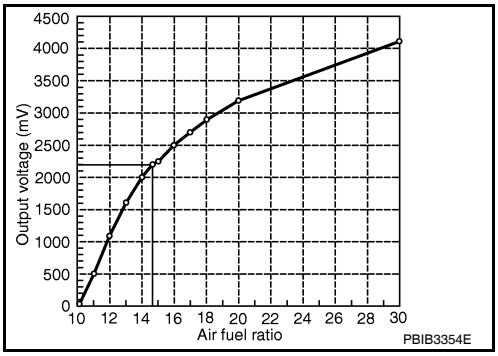
DTC P0133 A/F SENSOR 1

Component Description

INFOID:0000000004537190

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 = 1, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide 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).





CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537191

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2V

On Board Diagnosis Logic

INFOID:0000000004537192

To judge the malfunction of air fuel ratio (A/F) sensor 1, this diagnosis measures response time of the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the air fuel ratio (A/F) sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F sensor 1 signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0133 0133	Air fuel ratio (A/F) sensor 1 circuit slow response	The response of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time.	• Harness or connectors [Air fuel ratio (A/F) sensor circuit is open or shorted.] • Air fuel ratio (A/F) sensor 1 • Air fuel ratio (A/F) sensor heater 1 • Fuel pressure • Fuel injector • Intake air leaks • Exhaust gas leaks • PCV • Mass air flow sensor

DTC Confirmation Procedure

INFOID:0000000004537193

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
4. Let engine idle for 1 minute.
5. Select “A/F SEN1(B1) P1278/P1279” of “A/F SEN1” in “DTC WORK SUPPORT” mode with CONSULT-III.
6. Touch “START”.
   If “COMPLETED” appears on CONSULT-III screen, go to step 10.
   If “COMPLETED” does not appear on CONSULT-III screen, go to the following step.
7. After perform the following procedure, “TESTING” will be displayed on the CONSULT-III screen.

a. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.

b. Fully release accelerator pedal and then let engine idle for about 10 seconds.
   If “TESTING” is not displayed after 10 seconds, refer to EC-618.

8. Wait for about 20 seconds at idle at under the condition that “TESTING” is displayed on the CONSULT-III screen.
9. Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, refer to EC-618.
10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULT”.
    If “NG” is displayed, go to EC-713, "Diagnosis Procedure".

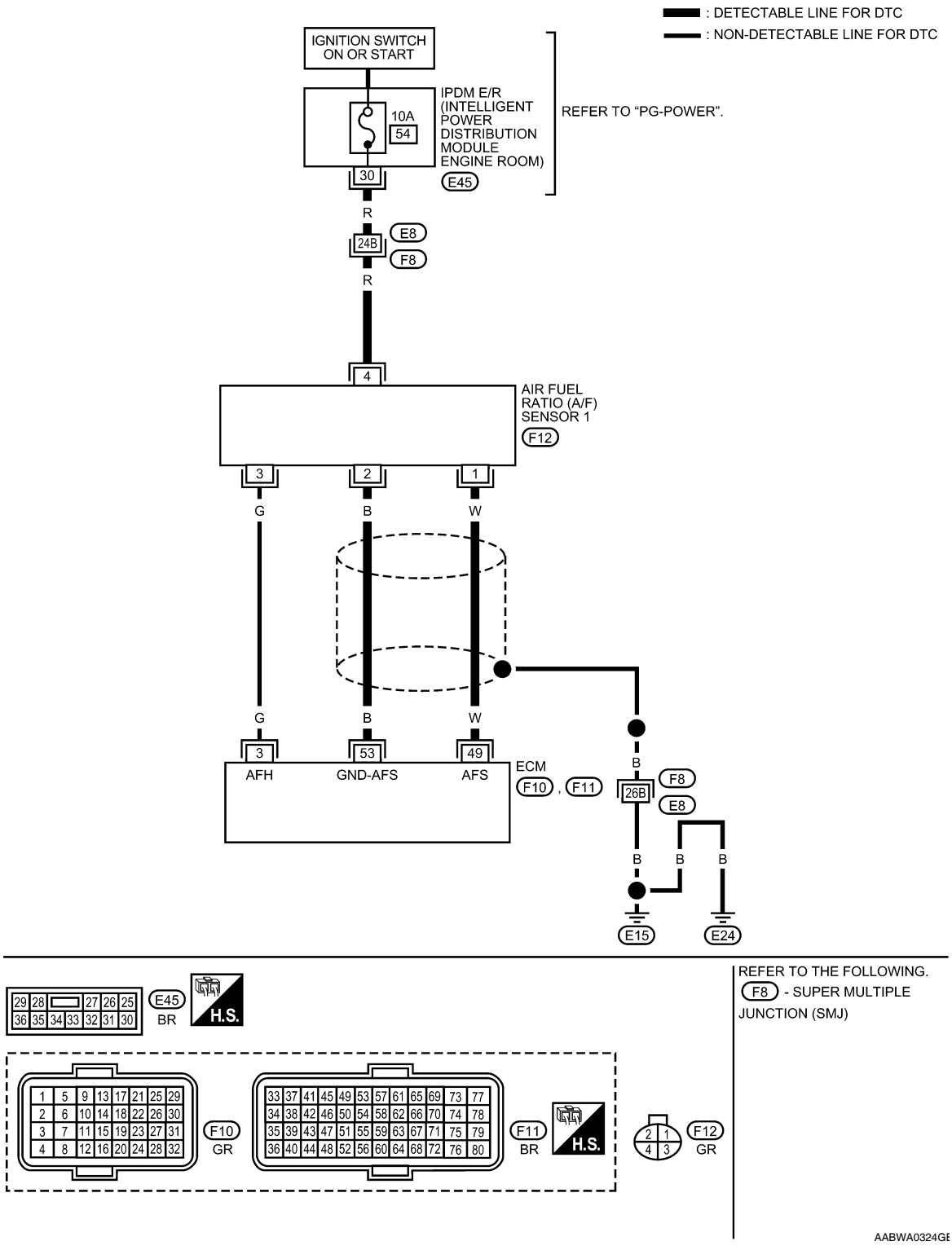
WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Select Service $01 with GST.
3. Calculate the total value of “Short term fuel trim” and “Long term fuel trim” indications.
   Make sure that the total percentage should be within ±15%.
   If OK, go to the following step.
   If NG, check the following.
   - Intake air leaks
   - Exhaust gas leaks
   - Incorrect fuel pressure
   - Lack of fuel
   - Fuel injector
   - Incorrect PCV hose connection
   - PCV valve
   - Mass air flow sensor
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
6. Let engine idle for 1 minute.
7. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
8. Fully release accelerator pedal and then let engine idle for about 1 minute.
9. Select Service $07 with GST.
   If 1st trip DTC is detected, go to EC-713, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004560764

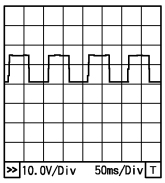
EC-A/F-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V  PBIA8148J
49	W	A/F sensor 1	**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	**[Ignition switch: ON]**	Approximately 2.2V

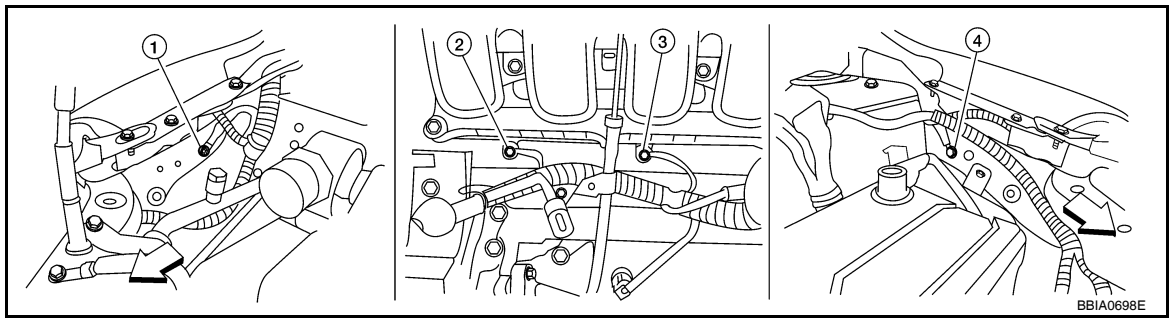
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004537195

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

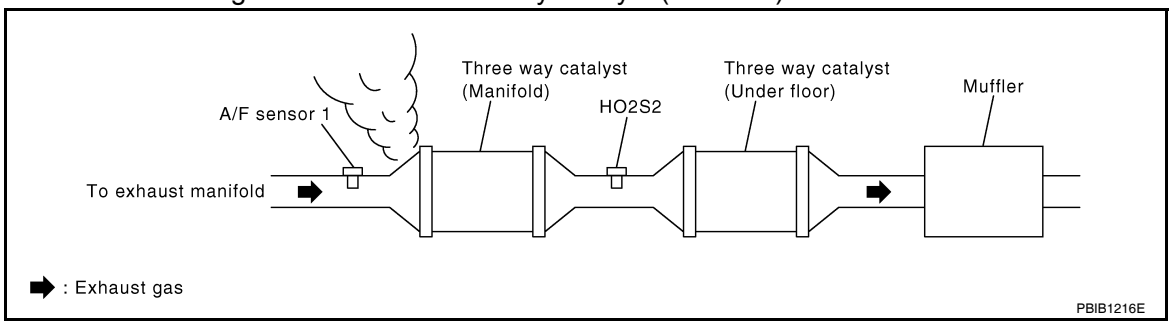
Loosen and retighten the air fuel ratio (A/F) sensor 1. Refer to EM-144, "Removal and Installation".

>> GO TO 3.

3.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.

2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

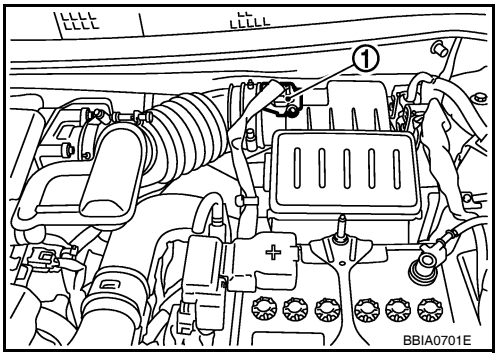
5. CLEAR THE SELF-LEARNING DATA

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching “CLEAR” or “START”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

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 (1) 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 DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-542, "Emission-related Diagnostic Information".
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?



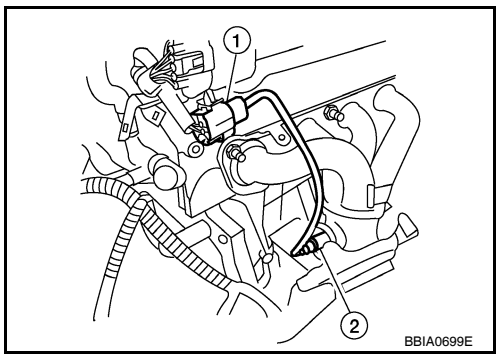
Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0172. Refer to EC-740or EC-746.
No >> GO TO 6.

6. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect A/F sensor 1 harness connector (1).
- Air fuel ratio (A/F) sensor (2)
3. Turn ignition switch ON.

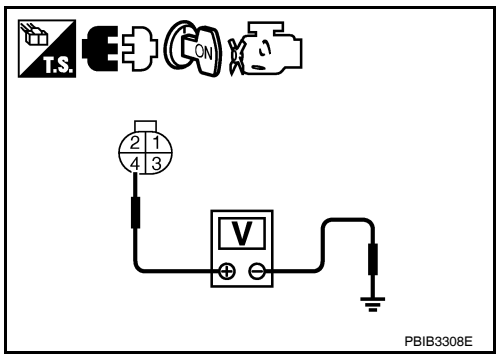


4. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.



7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

4. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to EC-643, "Component Inspection".

OK or NG

OK >> GO TO 10.
NG >> GO TO 13.

10. CHECK MASS AIR FLOW SENSOR

Refer to EC-661, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> Replace mass air flow sensor.

11. CHECK PCV VALVE

Refer to EC-538, "Component Inspection".

OK or NG

OK >> GO TO 12.
NG >> Repair or replace PCV valve.

12. CHECK INTERMITTENT INCIDENT

Perform EC-626.

OK or NG

OK >> GO TO 13.
NG >> Repair or replace.

13. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

>> **INSPECTION END**

Removal and Installation

INFOID:0000000004537196

AIR FUEL RATIO SENSOR

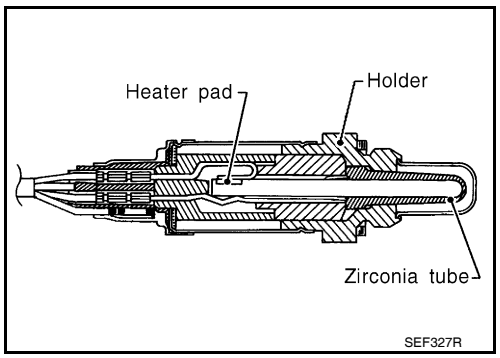
Refer to EM-144.

DTC P0137 HO2S2

Component Description

INFOID:0000000004537197

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air/fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537198

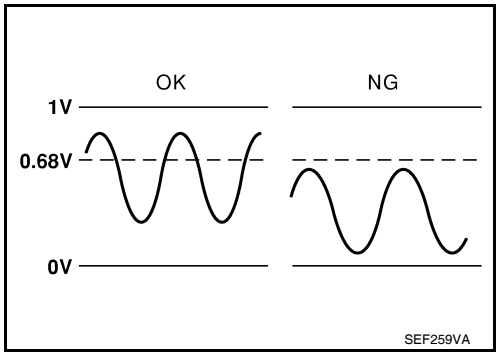
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1)	• 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 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)		LEAN ←→ RICH

On Board Diagnosis Logic

INFOID:0000000004537199

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 before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0137 0137	Heated oxygen sensor 2 circuit low voltage	The maximum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (Heated oxygen sensor 2 circuit open or shorted.) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks

DTC Confirmation Procedure

INFOID:0000000004537200

NOTE:
If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-III

TESTING CONDITION:
For the best results, perform DTC WORK SUPPORT at a temperature of 0 to 30°C (32 to 86°F).

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
7. Open engine hood.
8. Select “HO2S2 (B1) P1147” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-III.
9. Start engine and following the instruction of CONSULT-III.
   NOTE:
   It will take at most 10 minutes until “COMPLETED” is displayed.
10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
    If “NG” is displayed, refer to EC-720, "Diagnosis Procedure".
    If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
b. Return to step 1.

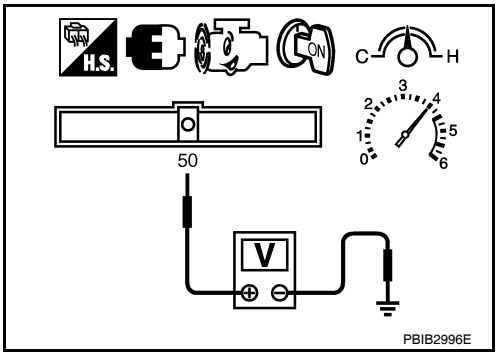
Overall Function Check

INFOID:0000000004537201

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to 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 1 minute.
5. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.

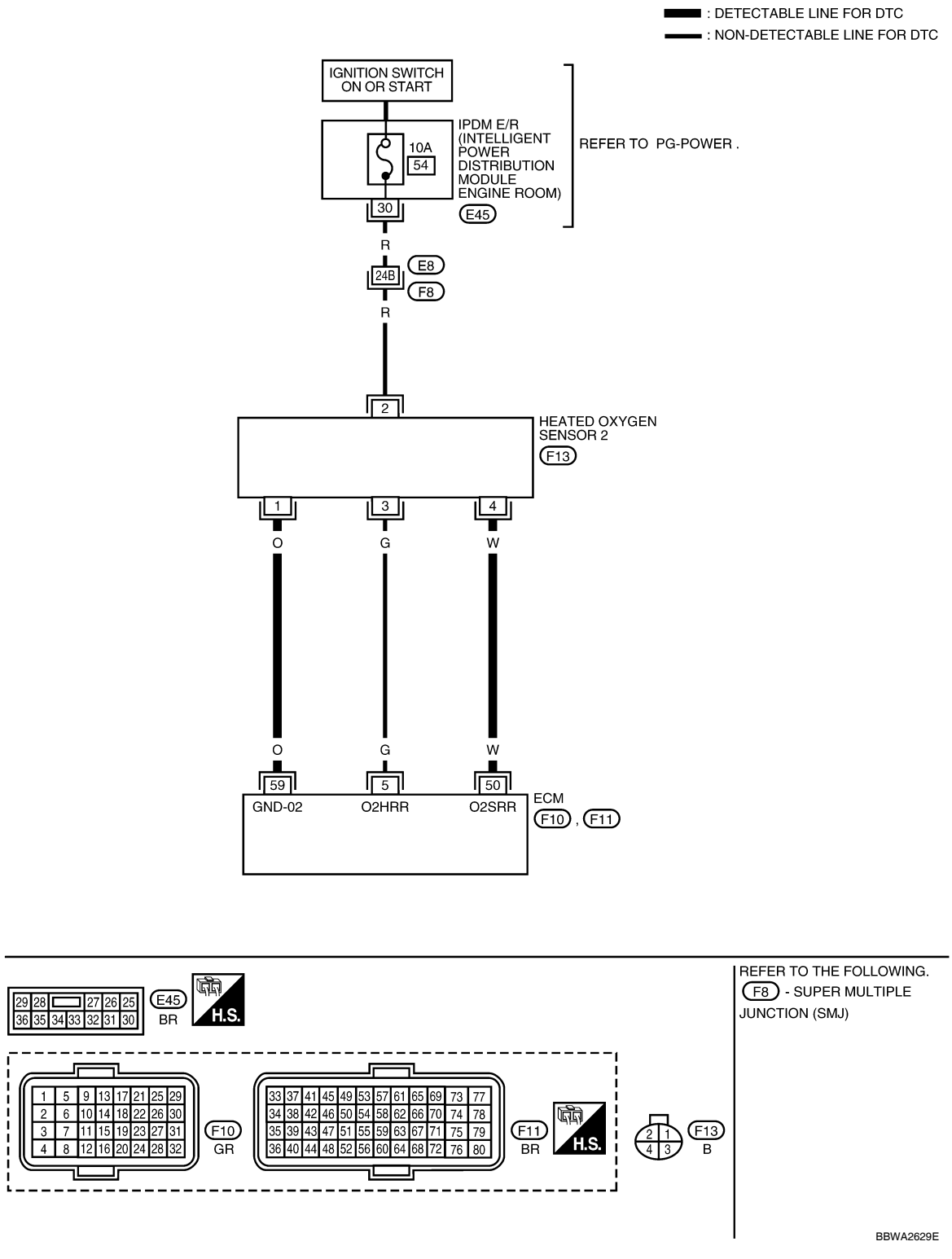


7. Keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with OD OFF (A/T), D position (CVT) or 3rd gear position (M/T).
   The voltage should be above 0.68V at least once during this procedure.
8. If NG, go to EC-720, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537202

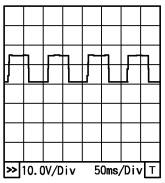
EC-HO2S2-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	G	Heated oxygen sensor 2 heater	**[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.	Approximately 10V  PBIA8148J
			[Ignition switch: ON] • Engine stopped **[Engine is running]** • Engine speed: Above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
50	W	Heated oxygen sensor 2	**[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 - Approximately 1.0V
59	O	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

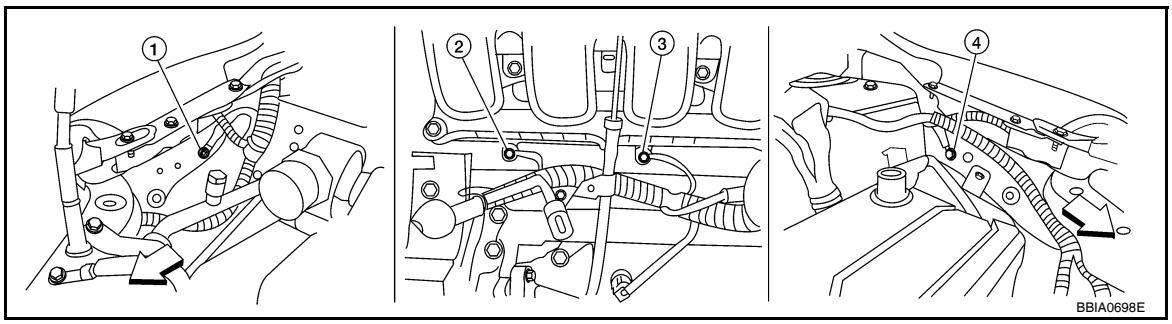
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004537203

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

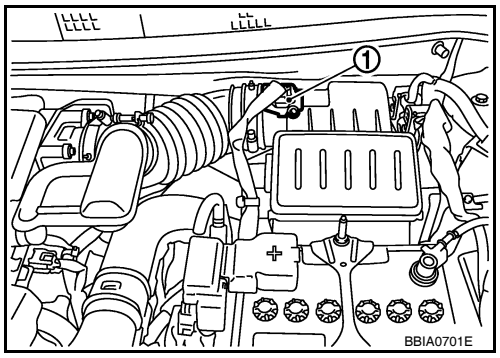
2.CLEAR THE SELF-LEARNING DATA

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor (1) 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 DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-542, "Emission-related Diagnostic Information".
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-740.
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

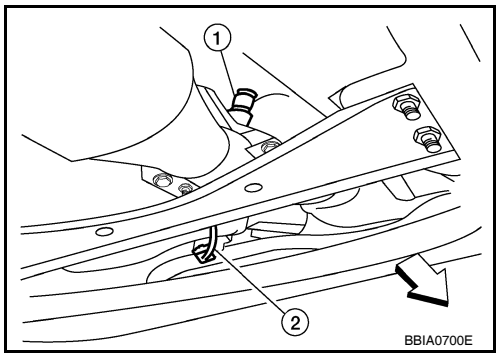
1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector (2).

- : Vehicle front
- Heated oxygen sensor 2 (1)

3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 59 and HO2S2 terminal 1.
   Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and HO2S2 terminal 4.
   Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 50 or HO2S2 terminal 4 and ground.
   Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-722, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6.CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

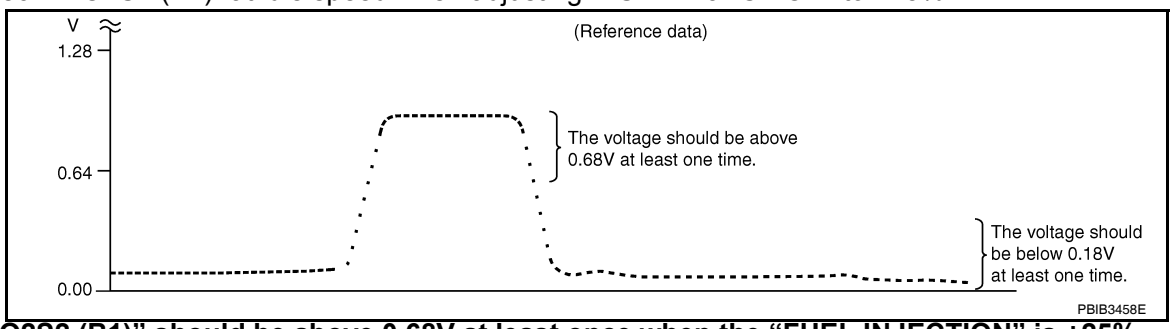
Component Inspection

INFOID:0000000004537204

HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



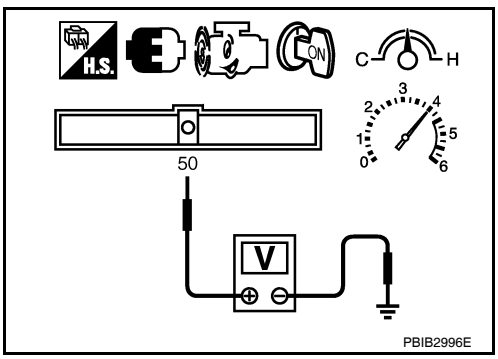
“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.18V at least once when the “FUEL INJECTION” is −25%.

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

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. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V and below 0.18V at least once during this procedure.
   If the voltage can be confirmed at step 6, step 7 is not necessary.



7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with OD OFF (A/T), D position (CVT) or 3rd gear position (M/T).
   The voltage should be above 0.68 and below 0.18V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

INFOID:0000000004537205

HEATED OXYGEN SENSOR 2

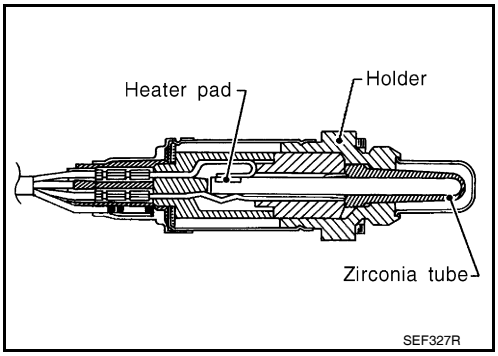
Refer to EM-144.

DTC P0138 HO2S2

Component Description

INFOID:0000000004537206

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air/fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537207

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1)	• 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 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)		LEAN ←→ RICH

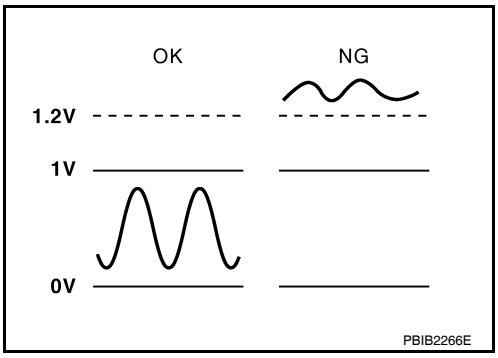
On Board Diagnosis Logic

INFOID:0000000004537208

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 before the three way catalyst (manifold) causes the longer switching time.

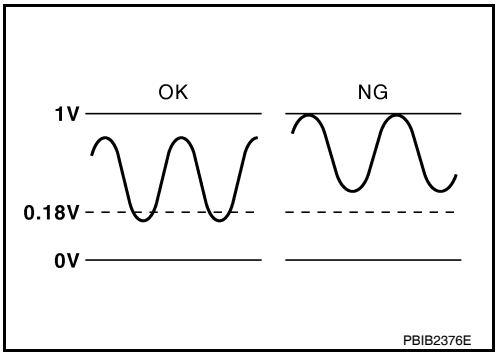
MALFUNCTION A

To judge the malfunctions of rear heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



MALFUNCTION B

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0138 0138	Heated oxygen sensor 2 circuit high voltage	A)	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (Heated oxygen sensor 2 circuit is open or shorted.) • Heated oxygen sensor 2
		B)	The minimum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (Heated oxygen sensor circuit is open or shorted.) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector

DTC Confirmation Procedure

INFOID:0000000004537209

Perform PROCEDURE FOR MALFUNCION A first.
If DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 2 minutes.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to EC-728, "Diagnosis Procedure".

PROCEDURE FOR MALFUNCTION B

With CONSULT-III

TESTING CONDITION:
For the best results, perform DTC WORK SUPPORT at a temperature of 0 to 30°C (32 to 86°F).

1. Turn ignition switch ON and select “DATA MONITOR ” mode with CONSULT-III
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
7. Open engine hood.
8. Select “HO2S2 (B1) P1146” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-III.
9. Start engine and following the instruction of CONSULT-III.
   NOTE:
   It will take at most 10 minutes until “COMPLETED” is displayed.
10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
    If “NG” is displayed, refer to EC-728, "Diagnosis Procedure".
    If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
b. Return to step 1.

Overall Function Check

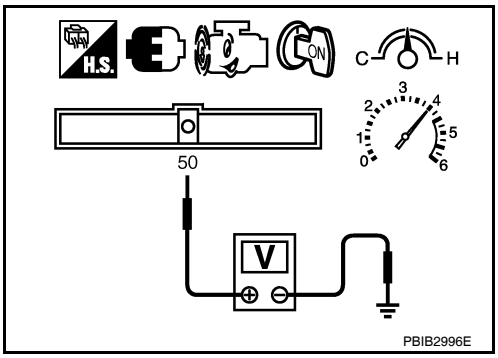
INFOID:0000000004537210

PROCEDURE FOR MALFUNCTION B

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

With GST

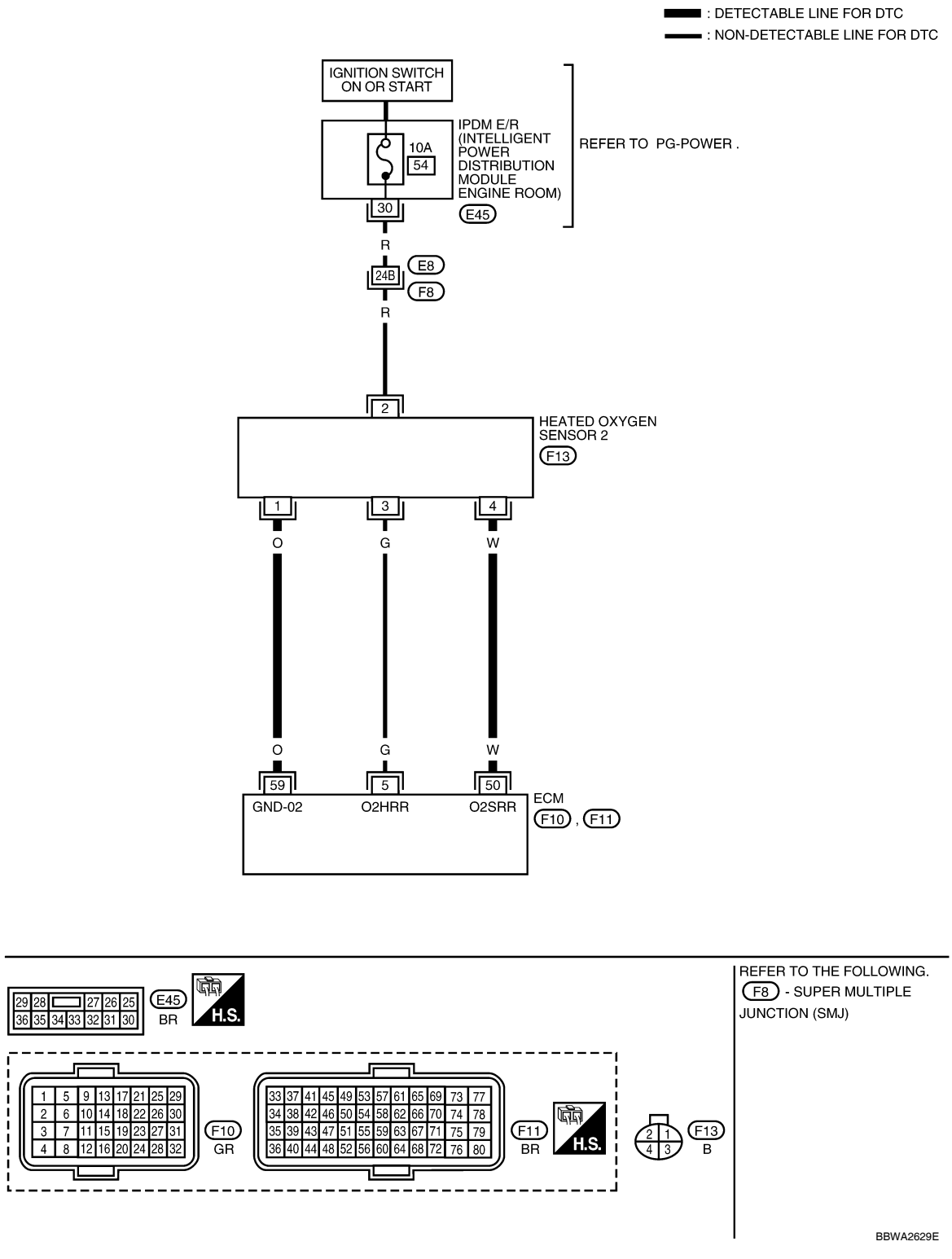
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle 1 minute.
5. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.18V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with OD OFF (A/T), D position (CVT) or 3rd gear position (M/T).
   The voltage should be below 0.18V at least once during this procedure.
8. If NG, go to EC-728, "Diagnosis Procedure".



Wiring Diagram

INFOID:0000000004537211

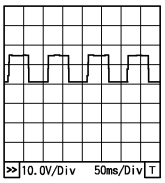
EC-HO2S2-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	G	Heated oxygen sensor 2 heater	**[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.	Approximately 10V  PBIA8148J
			[Ignition switch: ON] • Engine stopped **[Engine is running]** • Engine speed: Above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
50	W	Heated oxygen sensor 2	**[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 - Approximately 1.0V
59	O	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

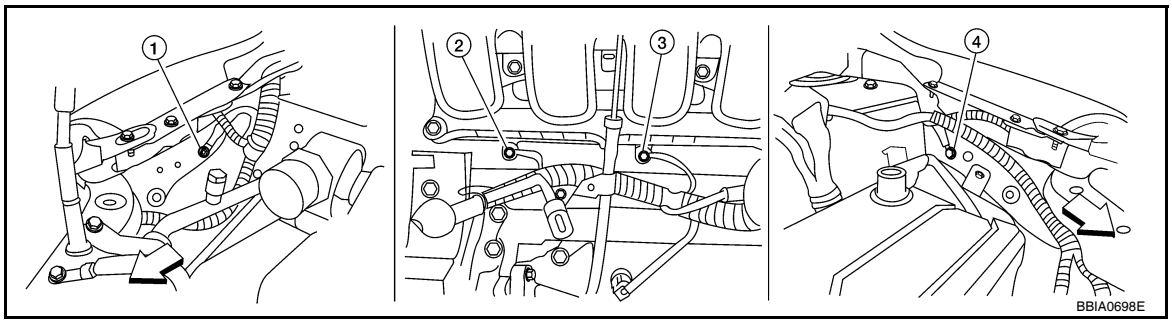
Diagnosis Procedure

INFOID:0000000004537212

PROCEDURE FOR MALFUNCTION A

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

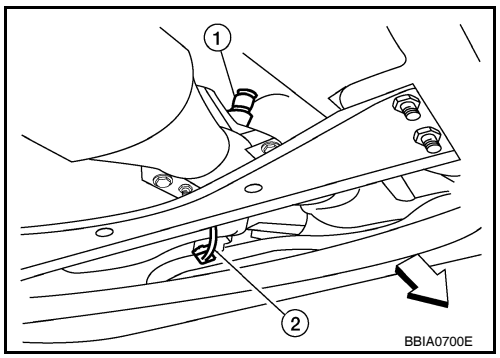
1. body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 harness connector (2).
- : Vehicle front
- Heated oxygen sensor 2 (1)
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 59 and HO2S2 terminal 1. Refer to Wiring Diagram.



Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and HO2S2 terminal 4. Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 50 or HO2S2 terminal 4 and ground. Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-731, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6.CHECK INTERMITTENT INCIDENT

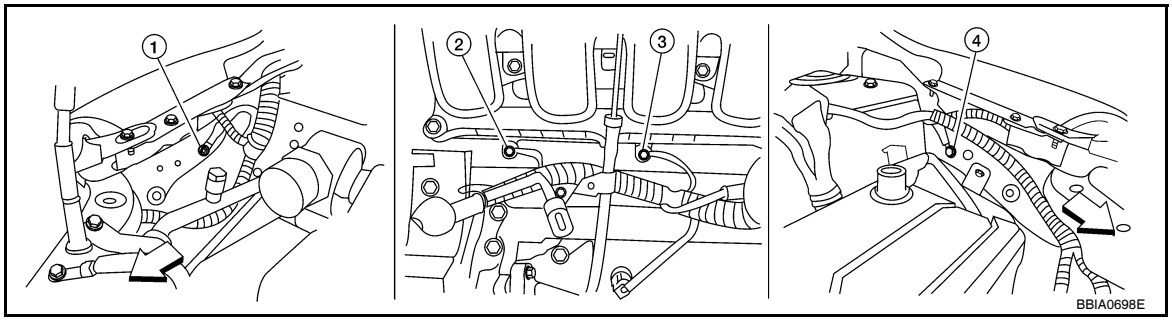
Refer to EC-626.

>> **INSPECTION END**

PROCEDURE FOR MALFUNCTION B

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine screw on the body. Refer to EC-632, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

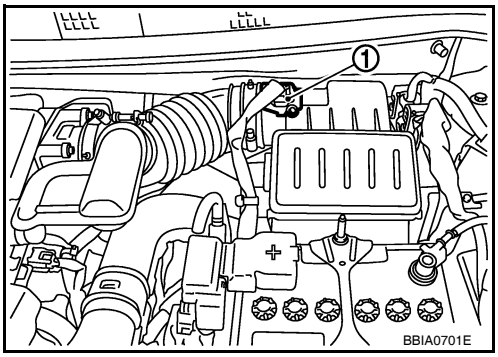
2. CLEAR THE SELF-LEARNING DATA

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor (1) 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-542, "Emission-related Diagnostic Information".
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



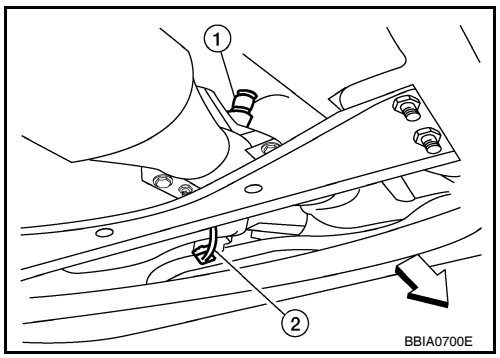
Yes or No

Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-746.
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect heated oxygen sensor 2 harness connector (2).
- : Vehicle front
- Heated oxygen sensor 2 (1)
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 59 and HO2S2 terminal 1. Refer to Wiring Diagram.



Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and HO2S2 terminal 4. Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 50 or HO2S2 terminal 4 and ground. Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-731, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

Component Inspection

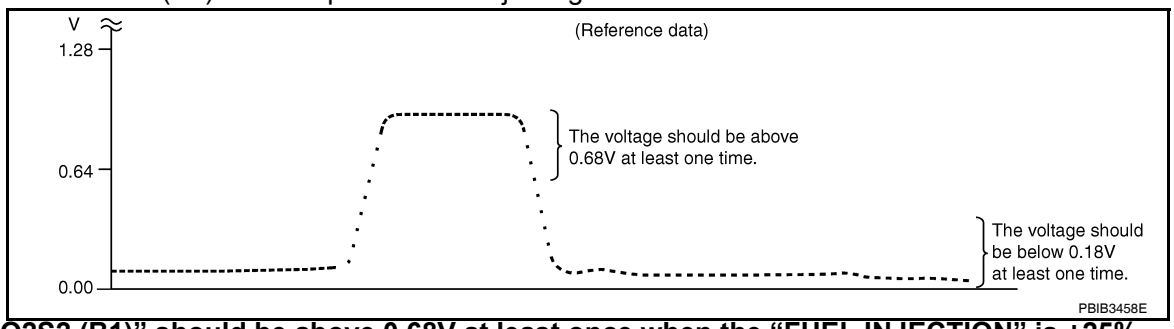
INFOID:0000000004537213

HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.

6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.

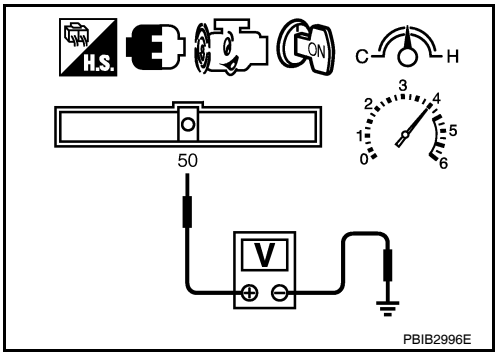


“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.18V at least once when the “FUEL INJECTION” is −25%.

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

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. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V and below 0.18V at least once during this procedure.
   If the voltage can be confirmed at step 6, step 7 is not necessary.



7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with OD OFF (A/T), D position (CVT) or 3rd gear position (M/T).
   The voltage should be above 0.68 and below 0.18V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

INFOID:0000000004537214

HEATED OXYGEN SENSOR 2

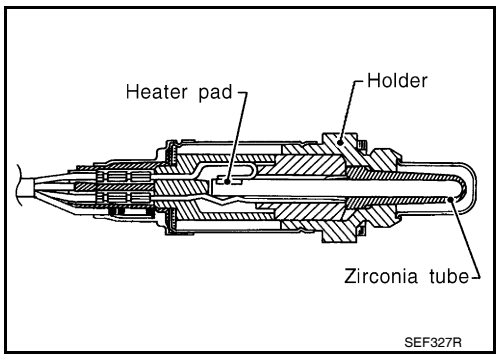
Refer to EM-144.

DTC P0139 HO2S2

Component Description

INFOID:0000000004537215

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air/fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537216

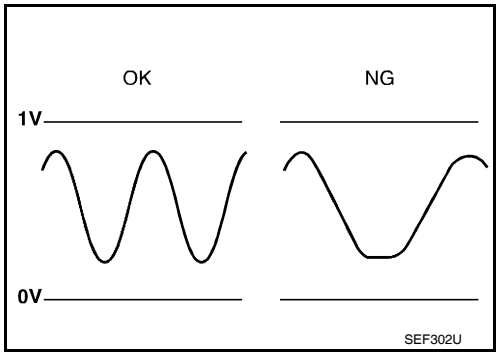
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1)	• Revving engine from idle to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - Keep the engine speed between 3,500 rpm and 4,000 rpm for 1 minute and idle for 1 minute under no load	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)		LEAN ←→ RICH

On Board Diagnosis Logic

INFOID:0000000004537217

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 before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139 0139	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond between rich and lean than the specified time.	• Harness or connectors (Heated oxygen sensor circuit is open or shorted.) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks

DTC Confirmation Procedure

INFOID:0000000004537218

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-III

TESTING CONDITION:
For better results, perform “DTC WORK SUPPORT” at a temperature of 0 to 30 °C (32 to 86 °F).

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
7. Select “HO2S2 (B1) P0139” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-III.
8. Start engine and following the instruction of CONSULT-III.
   NOTE:
   It will take at most 10 minutes until “COMPLETED” is displayed.
9. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-736, "Diagnosis Procedure".
   If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).

b. Return to step 1.

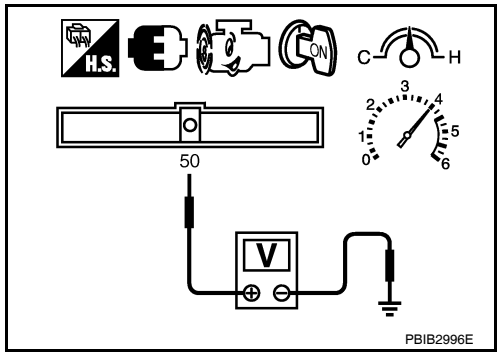
Overall Function Check

INFOID:0000000004537219

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

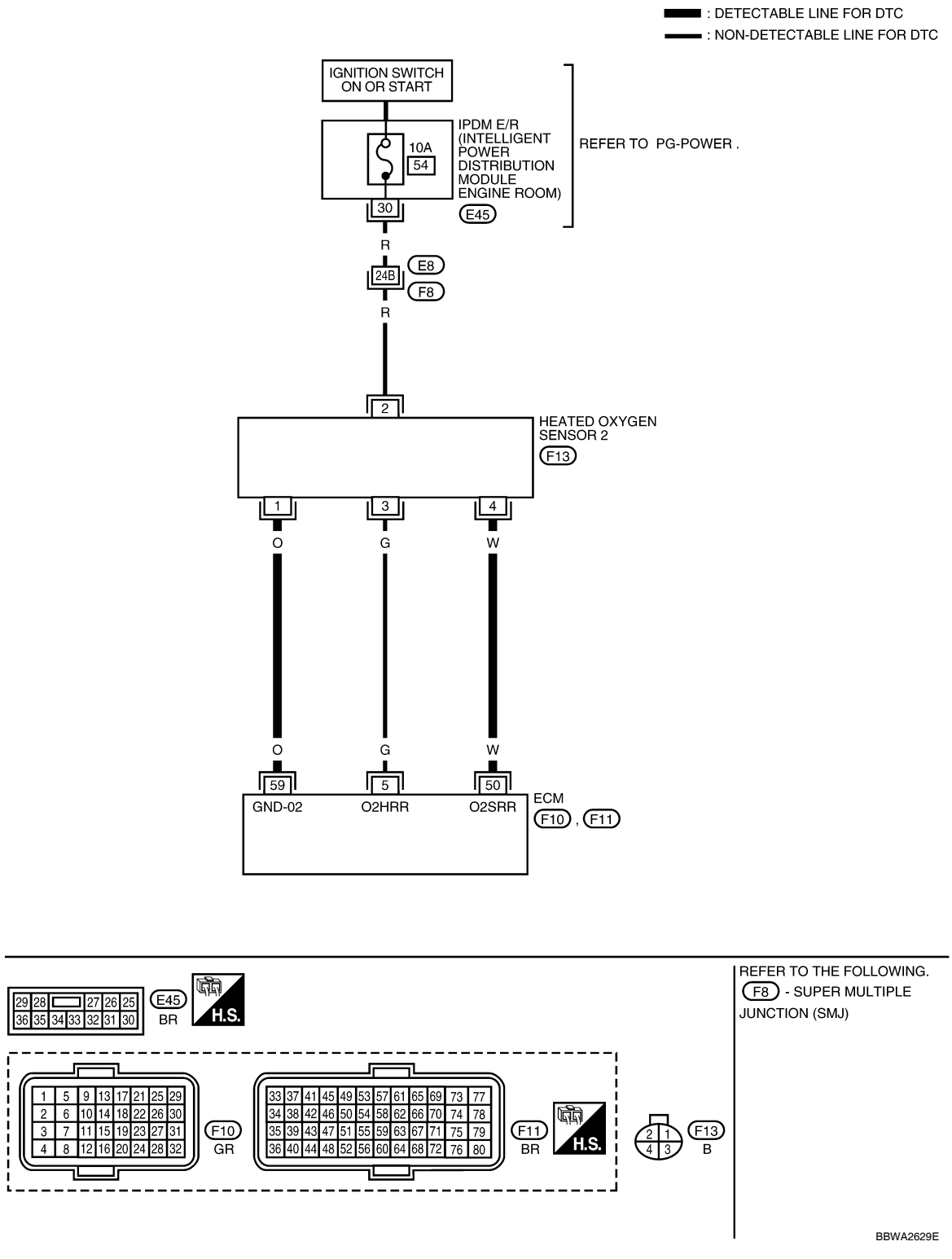
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   A change of voltage should be more than 0.24V for 1 second during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with OD OFF (A/T), D position (CVT) or 3rd gear position (M/T).
   A change of voltage should be more than 0.24V for 1 second during this procedure.
8. If NG, go to EC-736, "Diagnosis Procedure".



Wiring Diagram

INFOID:0000000004537220

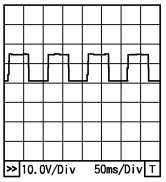
EC-HO2S2-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	G	Heated oxygen sensor 2 heater	**[Engine is running]** • 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	Approximately 10V  PBIA8148J
			[Ignition switch: ON] • Engine stopped **[Engine is running]** • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
50	W	Heated oxygen sensor 2	**[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 - Approximately 1.0V
59	O	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

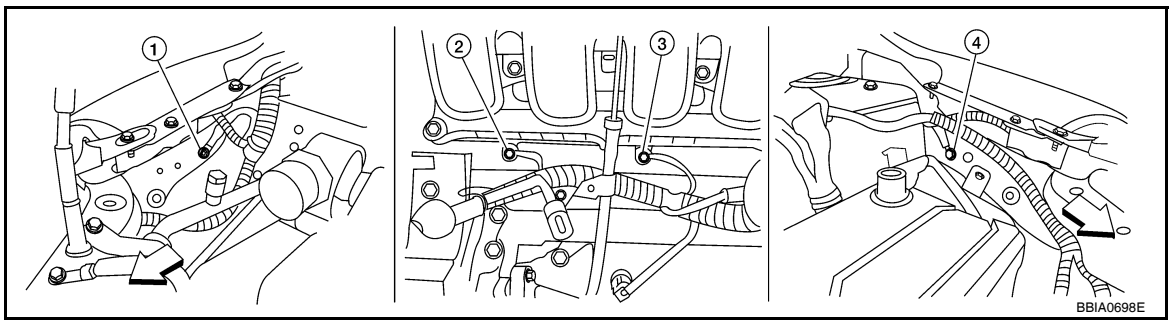
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004537221

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

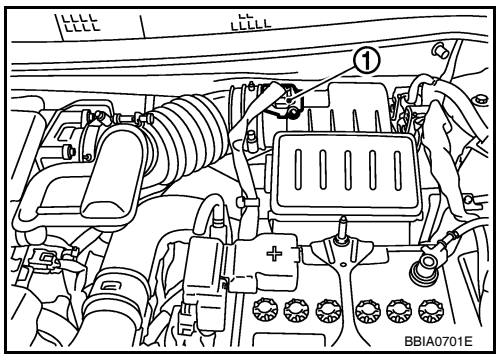
2.CLEAR THE SELF-LEARNING DATA

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected?
   Is it difficult to start engine?

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor (1) 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-542, "Emission-related Diagnostic Information".
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-740 or EC-746.
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

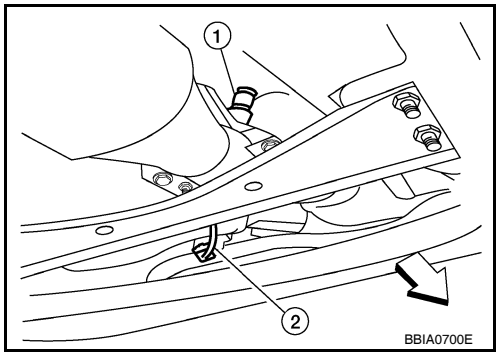
1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector (2).

- : Vehicle front
- Heated oxygen sensor 2 (1)

3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S2 terminal 1 and ECM terminal 59. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 4 and ECM terminal 50. Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 50 or HO2S2 terminal 4 and ground. Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-738, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

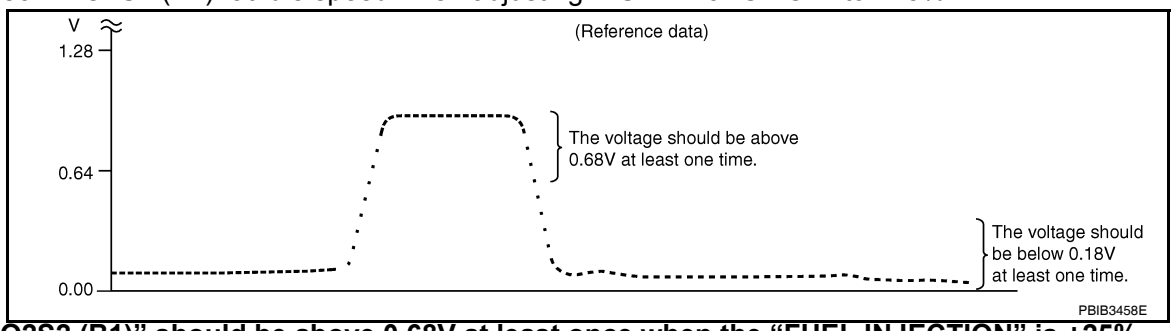
Component Inspection

INFOID:0000000004537222

HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



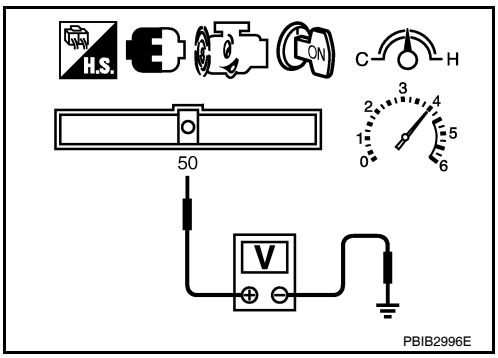
“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.18V at least once when the “FUEL INJECTION” is −25%.

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

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. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V and below 0.18V at least once during this procedure.
   If the voltage can be confirmed at step 6, step 7 is not necessary.
7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with OD OFF (A/T), D position (CVT) or 3rd gear position (M/T).
   The voltage should be above 0.68 and below 0.18V at least once during this procedure.



8. If NG, replace heated oxygen sensor 2.
   CAUTION:
   - **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
   - **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

INFOID:0000000004537223

HEATED OXYGEN SENSOR 2

Refer to EM-144.

DTC P0171 FUEL INJECTION SYSTEM FUNCTION

On Board Diagnosis Logic

INFOID:0000000004537224

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the air fuel ratio (A/F) sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171 0171	Fuel injection system too lean	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	• Intake air leaks • Air fuel ratio (A/F) sensor 1 • Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor • Incorrect PCV hose connection

DTC Confirmation Procedure

INFOID:0000000004537225

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Start engine again and let it idle for at least 10 minutes.
6. Check 1st trip DTC.
   The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to EC-743, "Diagnosis Procedure".
   NOTE:
   If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.

b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
   Hold the accelerator pedal as steady as possible.

   The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

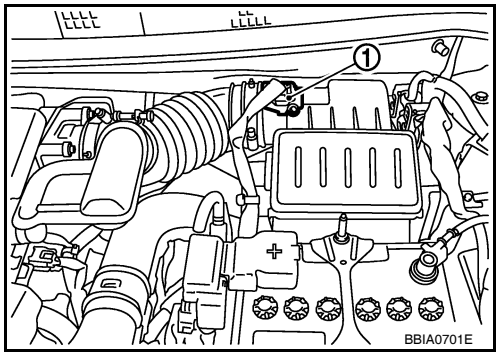
Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)

Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8. Crank engine while depressing accelerator pedal. If engine starts, go to EC-743, "Diagnosis Procedure". If engine does not start, check exhaust and intake air leak visually.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor (1) harness connector.
4. Restart engine and let idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor (1) harness connector.
6. Select Service $03 with GST. Make sure DTC P0102 is detected.
7. Select Service $04 with GST and erase the DTC P0102.
8. Start engine again and let it idle for at least 10 minutes.
9. Select Service $07 with GST. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to EC-743, "Diagnosis Procedure".



NOTE:
If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
Hold the accelerator pedal as steady as possible.

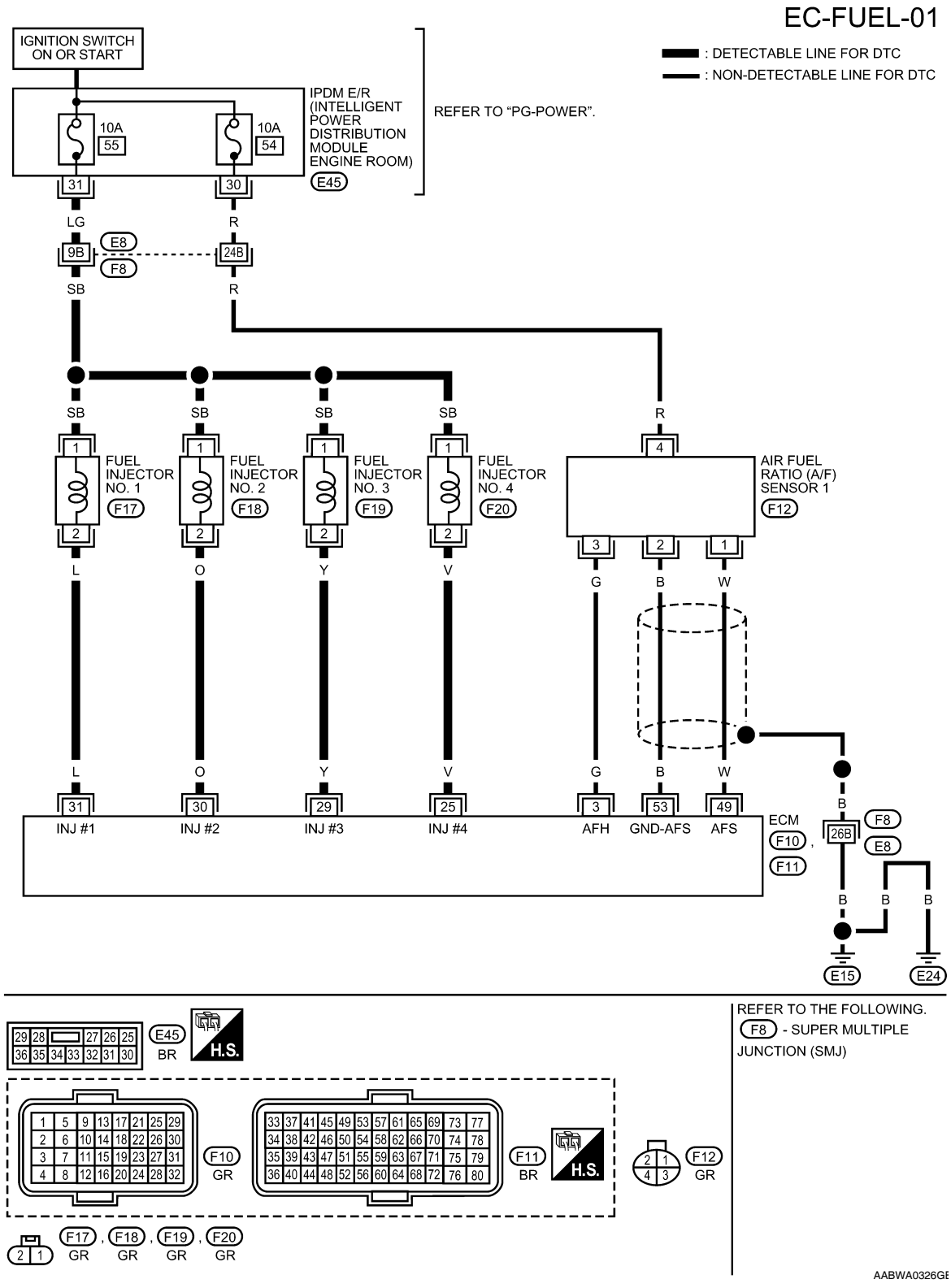
The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

10. If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
11. Crank engine while depressing accelerator pedal. If engine starts, go to EC-743, "Diagnosis Procedure". If engine does not start, check exhaust and intake air leak visually.

Wiring Diagram

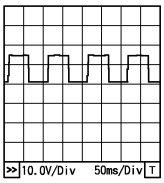
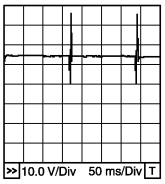
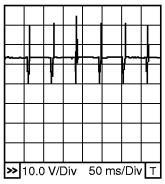
INFOID:0000000004537226



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V  PBIA8148J
25 29 30 31	V Y O L	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 2 Fuel injector No. 1	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)  PBIB0529E
			[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  PBIA4943J
49	W	A/F sensor 1	**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	**[Ignition switch: ON]**	Approximately 2.2V

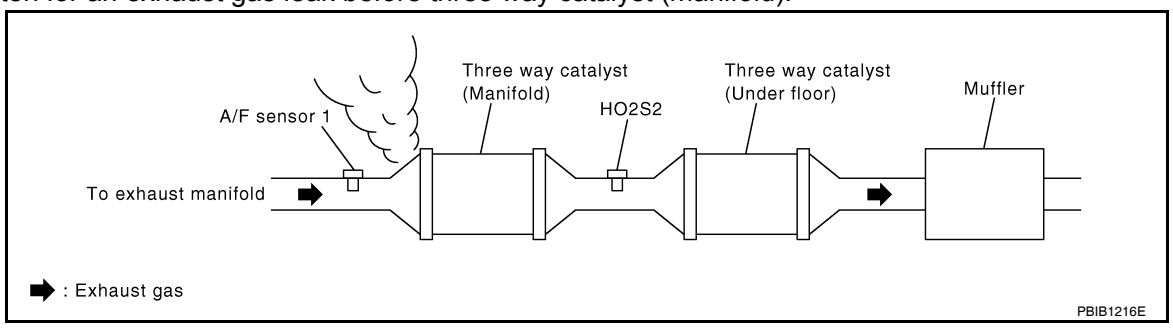
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004537227

1.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



PBIB1216E

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK FOR INTAKE AIR LEAK AND PCV HOSE

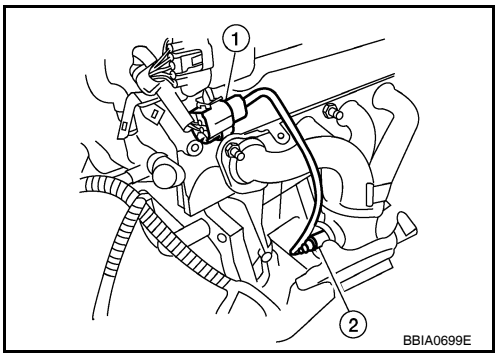
1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK AIR FUEL RATIO (A/F) SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect air fuel ratio (A/F) sensor 1 harness connector (1).
- Air fuel ratio (A/F) sensor 1 (2)
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.



A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

5. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-574, "Fuel Pressure Check".
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-574, "Fuel Pressure Check".

At idling: Approximately 350 kPa (3.57 kg/cm^2, 51 psi)

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Fuel pump and circuit (Refer to EC-991.)
- Fuel pressure regulator (Refer to EC-574, "Fuel Pressure Check".)
- Fuel lines (Refer to EM-156.)
- Fuel filter for clogging

>> Repair or replace.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-III.

at idling : 1.0 - 4.0 g·m/sec
at 2,500 rpm : 2.0 - 10.0 g·m/sec

With GST

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check mass air flow sensor signal in Service $01 with GST.

at idling : 1.0 - 4.0 g·m/sec
at 2,500 rpm : 2.0 - 10.0 g·m/sec

OK or NG

OK >> GO TO 7.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-655.

7. CHECK FUNCTION OF FUEL INJECTORS

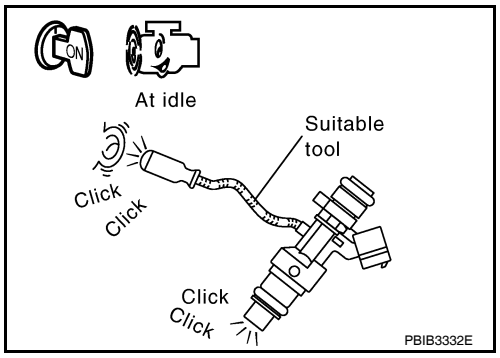
With CONSULT-III

1. Let engine idle.
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.



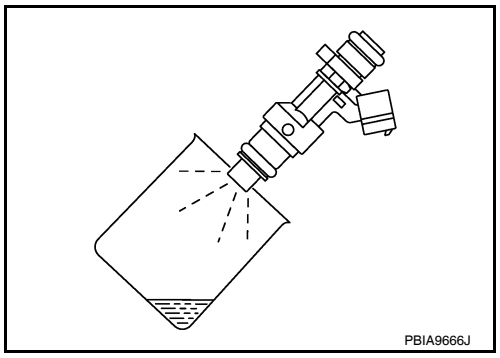
OK or NG

OK >> GO TO 8.
NG >> Perform trouble diagnosis for EC-986.

8. CHECK FUEL INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch OFF.
3. Reconnect all harness connectors disconnected.
4. Remove fuel tube assembly. Refer to EM-156.
   Keep fuel hose and all fuel injector connected to fuel tube.
   The fuel injector harness connectors should remain connected.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each fuel injector.
7. Crank engine for about 3 seconds. Make sure that fuel sprays out from fuel injectors.

Fuel should be sprayed evenly for each fuel injector.



OK or NG

OK >> GO TO 9.
NG >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

DTC P0172 FUEL INJECTION SYSTEM FUNCTION

On Board Diagnosis Logic

INFOID:0000000004537228

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the air fuel ratio (A/F) sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172 0172	Fuel injection system too rich	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• Air fuel ratio (A/F) sensor 1 • Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor

DTC Confirmation Procedure

INFOID:0000000004537229

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Start engine again and let it idle for at least 10 minutes.
6. Check 1st trip DTC.
   The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to EC-749, "Diagnosis Procedure".
   NOTE:
   If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.

b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
   Hold the accelerator pedal as steady as possible.

   The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

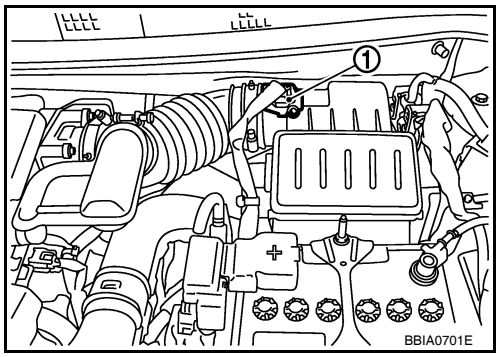
Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.

8. Crank engine while depressing accelerator pedal.
If engine starts, go to EC-749, "Diagnosis Procedure". If engine does not start, remove ignition plugs and check for fouling, etc.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor (1) harness connector.
4. Restart engine and let idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select Service $03 with GST. Make sure DTC P0102 is detected.
7. Select Service $04 with GST and erase the DTC P0102.
8. Start engine again and let it idle for at least 10 minutes.
9. Select Service $07 with GST. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to EC-749, "Diagnosis Procedure".



NOTE:
If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
Hold the accelerator pedal as steady as possible.

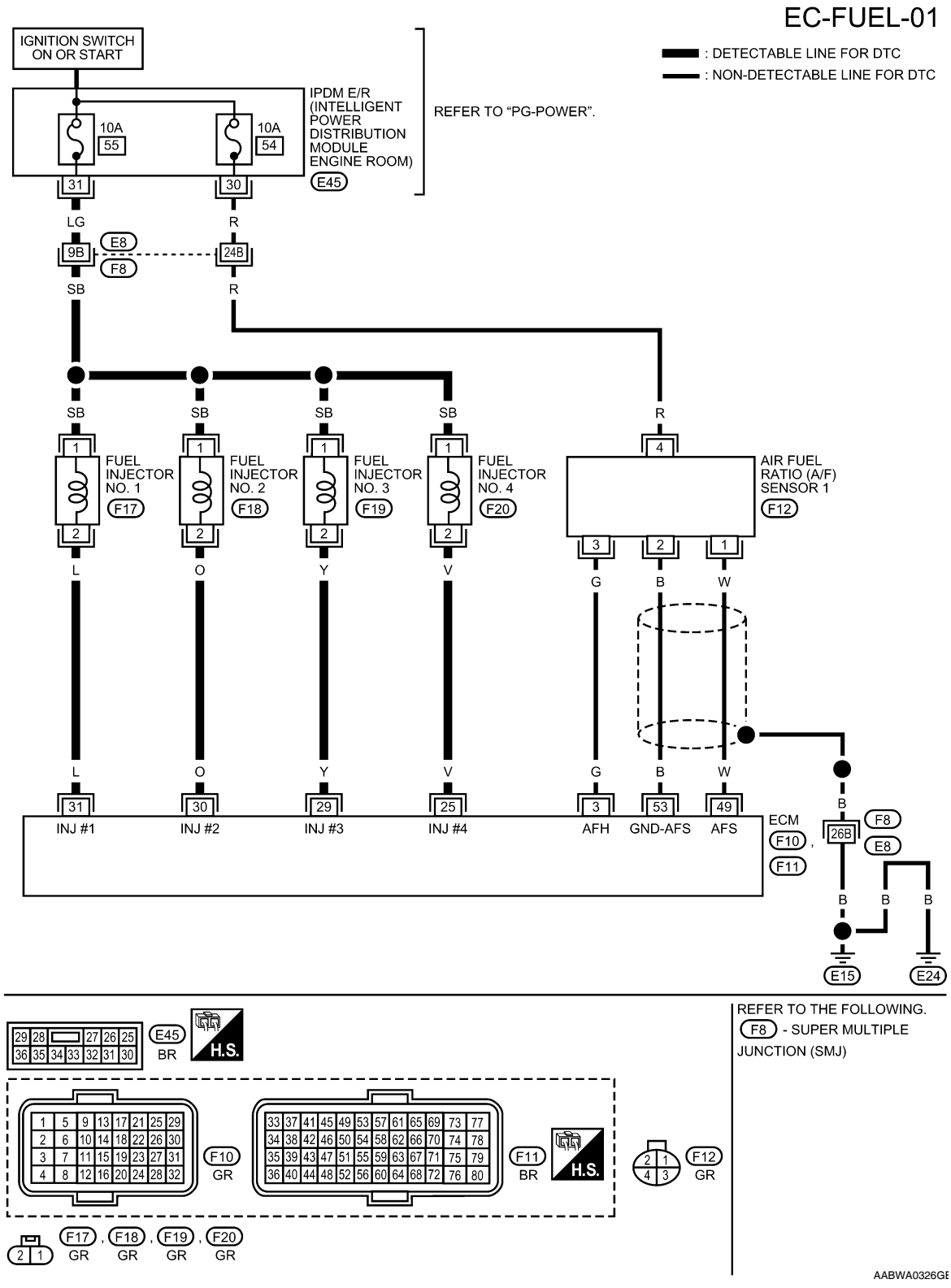
The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

10. If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
11. Crank engine while depressing accelerator pedal.
If engine starts, go to EC-749, "Diagnosis Procedure". If engine does not start, remove ignition plugs and check for fouling, etc.

Wiring Diagram

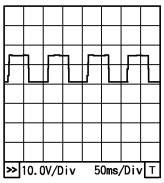
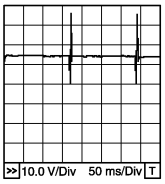
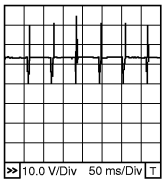
INFOID:0000000004537230



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V  PBIA8148J
25 29 30 31	V Y O L	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 2 Fuel injector No. 1	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)  PBIB0529E
			[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  PBIA4943J
49	W	A/F sensor 1	**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	**[Ignition switch: ON]**	Approximately 2.2V

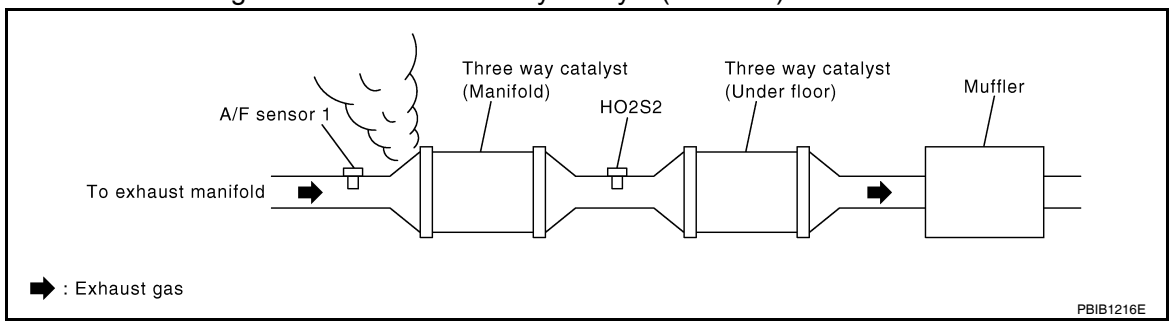
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004537231

1.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



PBIB1216E

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK FOR INTAKE AIR LEAK

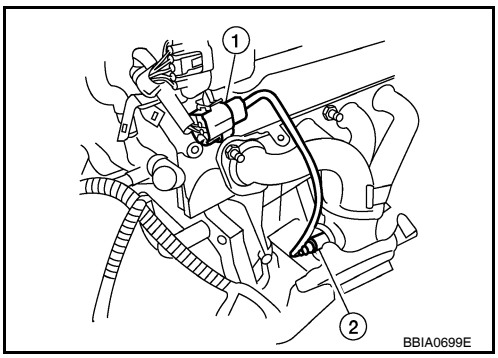
Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK AIR FUEL RATIO (A/F) SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect air fuel ratio (A/F) sensor 1 harness connector (1).
- Air fuel ratio (A/F) sensor 1 (2)
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.



A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

5. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-574, "Fuel Pressure Check".
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-574, "Fuel Pressure Check".

At idling: Approximately 350 kPa (3.57 kg/cm2, 51 psi)

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Fuel pump and circuit (Refer to EC-991.)
- Fuel pressure regulator (Refer to EC-574, "Fuel Pressure Check".)

>> Repair or replace.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-III.

at idling : 1.0 - 4.0 g·m/sec
at 2,500 rpm : 2.0 - 10.0 g·m/sec

With GST

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check mass air flow sensor signal in Service $01 with GST.

at idling : 1.0 - 4.0 g·m/sec
at 2,500 rpm : 2.0 - 10.0 g·m/sec

OK or NG

OK >> GO TO 7.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-655.

7. CHECK FUNCTION OF FUEL INJECTORS

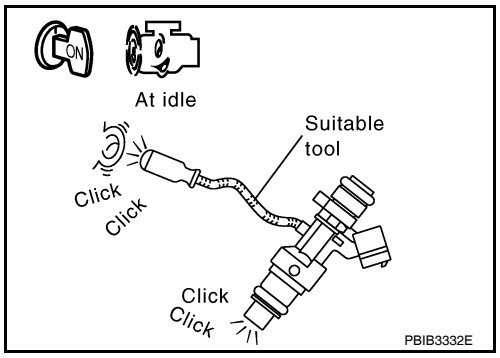
With CONSULT-III

1. Let engine idle.
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.



OK or NG

OK >> GO TO 8.
NG >> Perform trouble diagnosis for EC-986.

8. CHECK FUEL INJECTOR

1. Remove fuel injector assembly. Refer to EM-156.
   Keep fuel hose and all fuel injector connected to fuel tube.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Reconnect all harness connectors disconnected.
4. Disconnect all injector harness connectors.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each fuel injector.
7. Crank engine for about 3 seconds.
   Make sure fuel does not drip from fuel injector.

OK or NG

OK (Does not drip.)>>GO TO 9.
NG (Drips.)>>Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

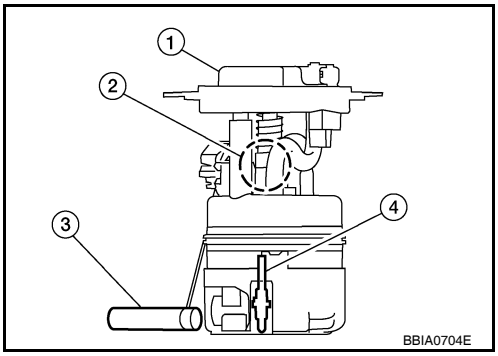
DTC P0181 FTT SENSOR

Component Description

INFOID:0000000004537232

The fuel tank temperature sensor (4) is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

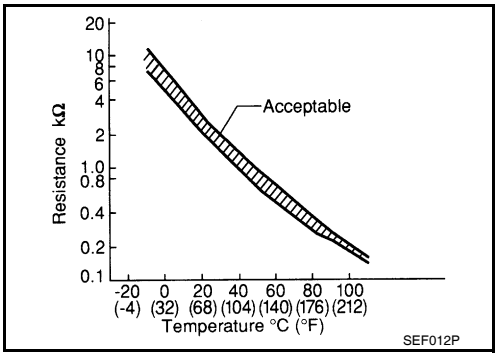
- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel level sensor (3)



<Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: This data is reference values and is measured between ECM terminal 43 (Fuel tank temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result damage the ECM's transistor. Use ground other than ECM, such as ground.

On Board Diagnosis Logic

INFOID:0000000004537233

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0181 0181	Fuel tank temperature sensor circuit range/performance	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	• Harness or connectors (Fuel tank temperature sensor circuit is open or shorted) • Fuel tank temperature sensor

DTC Confirmation Procedure

INFOID:0000000004537234

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-III

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check 1st trip DTC.
   If 1st trip DTC is detected, go to EC-753, "Diagnosis Procedure".
   If 1st trip DTC is not detected, go to following step.
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Check “COOLAN TEMP/S” value.
   If the “COOLAN TEMP/S” is less than 60°C (140°F), the result will be OK.
   If the “COOLAN TEMP/S” is above 60°C (140°F), go to the following step.
5. Cool engine down until “COOLAN TEMP/S” signal is less than 60°C (140°F).
6. Wait at least 10 seconds.
7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to EC-753, "Diagnosis Procedure".

WITH GST

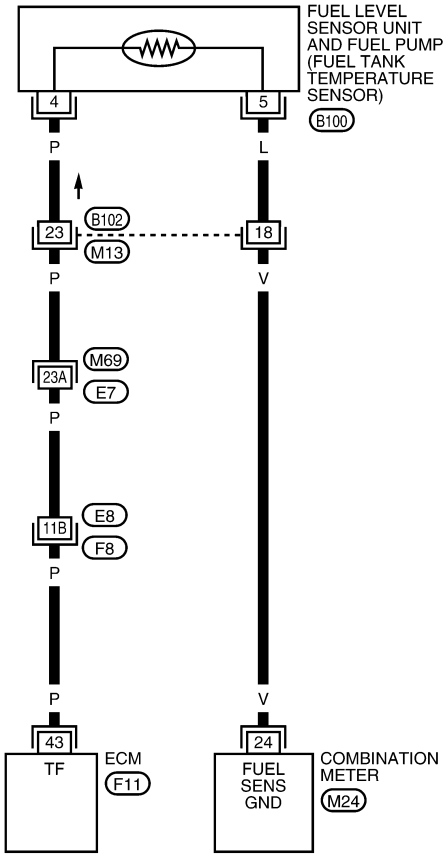
Follow the procedure “WITH CONSULT-III” above.

Wiring Diagram

INFOID:0000000004537235

EC-FTTS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC



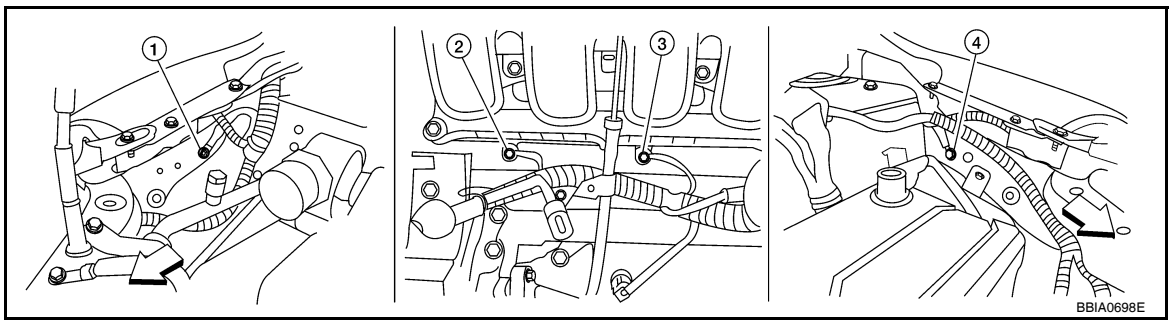
Diagnosis Procedure

INFOID:0000000004537236

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.

2. Loosen and retighten ground screw on the body.
Refer to EC-632, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

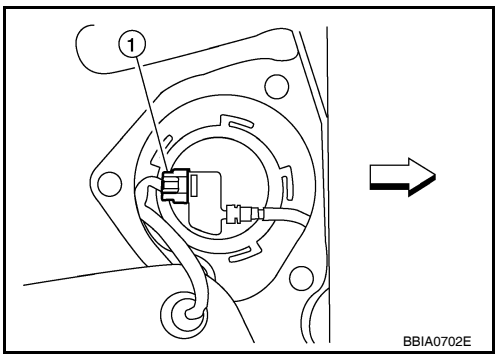
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector (1).

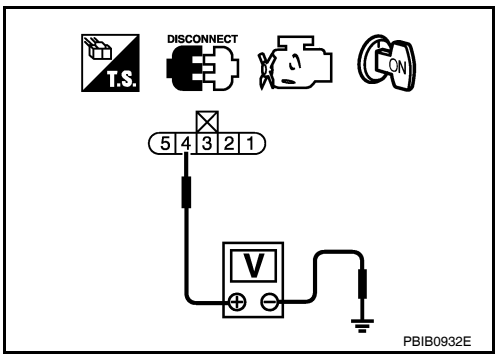
- : Vehicle front

3. Turn ignition switch ON.



4. Check voltage between “fuel level sensor unit and fuel pump” terminal 4 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between ECM and “fuel level sensor unit and fuel pump”

>> Repair open circuit or short to ground or short to power in harness or connector.

4.CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect combination meter harness connector.
3. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 5 and combination meter terminal 24. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B102, M13
- Harness for open or short between “fuel level sensor unit and fuel pump” and ground.

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to, EC-755, "Component Inspection".

OK or NG

OK >> GO TO 7.
NG >> Replace “fuel level sensor unit and fuel pump”.

7. CHECK INTERMITTENT INCIDENT

Perform EC-626.

>> **INSPECTION END**

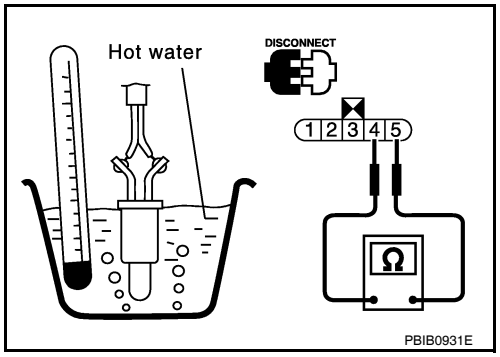
Component Inspection

INFOID:0000000004537237

FUEL TANK TEMPERATURE SENSOR

1. Check resistance between “fuel level sensor unit and fuel pump” terminal 4 and 5 by heating with hot water as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90



2. If NG, replace “fuel level sensor unit and fuel pump”.

Removal and Installation

INFOID:0000000004537238

FUEL TANK TEMPERATURE SENSOR

Refer to FL-5.

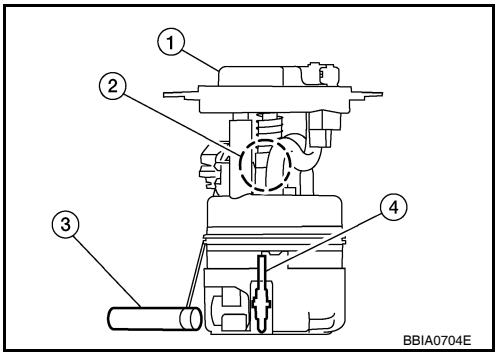
DTC P0182, P0183 FTT SENSOR

Component Description

INFOID:0000000004537239

The fuel tank temperature sensor (4) is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

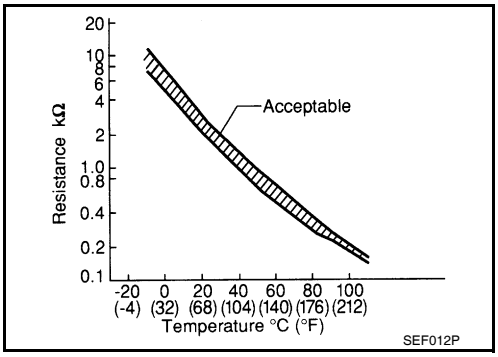
- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel level sensor (3)



<Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: This data is reference values and is measured between ECM terminal 43 (Fuel tank temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result damage the ECM's transistor. Use ground other than ECM, such as ground.

On Board Diagnosis Logic

INFOID:0000000004537240

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0182 0182	Fuel tank temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (Fuel tank temperature sensor circuit is open or shorted.) • Fuel tank temperature sensor
P0183 0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

INFOID:0000000004537241

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

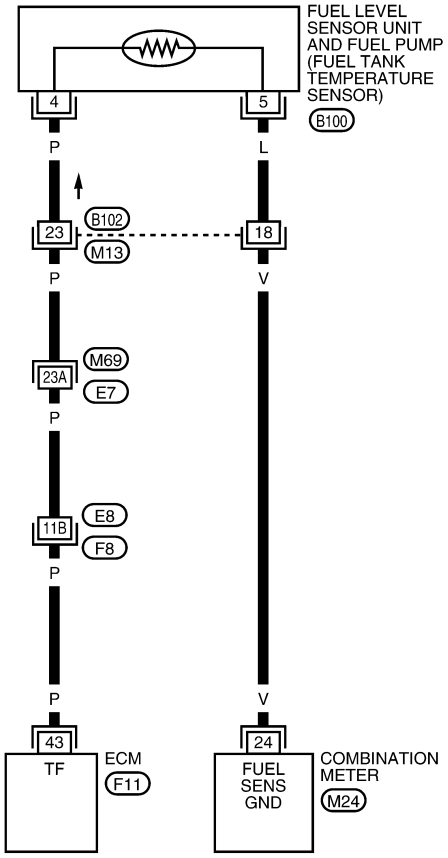
1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-757, "Diagnosis Procedure".

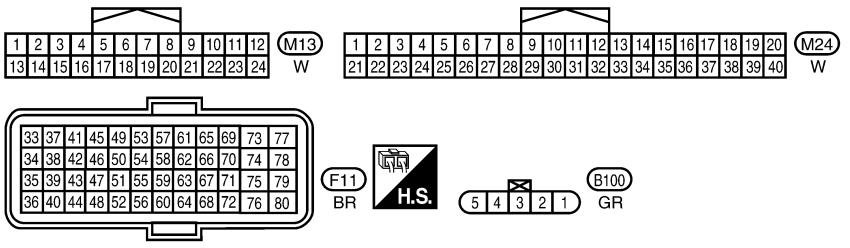
Wiring Diagram

INFOID:0000000004537242

EC-FTTS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





REFER TO THE FOLLOWING.
M69 , F8 - SUPER MULTIPLE JUNCTION (SMJ)

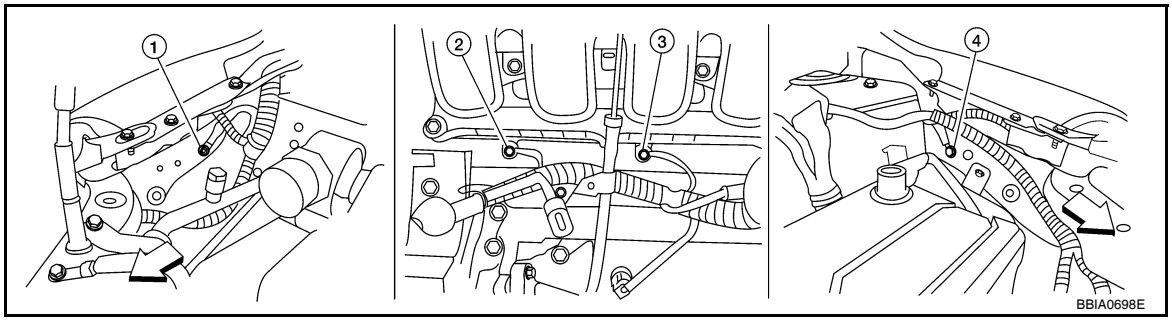
BBWA2636E

Diagnosis Procedure

INFOID:0000000004537243

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

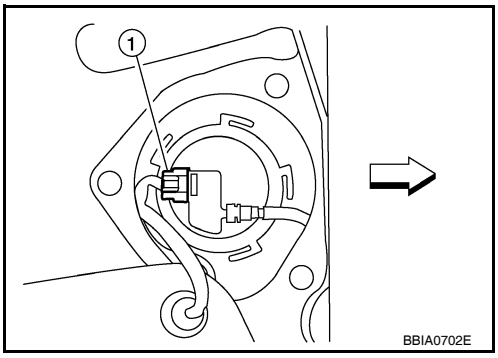
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

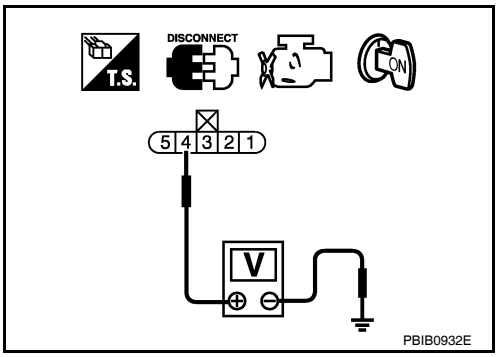
2.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect “fuel level sensor unit and fuel pump” harness connector (1).
- : Vehicle front
2. Turn ignition switch ON.



3. Check voltage between “fuel level sensor unit and fuel pump” terminal 4 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short to ground or short between ECM and “fuel level sensor unit and fuel pump”

>> Repair open circuit or short to ground or short to power in harness or connector.

4.CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect combination meter harness connector.
3. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 5 and combination meter terminal 24. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B102, M13
- Harness for open or short between “fuel level sensor unit and fuel pump” and ground

>> Repair open circuit or short to ground or short to power in harness or connector.

6. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to, EC-759, "Component Inspection".

OK or NG

OK >> GO TO 7.
NG >> Replace “fuel level sensor unit and fuel pump”.

7. CHECK INTERMITTENT INCIDENT

Perform EC-626.

>> **INSPECTION END**

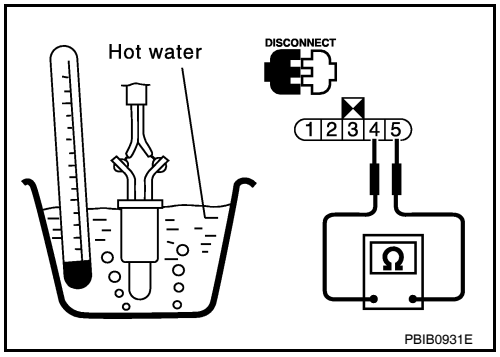
Component Inspection

INFOID:0000000004537244

FUEL TANK TEMPERATURE SENSOR

1. Check resistance between “fuel level sensor unit and fuel pump” terminal 4 and 5 by heating with hot water as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90



2. If NG, replace “fuel level sensor unit and fuel pump”.

Removal and Installation

INFOID:0000000004537245

FUEL TANK TEMPERATURE SENSOR

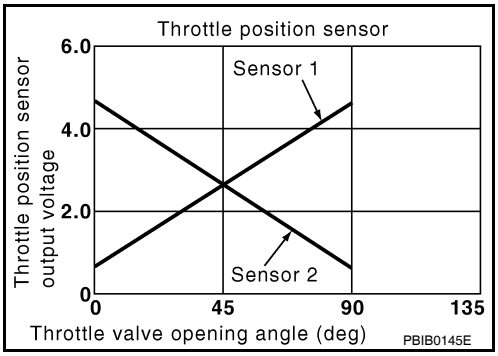
Refer to FL-5.

DTC P0222, P0223 TP SENSOR

Component Description

INFOID:0000000004537246

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.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537247

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
TP SEN 1-B1 TP SEN 2-B1*	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T, CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

INFOID:0000000004537248

These self-diagnoses have the one trip detection logic.
NOTE:
If DTC P0222 or P0223 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-874.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222 0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	• Harness or connectors (TP sensor 1 circuit is open or shorted.) (APP sensor 2 circuit is shorted.) • Electric throttle control actuator (TP sensor 1) • Accelerator pedal position sensor (APP sensor 2)
P0223 0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:0000000004537249

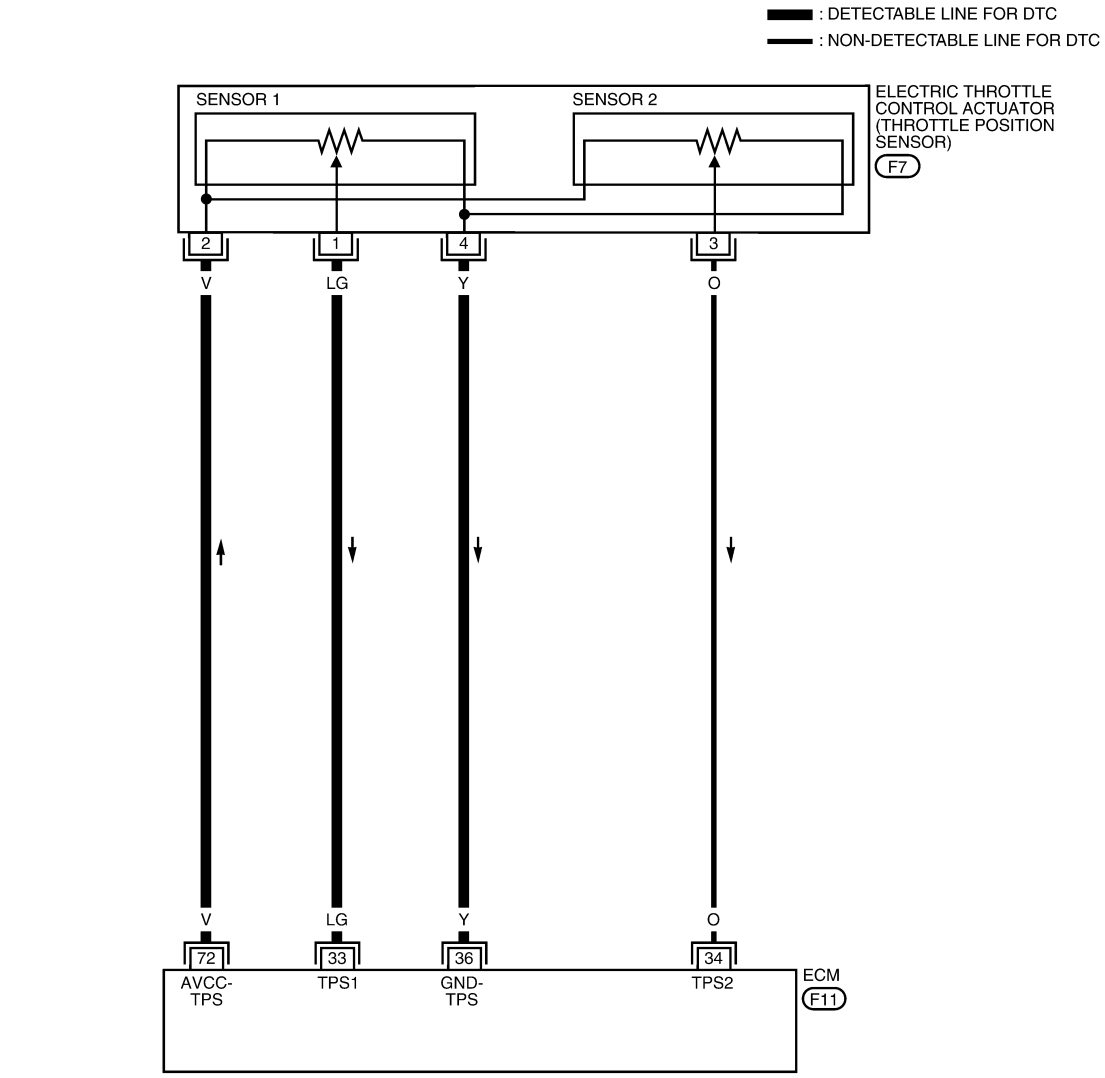
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

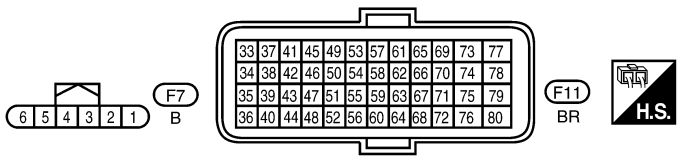
1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-762, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537250

EC-TPS1-01





BBWA2655E

Specification data are reference values and are measured between each terminal 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.

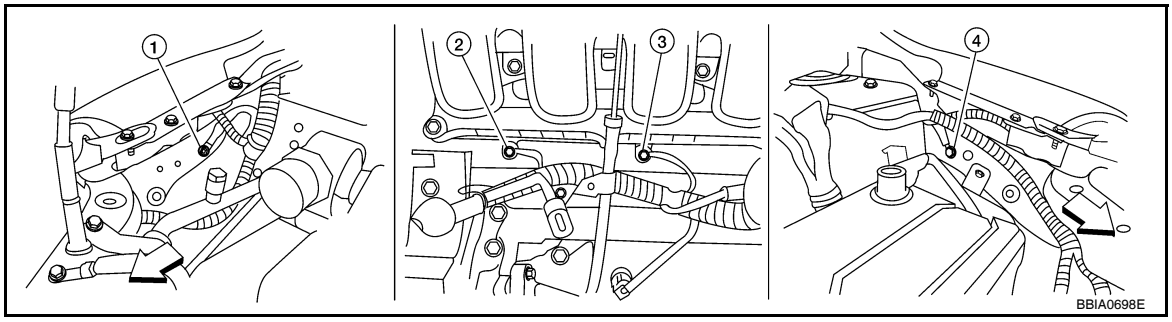
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	LG	Throttle position sensor 1	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
34	O	Throttle position sensor 2	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
36	Y	Sensor ground (Throttle position sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
72	V	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V

Diagnosis Procedure

INFOID:0000000004537251

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

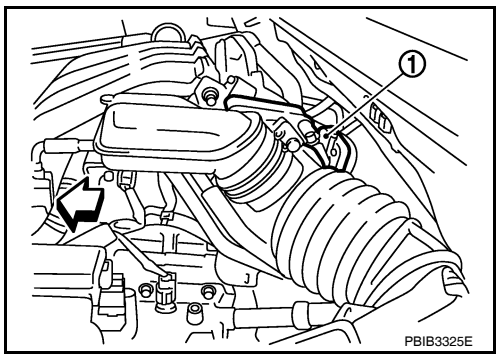
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator (1) harness connector.
- : Vehicle front
2. Turn ignition switch ON.

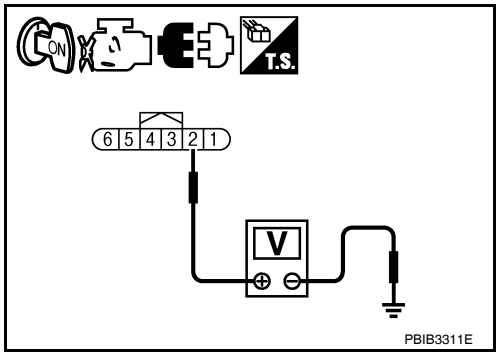


3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT-III or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness 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 harness continuity between ECM terminal 36 and electric throttle control actuator terminal 4. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 33 and electric throttle control actuator terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-764, "Component Inspection".

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-572, "Throttle Valve Closed Position Learning".
3. Perform EC-572, "Idle Air Volume Learning".

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

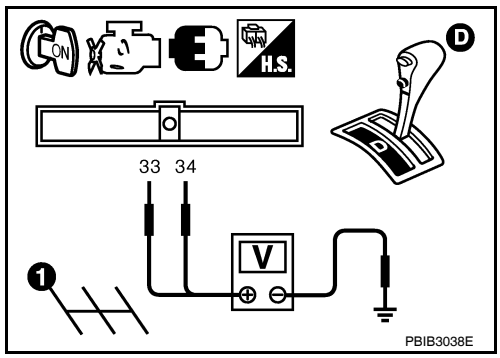
Component Inspection

INFOID:0000000004537252

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-572, "Throttle Valve Closed Position Learning".
3. Turn ignition switch ON.
4. Set shift lever to D position (A/T, CVT) or 1st position (M/T).
5. Check voltage between ECM terminals 33 (TP sensor 1 signal), 34 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
33 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
34 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-572, "Throttle Valve Closed Position Learning".
8. Perform EC-572, "Idle Air Volume Learning".

Removal and Installation

INFOID:0000000004537253

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-141.

DTC P0300 - P0304 MULTIPLE CYLINDER MISFIRE, NO. 1 - 4 CYLINDER MISFIRE

On Board Diagnosis Logic

INFOID:0000000004537254

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the 1st trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor (POS) signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
   If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300 0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • Fuel injector circuit is open or shorted • Fuel injector • Intake air leak • The ignition signal circuit is open or shorted • Lack of fuel • Drive plate or flywheel • Air fuel ratio (A/F) sensor 1 • Incorrect PCV hose connection
P0301 0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302 0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303 0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304 0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	

DTC Confirmation Procedure

INFOID:0000000004537255

CAUTION:
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for about 15 minutes.
4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to EC-766, "Diagnosis Procedure".
   NOTE:
   If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to table below.

Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following condition should be satisfied at the same time:

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F)
	When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F)

The time to driving varies according to the engine speed in the freeze frame data.
Refer to the following table.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

Diagnosis Procedure

INFOID:0000000004537256

1.CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.
3. Check PCV hose connection.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

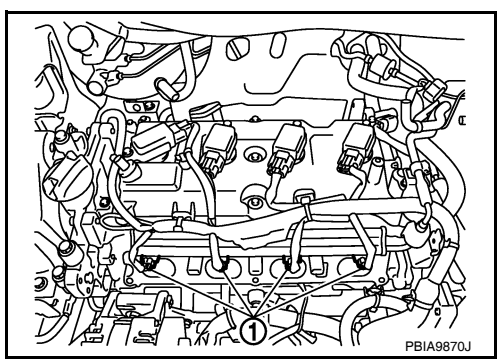
3.PERFORM POWER BALANCE TEST

With CONSULT-III

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

Without CONSULT-III

When disconnecting each fuel injector (1) harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?



Yes or No

Yes >> GO TO 4.

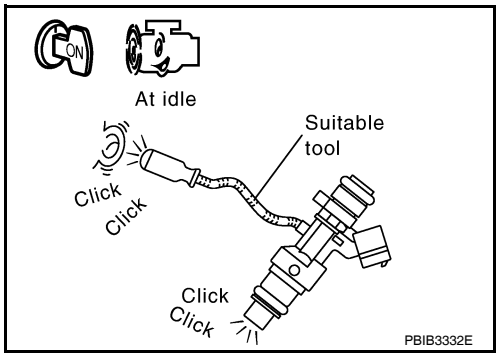
No >> GO TO 9.

4. CHECK FUEL INJECTOR

Does each fuel injector make an operating sound at idle?

Yes or No

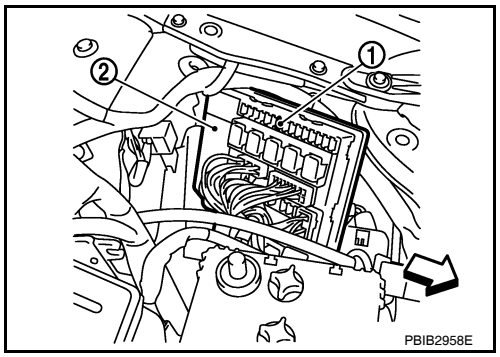
Yes >> GO TO 5.
No >> Check fuel injector(s) and circuit(s). Refer to EC-986.



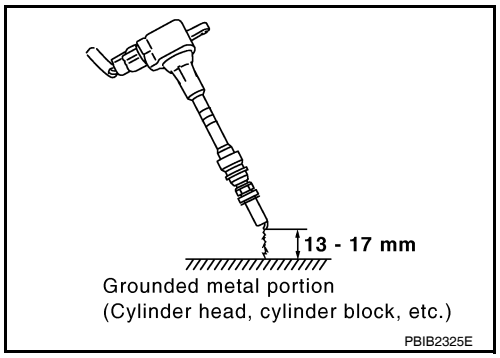
5. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
- : Vehicle front
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.



CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50cm. 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 is taken.**

NOTE:
When the gap is less than 13 mm, the spark might be generated even if the coil is malfunctioning.

OK or NG

OK >> GO TO 9.
NG >> GO TO 6.

6. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

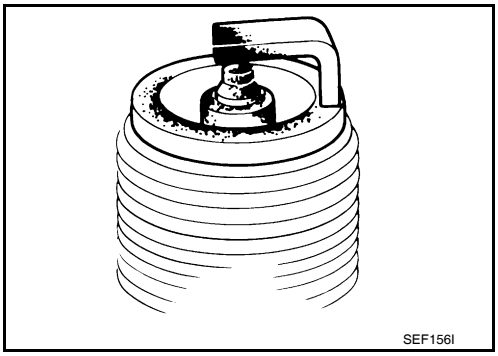
Spark should be generated.

OK or NG

OK >> GO TO 7.
NG >> Check ignition coil, power transistor and their circuits. Refer to EC-996.

7. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.



OK or NG

OK >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-227, "Standard and Limit".
NG >> 1. Repair or clean spark plug.
2. GO TO 8.

8. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

OK or NG

OK >> **INSPECTION END**
NG >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-227, "Standard and Limit".

9. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-185, "On-Vehicle Service".

OK or NG

OK >> GO TO 10.
NG >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

10. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to EC-574, "Fuel Pressure Check".
3. Install fuel pressure gauge and check fuel pressure. Refer to EC-574, "Fuel Pressure Check".

At idling: Approximately 350 kPa (3.57 kg/cm^2, 51 psi)

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.
- Fuel pump and circuit (Refer to EC-991.)
- Fuel pressure regulator (Refer to EC-574, "Fuel Pressure Check".)
- Fuel lines (Refer to EM-156.)
- Fuel filter for clogging

>> Repair or replace.

12. CHECK IGNITION TIMING

Check the following items. Refer to EC-566, "Basic Inspection".

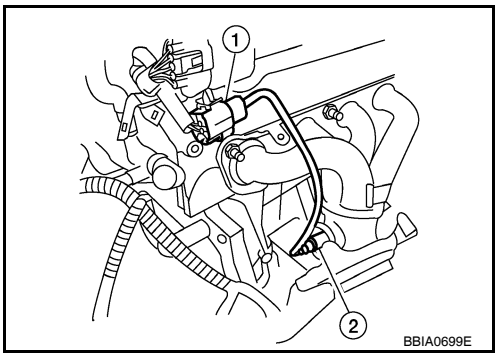
Items	Specifications
Target idle speed	A/T: 700 ± 50 rpm (in P or N position)
	CVT: 700 ± 50 rpm (in P or N position)
	M/T: 700 ± 50 rpm (in Neutral position)
Ignition timing	A/T: 13 ± 5° BTDC (in P or N position)
	CVT: 13 ± 5° BTDC (in Neutral position)
	M/T: 13 ± 5° BTDC (in Neutral position)

OK or NG

OK >> GO TO 13.
NG >> Follow the EC-566, "Basic Inspection".

13. CHECK AIR FUEL RATIO (A/F) SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect air fuel ratio (A/F) sensor 1 harness connector (1).
- Air fuel ratio (A/F) sensor 1 (2)
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.



A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

5. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK >> GO TO 14.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to EC-643, "Component Inspection".

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

15. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

>> **INSPECTION END**

16. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Check mass air flow sensor signal in “DATA MONITOR” mode with CONSULT-III.

at idling : 1.0 - 4.0 g·m/sec
at 2,500 rpm : 2.0 - 10.0 g·m/sec

With GST
1. Start engine and warm it up to normal operating temperature.
2. Check mass air flow sensor signal in Service $01 with GST.

at idling : 1.0 - 4.0 g·m/sec
at 2,500 rpm : 2.0 - 10.0 g·m/sec

OK or NG

OK >> GO TO 17.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-655.

17. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in EC-583, "Symptom Matrix Chart".

OK or NG

OK >> GO TO 18.
NG >> Repair or replace.

18. ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-542, "Emission-related Diagnostic Information".

>> GO TO 19.

19. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

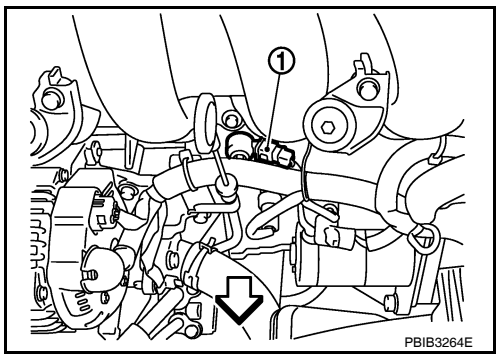
DTC P0327, P0328 KS

Component Description

INFOID:0000000004537257

The knock sensor (1) 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.

• : Vehicle front



On Board Diagnosis Logic

INFOID:0000000004537258

The MIL will not light up for these self-diagnoses.

DTC No.	Trouble Diagnosis Name	DTC Detected Condition	Possible Cause
P0327 0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (Knock sensor circuit is open or shorted.) • Knock sensor
P0328 0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

INFOID:0000000004537259

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

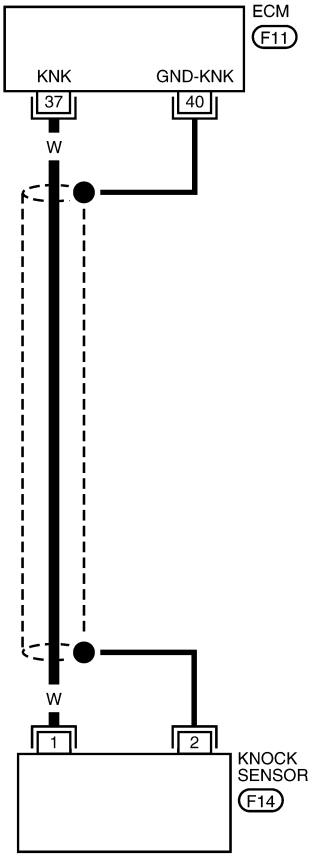
1. Start engine and run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-773, "Diagnosis Procedure".

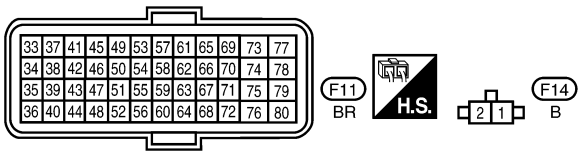
Wiring Diagram

INFOID:0000000004537260

EC-KS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





BBWA2637E

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
37	W	Knock sensor	**[Engine is running]** • Idle speed	Approximately 2.5V
40	—	Sensor ground (Knock sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:0000000004537261

1.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminal 37 and ground. Refer to Wiring Diagram.
   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

   Resistance: Approximately 532 - 588kΩ [at 20°C (68°F)]

4. Also check harness for short to ground and short to power.

OK or NG

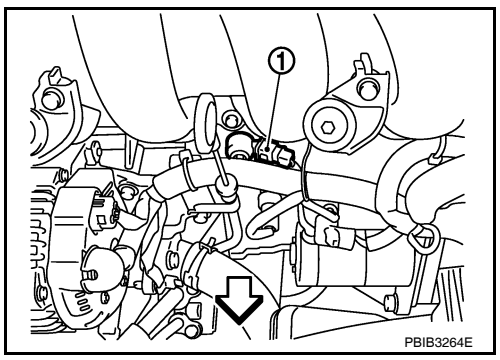
OK >> GO TO 4.
NG >> GO TO 2.

2.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-II

1. Disconnect knock sensor (1) harness connector.

- : Vehicle front

2. Check harness continuity between ECM terminal 37 and knock sensor terminal 1. Refer to Wiring Diagram.



   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK KNOCK SENSOR

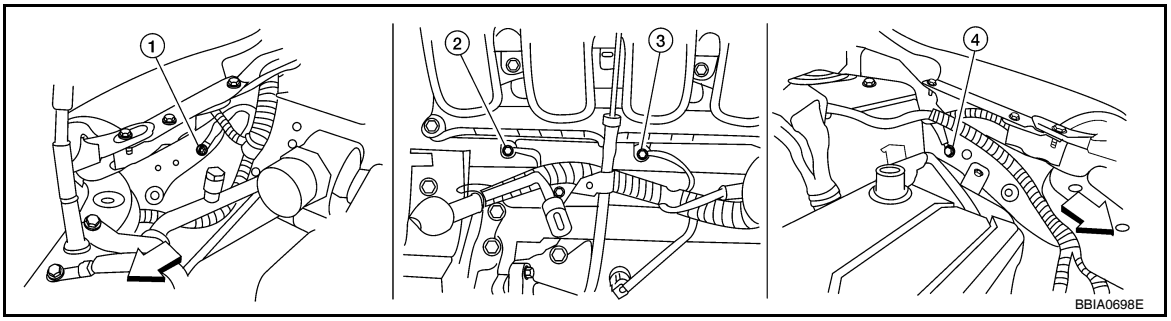
Refer to EC-774, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace knock sensor.

4.CHECK GROUND CONNECTIONS

Loosen and retighten ground screws on the body.
Refer to EC-632, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 5.
NG >> Repair or replace ground connections.

5. CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Reconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 40 and knock sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

Component Inspection

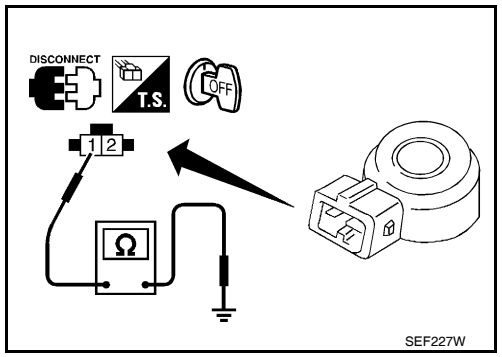
INFOID:0000000004537262

KNOCK SENSOR

1. Check resistance between knock sensor terminal 1 and ground.
   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

   Resistance: Approximately 532 - 588kΩ [at 20°C (68°F)]

   CAUTION:
   Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.
2. If NG, replace knock sensor.



Removal and Installation

INFOID:0000000004537263

KNOCK SENSOR

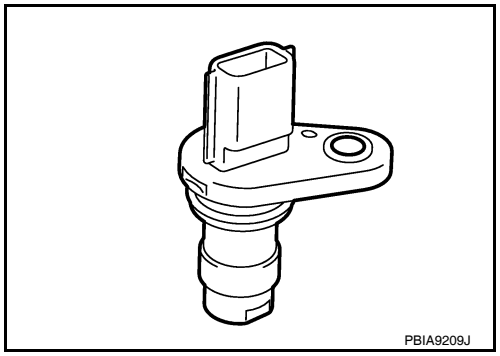
Refer to EM-199.

DTC P0335 CKP SENSOR (POS)

Component Description

INFOID:0000000004537264

The crankshaft position sensor (POS) is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution. The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes. The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
ECM receives the signals as shown in the figure.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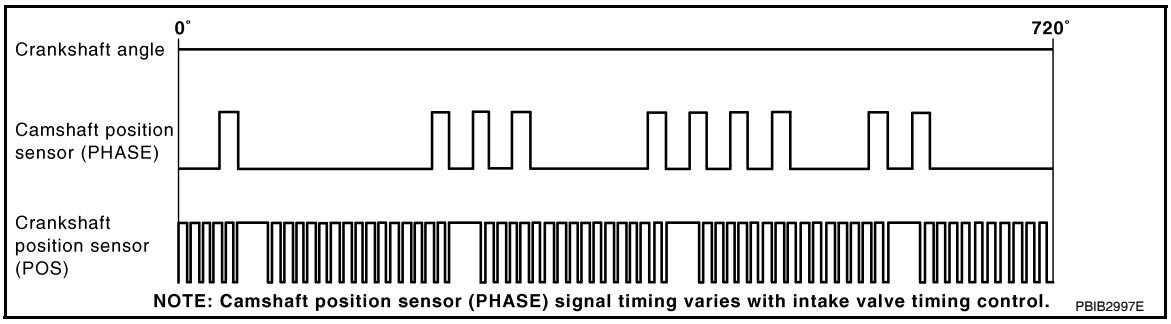


CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537265

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

INFOID:0000000004537266

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335 0335	Crankshaft position sensor (POS) circuit	• The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. • The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	• Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) • Crankshaft position sensor (POS) • Accelerator pedal position sensor • Refrigerant pressure sensor • EVAP control system pressure sensor • Signal plate

DTC Confirmation Procedure

INFOID:0000000004537267

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:

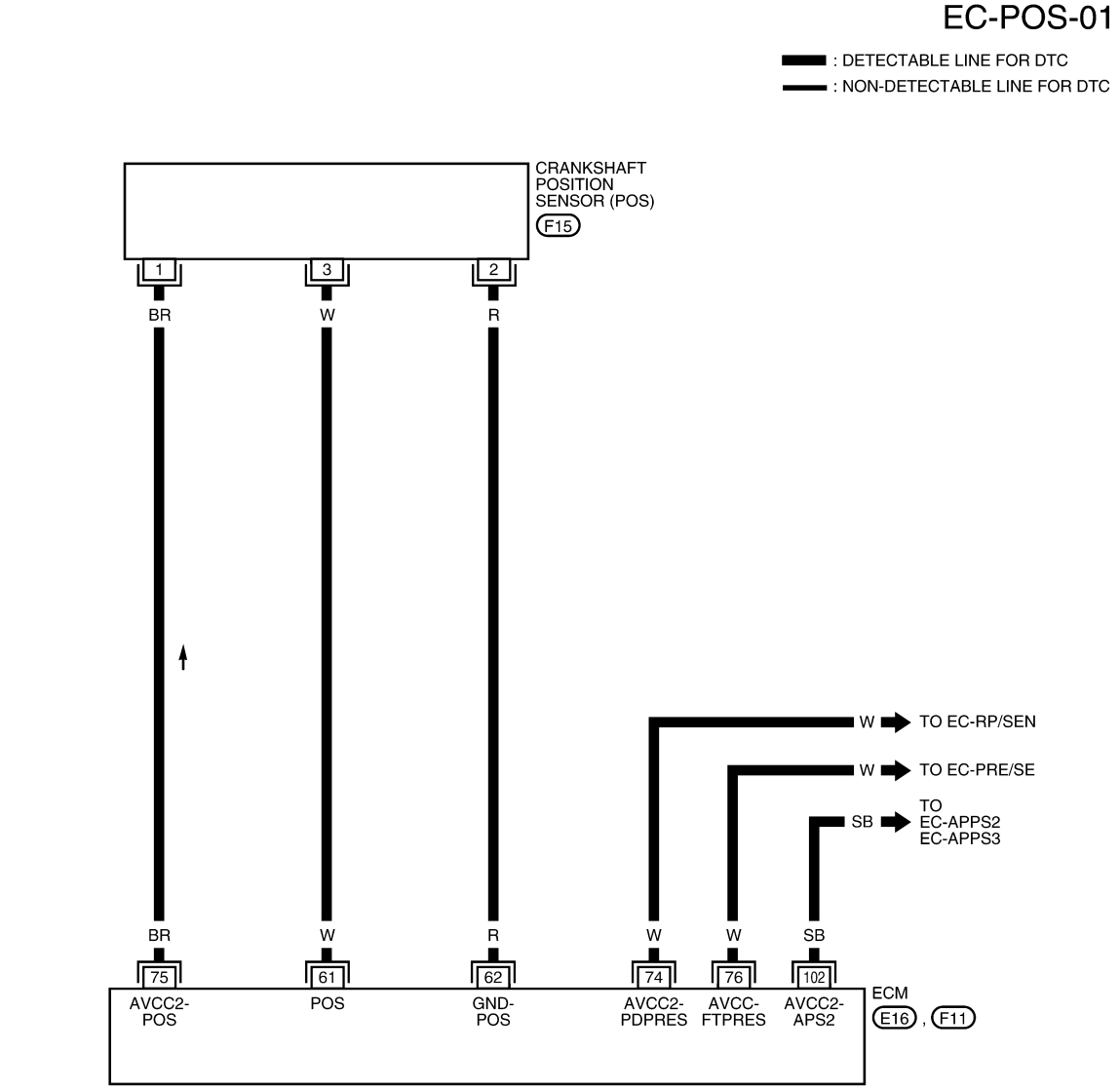
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

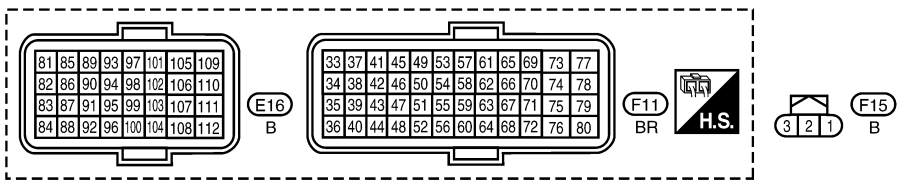
1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-777, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537268

EC-POS-01

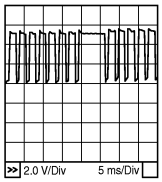
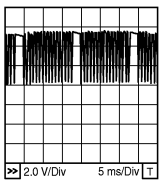




BBWA3071E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
61	W	Crankshaft position sensor (POS)	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	Approximately 4.0V  PBIB2998E
			[Engine is running] • Engine speed: 2,000 rpm	Approximately 4.0V  PBIB2999E
62	R	Sensor ground [Crankshaft position sensor (POS)]	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
74	W	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
75	BR	Sensor power supply [Crankshaft position sensor (POS)]	**[Ignition switch: ON]**	Approximately 5V
76	W	EVAP control system pressure sensor power supply	**[Ignition switch: ON]**	Approximately 5V
102	SB	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V

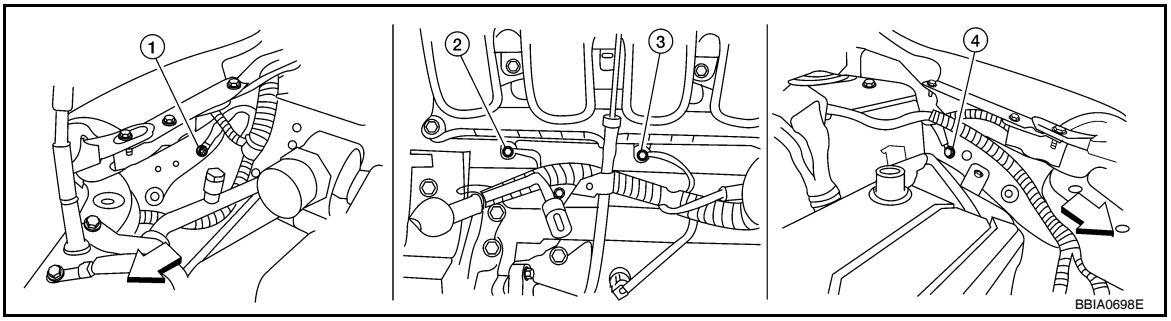
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004537269

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-632, "Ground Inspection".



BBIA0698E

: Vehicle front

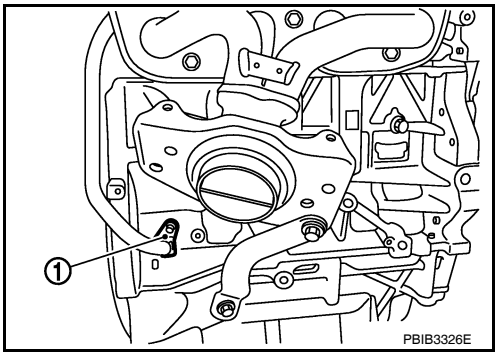
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

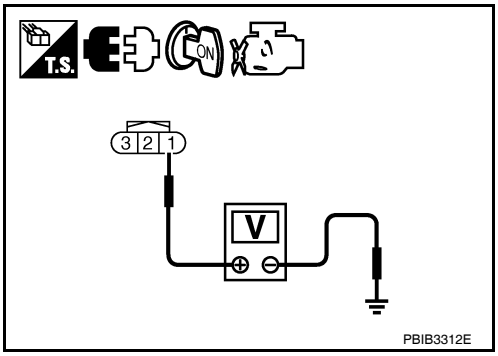
2.CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-I

1. Disconnect crankshaft position (CKP) sensor (POS) (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between CKP sensor (POS) terminal 1 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

3.CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between CKP sensor (POS) terminal 1 and ECM terminal 75. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit.

4.CHECK COMPONENTS POWER SUPPLY

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
74	Refrigerant pressure sensor terminal 3	EC-1006, "Wiring Diagram"
75	Crankshaft position sensor (POS) terminal 1	EC-776, "Wiring Diagram"
76	EVAP control system pressure sensor terminal 3	EC-834, "Wiring Diagram"
102	APP sensor terminal 5	EC-949, "Wiring Diagram"

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5.CHECK COMPONENTS

Check the following.
- Refrigerant pressure sensor. (Refer to MTC-37.)
- EVAP control system pressure sensor. (Refer to EC-838, "Component Inspection".)

OK or NG

OK >> GO TO 6.
NG >> Replace malfunctioning components.

6.CHECK APP SENSOR

Refer to EC-952, "Component Inspection".

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-572, "Accelerator Pedal Released Position Learning".
3. Perform EC-572, "Throttle Valve Closed Position Learning".
4. Perform EC-572, "Idle Air Volume Learning".

>> **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 harness continuity between CKP sensor (POS) terminal 2 and ECM terminal 62. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between CKP sensor (POS) terminal 3 and ECM terminal 61. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-780, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> Replace crankshaft position sensor (POS).

11.CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 12.
NG >> Replace the signal plate.

12. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

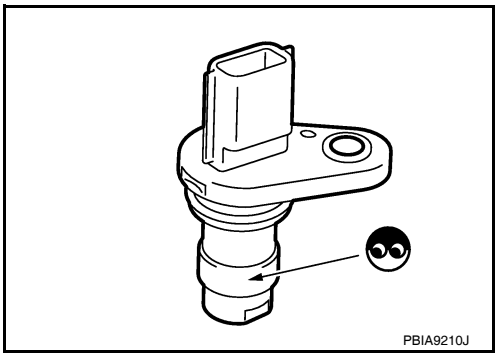
>> **INSPECTION END**

Component Inspection

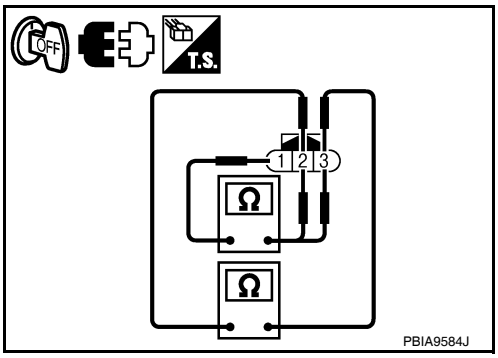
INFOID:0000000004537270

CRANKSHAFT POSITION SENSOR (POS)

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor (POS) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.



Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	

6. If NG, replace crankshaft position sensor (POS).

Removal and Installation

INFOID:0000000004537271

CRANKSHAFT POSITION SENSOR (POS)

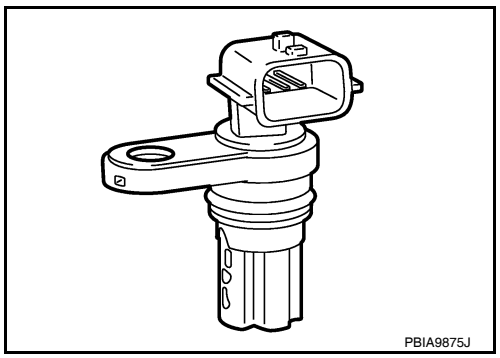
Refer to EM-199.

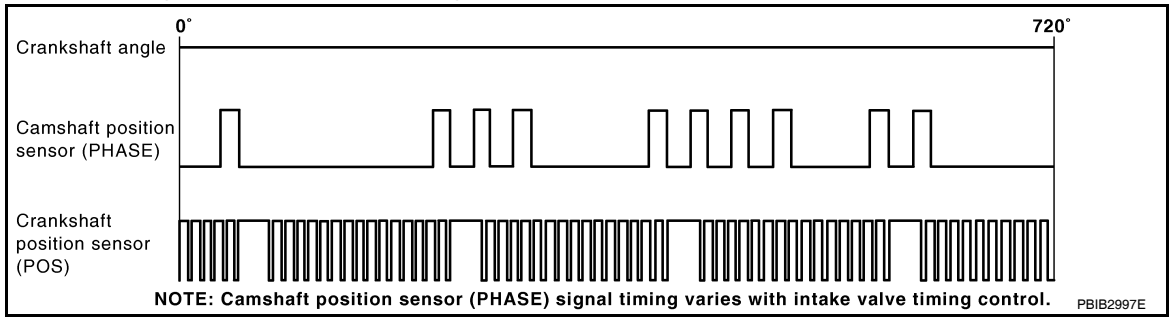
DTC P0340 CMP SENSOR (PHASE)

Component Description

INFOID:0000000004537272

The camshaft position sensor (PHASE) senses the protrusion 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.


PBIA9875J



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537273

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

INFOID:0000000004537274

NOTE:
If DTC P0340 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.
Refer to EC-874.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340	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 set to ECM during engine running. • The cylinder No. signal is not in the normal pattern during engine running.	• Harness or connectors [Camshaft position sensor (PHASE) circuit is open or shorted.] • Camshaft position sensor (PHASE) • Camshaft (INT) • Starter motor (Refer to SC-9.) • Starting system circuit (Refer to SC-9) • Dead (Weak) battery

DTC Confirmation Procedure

INFOID:0000000004537275

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.

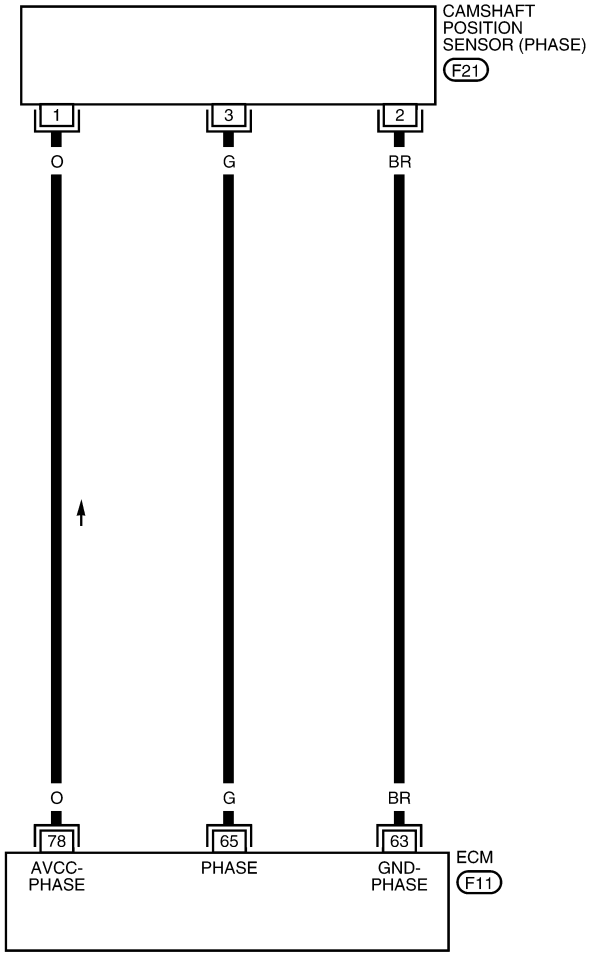
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-783, "Diagnosis Procedure".
   If 1st trip DTC is not detected, go to next step.
4. Maintain engine speed at more than 800 rpm for at least 5 seconds.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to EC-783, "Diagnosis Procedure".

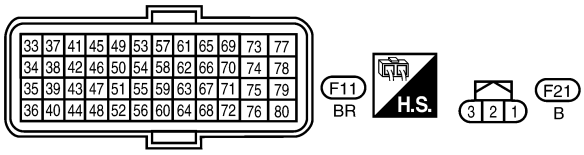
Wiring Diagram

INFOID:0000000004537276

EC-PHASE-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

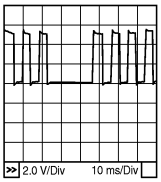
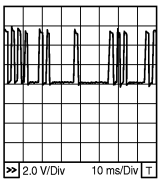




BBWA2639E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63	BR	Sensor ground [Camshaft position sensor (PHASE)]	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
65	G	Camshaft position sensor (PHASE)	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	1.0 - 2.0V  PBIB2986E
			[Engine is running] • Engine speed: 2,000 rpm.	1.0 - 2.0V  PBIB2987E
78	O	Sensor power supply [Camshaft position sensor (PHASE)]	**[Ignition switch: ON]**	Approximately 5V

: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004537277

1.CHECK STARTING SYSTEM

Turn ignition switch to START position.

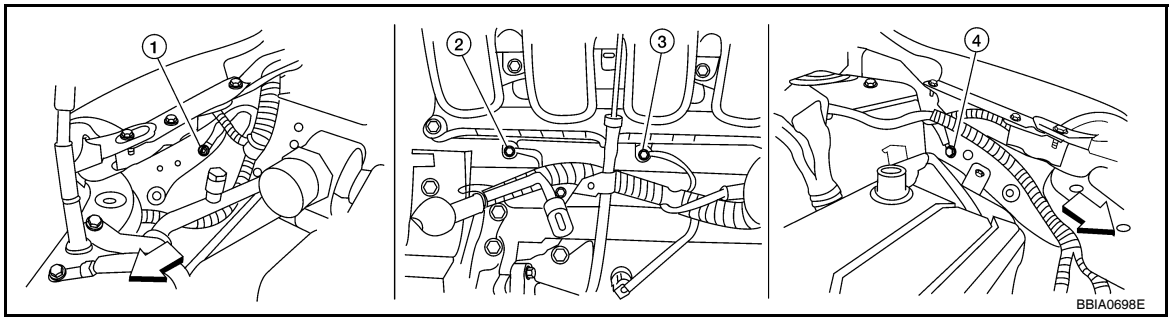
Does the engine turn over?
Does the starter motor operate?

Yes or No

Yes >> GO TO 2.
No >> Check starting system. (Refer to SC-9.)

2.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

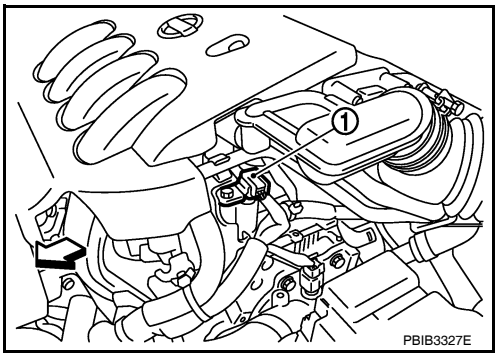
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

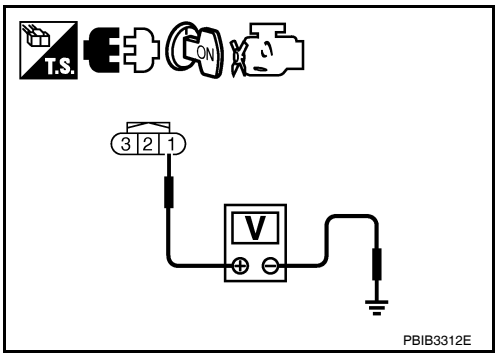
3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) (1) harness connector.
- : Vehicle front
2. Turn ignition switch ON.



3. Check voltage between CMP sensor (PHASE) terminal 1 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between CMP sensor (PHASE) terminal 2 and ECM terminal 63. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between CMP sensor (PHASE) terminal 3 and ECM terminal 65. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-785, "Component Inspection".

OK or NG

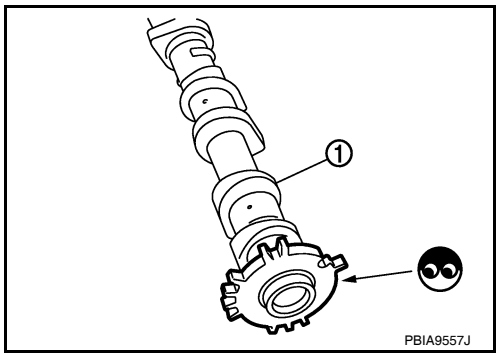
OK >> GO TO 7.
NG >> Replace camshaft position sensor (PHASE).

7. 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

OK or NG

OK >> GO TO 8.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



8. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

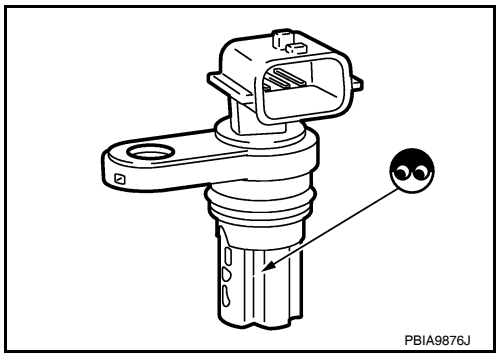
>> **INSPECTION END**

Component Inspection

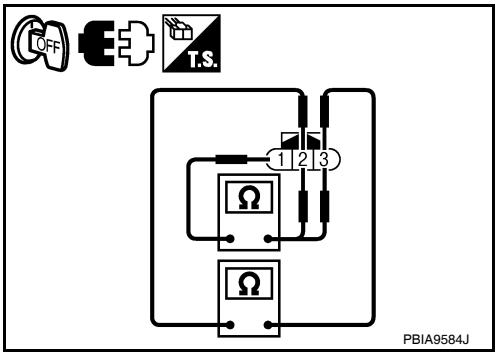
INFOID:0000000004537278

CAMSHAFT POSITION SENSOR (PHASE)

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor (PHASE) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.



Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	

6. If NG, replace camshaft position sensor (PHASE).

Removal and Installation

INFOID:0000000004537279

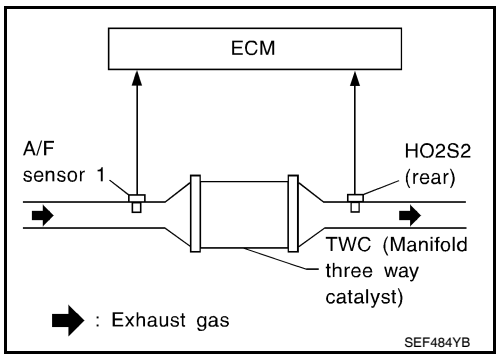
CAMSHAFT POSITION SENSOR (PHASE)
Refer to EM-170.

DTC P0420 THREE WAY CATALYST FUNCTION

On Board Diagnosis Logic

INFOID:0000000004537280

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2.
A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.
When the frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420 0420	Catalyst system efficiency below threshold	• Three way catalyst (manifold) does not operate properly. • Three way catalyst (manifold) does not have enough oxygen storage capacity.	• Three way catalyst (manifold) • Exhaust tube • Intake air leaks • Fuel injector • Fuel injector leaks • Spark plug • Improper ignition timing

DTC Confirmation Procedure

INFOID:0000000004537281

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-III

TESTING CONDITION:
Do not hold engine speed for more than the specified minutes below.

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
7. Open engine hood.
8. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-III.
9. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
   If “INCMP” of “CATALYST” changed to “CMPLT”, go to step 12.
10. Wait 5 seconds at idle.
11. Rev engine up to 2,000 to 3,000 rpm and maintain it until “INCMP” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes).
    If not “CMPLT”, stop engine and cool it down to less than 70°C (158°F) and then retest from step 1.
12. Check 1st trip DTC.
    If 1st trip DTC is detected, go to EC-788, "Diagnosis Procedure".

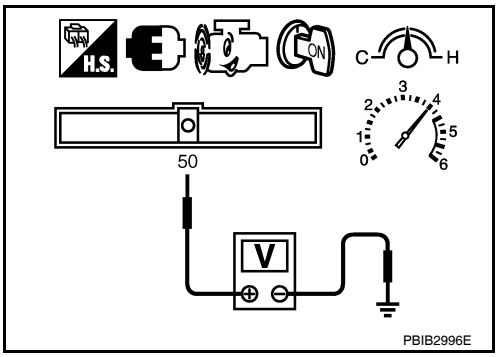
Overall Function Check

INFOID:0000000004537282

Use this procedure to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.
6. Set voltmeter probe between ECM terminals 50 (HO2S2 signal) and ground.
7. Keep engine speed at 2,500 rpm constant under no load.
8. Make sure that the voltage does not vary for more than 5 seconds.
   If the voltage fluctuation cycle takes less than 5 seconds, go to EC-788, "Diagnosis Procedure".
   • 1 cycle: 0.6 - 1.0 → 0 - 0.3 → 0.6 - 1.0



Diagnosis Procedure

INFOID:0000000004537283

1.CHECK EXHAUST SYSTEM

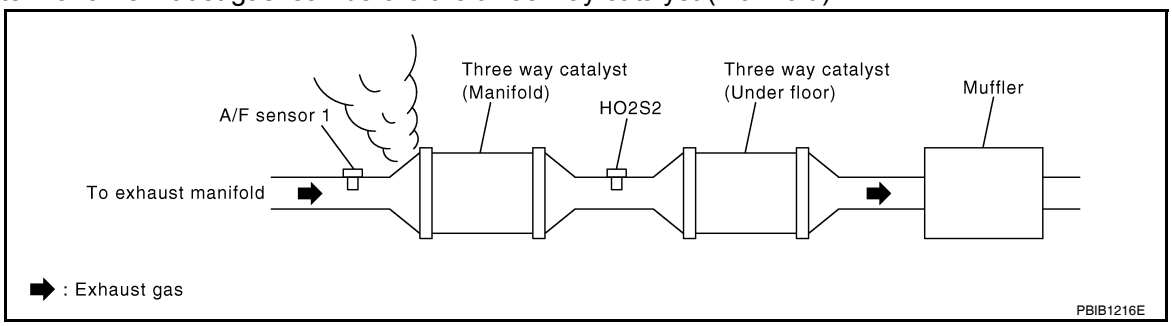
Visually check exhaust tubes and muffler for dent.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (manifold).



OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3.CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4.CHECK IGNITION TIMING

Check the following items. Refer to EC-566, "Basic Inspection".

Items	Specifications
Target idle speed	A/T: 700 ± 50 rpm (in P or N position)
	CVT: 700 ± 50 rpm (in P or N position)
	M/T: 700 ± 50 rpm (in Neutral position)
Ignition timing	A/T: 13 ± 5° BTDC (in P or N position)
	CVT: 13 ± 5° BTDC (in P or N position)
	M/T: 13 ± 5° BTDC (in Neutral position)

OK or NG

OK >> GO TO 5.
NG >> Follow the EC-566, "Basic Inspection".

5.CHECK FUEL INJECTOR

1. Stop engine and turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check voltage between ECM terminals 25, 29, 30, 31 and ground with CONSULT-III or tester. Refer to Wiring Diagram for fuel injectors, EC-987, "Wiring Diagram".

Voltage: Battery voltage

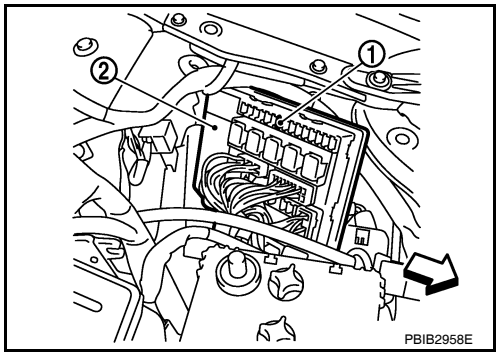
OK or NG

OK >> GO TO 6.
NG >> Perform EC-988, "Diagnosis Procedure".

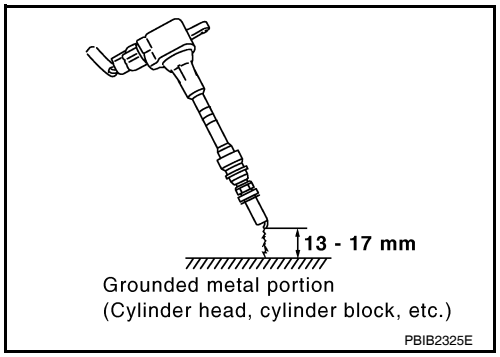
6.CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump (1) fuse in IPDM E/R (2) to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.



- : Vehicle front
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:
- **Do not approach to the spark plug and the ignition coil within 50cm. 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 is taken.
NOTE:
When the gap is less than 13 mm, the spark might be generated even if the coil is malfunctioning.

OK or NG

OK >> GO TO 10.
NG >> GO TO 7.

7.CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

OK or NG

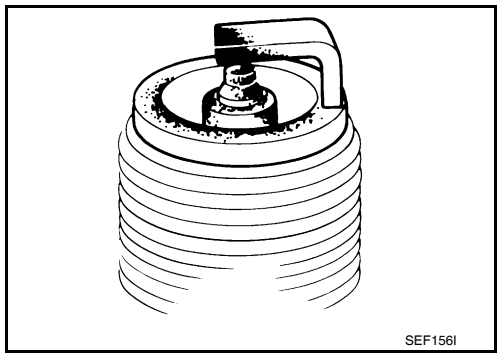
OK >> GO TO 8.
NG >> Check ignition coil, power transistor and their circuits. Refer to EC-996.

8.CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

OK or NG

OK >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-227, "Standard and Limit".
NG >> 1. Repair or clean spark plug.
2. GO TO 9.



9.CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

OK or NG

OK >> **INSPECTION END**
NG >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-227, "Standard and Limit".

10.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Remove fuel injector assembly.
   Refer to EM-156.
   Keep fuel hose and all fuel injectors connected to fuel tube.
3. Disconnect all ignition coil harness connectors.
4. Reconnect all fuel injector harness connectors disconnected.
5. Turn ignition switch ON.
   Make sure fuel does not drip from fuel injector.

OK or NG

OK (Does not drip.)>>GO TO 11.
NG (Drips.)>>Replace the fuel injector(s) from which fuel is dripping.

11.CHECK INTERMITTENT INCIDENT

Refer to EC-626.

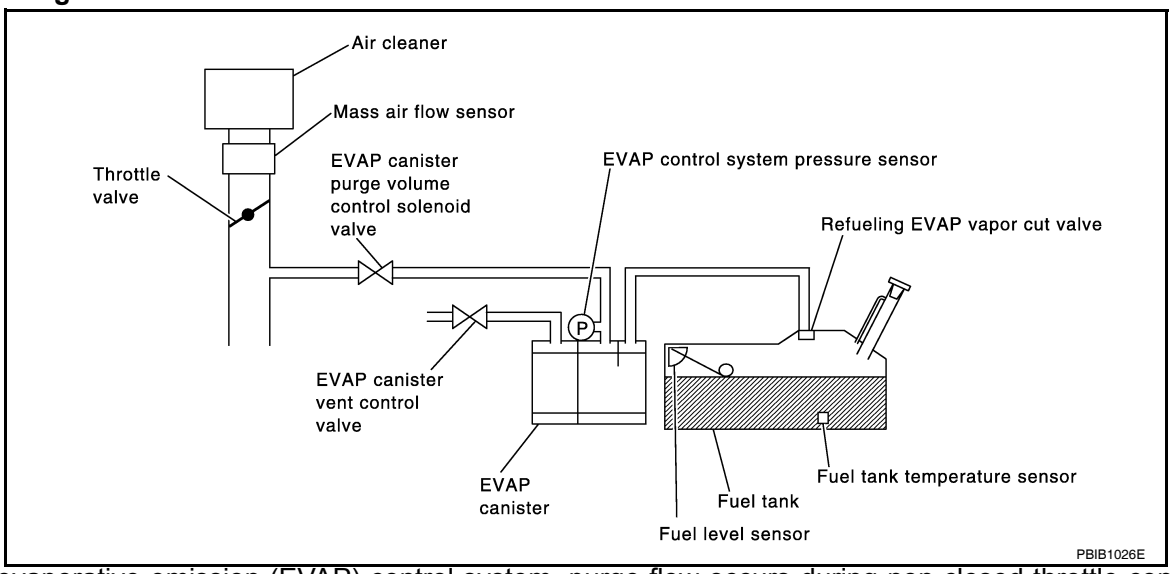
Trouble is fixed.>>**INSPECTION END**
Trouble is not fixed.>>Replace three way catalyst (manifold).

DTC P0441 EVAP CONTROL SYSTEM

System Description

INFOID:0000000004537284

NOTE:
If DTC P0441 is displayed with other DTC such as P2122, P2123 P2127, P2128, P2138, first perform trouble diagnosis for other DTC.



In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

INFOID:0000000004537285

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a malfunction is determined.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0441 0441	EVAP control system incorrect purge flow	• EVAP control system does not operate properly. • EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	• EVAP canister purge volume control solenoid valve stuck closed • EVAP control system pressure sensor and the circuit • Loose, disconnected or improper connection of rubber tube • Blocked rubber tube • Cracked EVAP canister • EVAP canister purge volume control solenoid valve circuit • Accelerator pedal position sensor • Blocked purge port • EVAP canister vent control valve

DTC Confirmation Procedure

INFOID:0000000004537286

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 70 seconds.
4. Select “PURG FLOW P0441” of “EVAPORATIVE SYSTEM” in “DTC CONFIRMATION” mode with CONSULT-III.
5. Touch “START”.
   If “COMPLETED” is displayed, go to step 7.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 35 seconds.)

Shift lever	Suitable position
VHCL SPEED SE	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,800 rpm
B/FUEL SCHDL	1.0 - 10.0 msec
COOLAN TEMP/S	More than 0°C

If TESTING is not changed for a long time, retry from step 2.

7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-793, "Diagnosis Procedure".

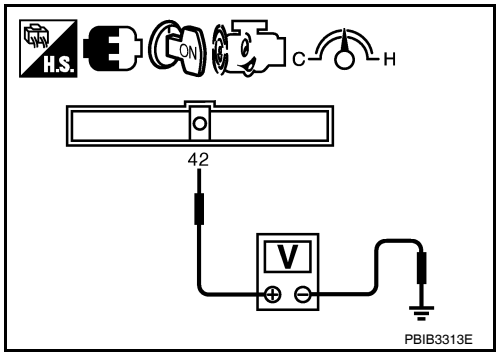
Overall Function Check

INFOID:0000000004537287

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Lift up drive wheels.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and wait at least 70 seconds.
5. Set voltmeter probes to ECM terminals 42 (EVAP control system pressure sensor signal) and ground.
6. Check EVAP control system pressure sensor value at idle speed and note it.
7. Establish and maintain the following conditions for at least 1 minute.



Air conditioner switch	ON
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Shift lever	Any position other than P, N or R

8. Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.
9. If NG, go to EC-793, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004537288

1.CHECK EVAP CANISTER

1. Turn ignition switch OFF.
2. Check EVAP canister for cracks.

OK or NG

OK (With CONSULT-III)>>GO TO 2.
OK (Without CONSULT-III)>>GO TO 3.
NG >> Replace EVAP canister.

2.CHECK PURGE FLOW

With CONSULT-III

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to EC-527, "Description".
2. Start engine and let it idle.
3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III.
4. Rev engine up to 2,000 rpm.
5. Touch “Qd” and “Qu” on CONSULT-III screen to adjust “PURG VOL CONT/V” opening and check vacuum existence.

PURG VOL CONT/V	VACUUM
100%	Should exist.
0%	should not exist.

OK or NG

OK >> GO TO 7.
NG >> GO TO 4.

3.CHECK PURGE FLOW

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to EC-527, "Description".
4. Start engine and let it idle.
   Do not depress accelerator pedal even slightly.
5. Check vacuum gauge indication before 60 seconds passed after starting engine.

   Vacuum should not exist.

6. Revving engine up to 2,000 rpm after 100 seconds passed after starting engine.

   Vacuum should exist.

OK or NG

OK >> GO TO 7.
NG >> GO TO 4.

4.CHECK EVAP PURGE LINE

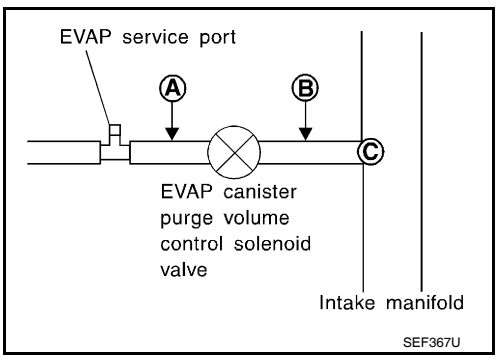
1. Turn ignition switch OFF.
2. Check EVAP purge line for improper connection or disconnection. Refer to EC-527, "Description".

OK or NG

OK >> GO TO 5.
NG >> Repair it.

5.CHECK EVAP PURGE HOSE AND PURGE PORT

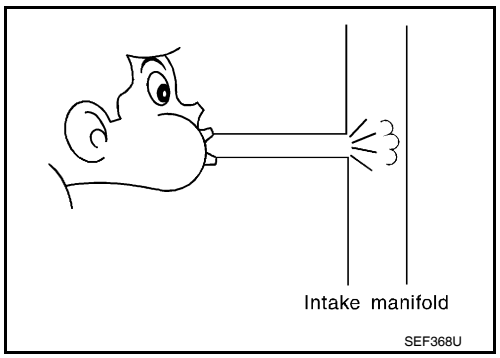
1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.
2. Blow air into each hose and EVAP purge port **C**.



3. Check that air flows freely.

OK or NG

OK (With CONSULT-III)>>GO TO 6.
OK (Without CONSULT-III)>>GO TO 7.
NG >> Repair or clean hoses and/or purge port.



6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III. Check that engine speed varies according to the valve opening.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-815, "Component Inspection".

OK or NG

OK >> GO TO 8.
NG >> Replace EVAP canister purge volume control solenoid valve.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP control system pressure sensor.

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to EC-832 or DTC P0452 and EC-839 for DTC P0453.

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.

10. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 11.
NG >> Clean the rubber tube using an air blower.

11. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-821, "Component Inspection".

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP canister vent control valve.

12. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.

Refer to EC-527, "Description".

OK or NG

OK >> GO TO 13.
NG >> Replace it.

13. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 14.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

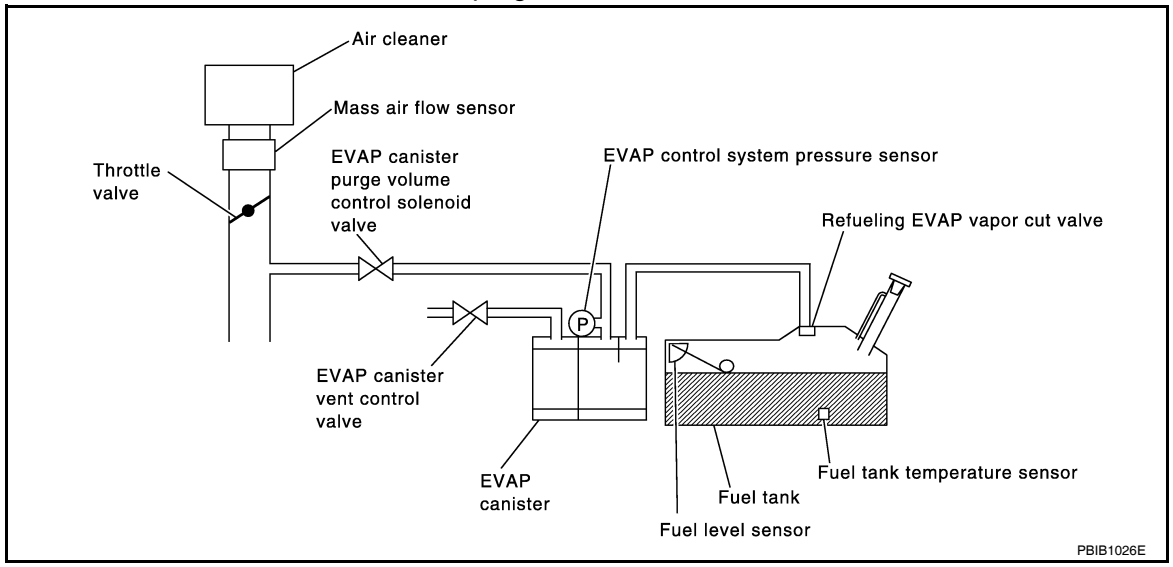
>> **INSPECTION END**

DTC P0442 EVAP CONTROL SYSTEM

On Board Diagnosis Logic

INFOID:0000000004537289

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.
If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following Vacuum test conditions.
The EVAP canister vent control valve is closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve will then be opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0442 0442	EVAP control system small leak detected (negative pressure)	EVAP control system has a leak, EVAP control system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or fails to close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Fuel tank temperature sensor • O-ring of EVAP canister vent control valve is missing or damaged • EVAP canister is saturated with water • EVAP control system pressure sensor • Fuel level sensor and the circuit • Refueling EVAP vapor cut valve • ORVR system leaks

CAUTION:
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC Confirmation Procedure

INFOID:0000000004537290

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**
- **Open engine hood before conducting following procedure.**

WITH CONSULT-III

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
4. Check the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 30°C (32 - 86°F)
5. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
   Follow the instruction displayed.
   NOTE:
   If the engine speed cannot be maintained within the range displayed on the CONSULT-III screen, go to EC-566, "Basic Inspection".
6. Make sure that "OK" is displayed.
   If "NG" is displayed, refer to EC-798, "Diagnosis Procedure".
   NOTE:
   Make sure that EVAP hoses are connected to the EVAP canister purge volume control solenoid valve properly.

WITH GST

NOTE:

Be sure to read the explanation of Driving Pattern on EC-542, "Emission-related Diagnostic Information" before driving vehicle.

1. Start engine.
2. Drive vehicle according to Driving Pattern, EC-542, "Emission-related Diagnostic Information".
3. Stop vehicle.
4. Turn ignition switch OFF and wait at least 10 seconds and then turn ignition switch ON.
5. Select Service $07 with GST.

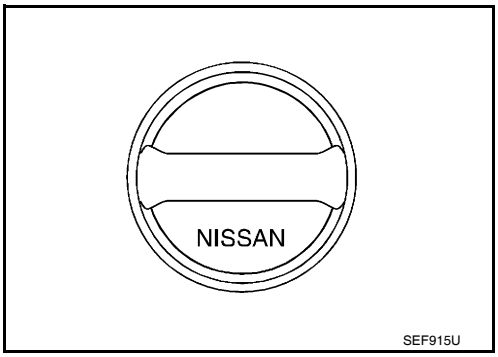
- If P0442 is displayed on the screen, go to EC-798, "Diagnosis Procedure".
- If P0441 is displayed on the screen, go to EC-793, "Diagnosis Procedure" for DTC P0441.

Diagnosis Procedure

INFOID:0000000004537291

1.CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.



OK or NG

OK >> GO TO 2.
NG >> Replace with genuine NISSAN fuel filler cap.

2.CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK >> GO TO 3.
NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.

2. Retighten until reteaching sound is heard.

3.CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4.CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-529, "Component Inspection".

OK or NG

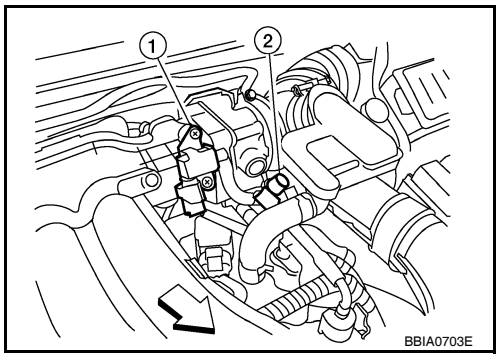
OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

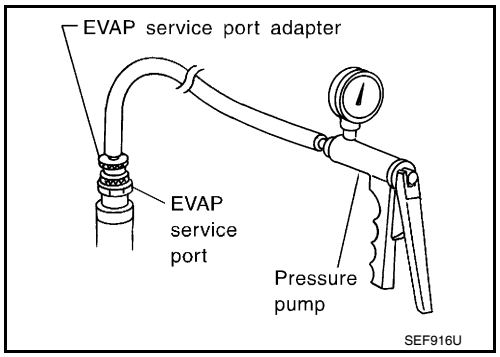
5.INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.
For the location of EVAP service port (2), refer to EC-527, "Description".

- EVAP canister purge volume control solenoid valve (1)
- : Vehicle front

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.





With CONSULT-III>>GO TO 6.
Without CONSULT-III>>GO TO 7.

6.CHECK FOR EVAP LEAK

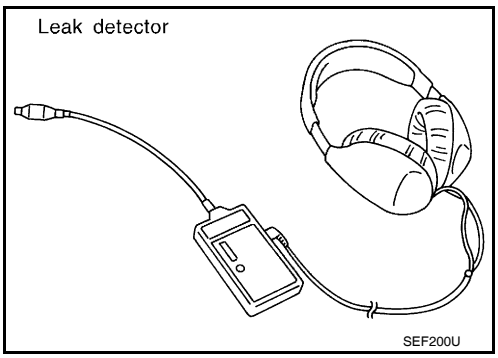
With CONSULT-III

1. Turn ignition switch ON.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-III.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

CAUTION:

- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-527, "Description".



OK or NG

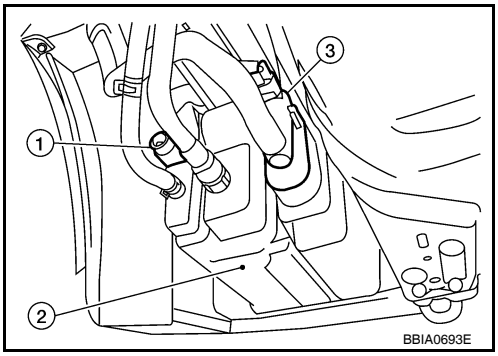
OK >> GO TO 8.
NG >> Repair or replace.

7. CHECK FOR EVAP LEAK

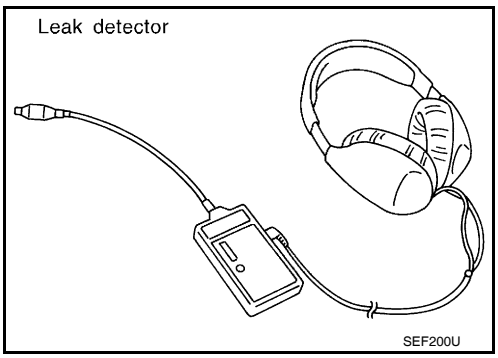
Without CONSULT-III

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
- EVAP control system pressure sensor (1)
- EVAP canister (2)
- EVAP canister vent control valve (3)
3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

CAUTION:
- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-527, "Description".



OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following,
- EVAP canister vent control valve is installed properly. Refer to EC-531, "Removal and Installation".
- EVAP canister vent control valve. Refer to EC-821, "Component Inspection".

OK or NG

OK >> GO TO 9.
NG >> Repair or replace EVAP canister vent control valve and O-ring.

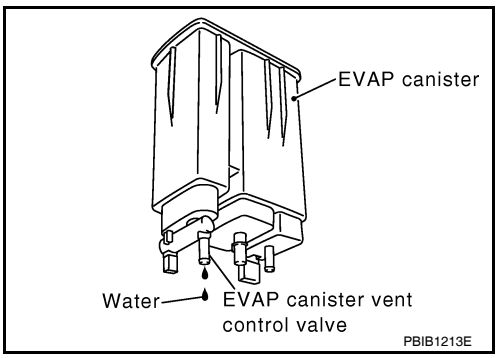
9. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

2. Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 10.
No (With CONSULT-III)>>GO TO 12.
No (Without CONSULT-III)>>GO TO 13.



10. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensorattached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK (With CONSULT-III)>>GO TO 12.
OK (Without CONSULT-III)>>GO TO 13.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose connected to EVAP canister for clogging or poor connection

>> Repair hose or replace EVAP canister.

12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-III screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum.

Vacuum should exist.

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK >> GO TO 16.
NG >> GO TO 14.

14. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-594, "Vacuum Hose Drawing".

OK or NG

OK >> GO TO 15.
NG >> Repair or reconnect the hose.

15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-815, "Component Inspection".

OK or NG

OK >> GO TO 16.
NG >> Replace EVAP canister purge volume control solenoid valve.

16. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-755, "Component Inspection".

OK or NG

OK >> GO TO 17.
NG >> Replace fuel level sensor unit.

17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-838, "Component Inspection".

OK or NG

OK >> GO TO 18.
NG >> Replace EVAP control system pressure sensor.

18. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to EC-527.

OK or NG

OK >> GO TO 19.
NG >> Repair or reconnect the hose.

19. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 20.

20. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-533.

OK or NG

OK >> GO TO 21.
NG >> Repair or replace hoses and tubes.

21. CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 22.
NG >> Repair or replace hoses, tubes or filler neck tube.

22. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-535, "Component Inspection".

OK or NG

OK >> GO TO 23.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

23. CHECK FUEL LEVEL SENSOR

Refer to FL-5.

OK or NG

OK >> GO TO 24.

NG >> Replace fuel level sensor unit.

24. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:0000000004537292

SYSTEM DESCRIPTION

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)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
ABS actuator and electric unit (control unit)	Vehicle speed*2		
Combination meter			

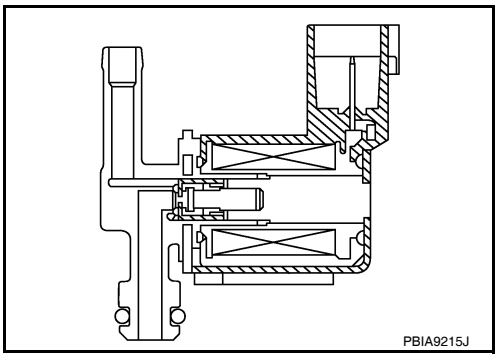
*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to the ECM though CAN communication line.

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve 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.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537293

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	• Engine: After warming up • Shift lever: P or N (A/T, CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle (Accelerator pedal is not depressed even slightly, after engine starting)	0%
		2,000 rpm	0 - 50%

On Board Diagnosis Logic

INFOID:0000000004537294

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0443 0443	EVAP canister purge volume control solenoid valve	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	• EVAP control system pressure sensor • EVAP canister purge volume control solenoid valve (EVAP canister purge volume control solenoid valve is stuck open.) • EVAP canister vent control valve • EVAP canister • Hoses (Hoses are connected incorrectly or clogged.)

DTC Confirmation Procedure

INFOID:0000000004537295

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “PURG VOL CN/V P1444” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-III.
5. Touch “START”.
6. Start engine and let it idle until “TESTING” on CONSULT-III changes to “COMPLETED”. (It will take approximately 10 seconds.)
   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-807, "Diagnosis Procedure".

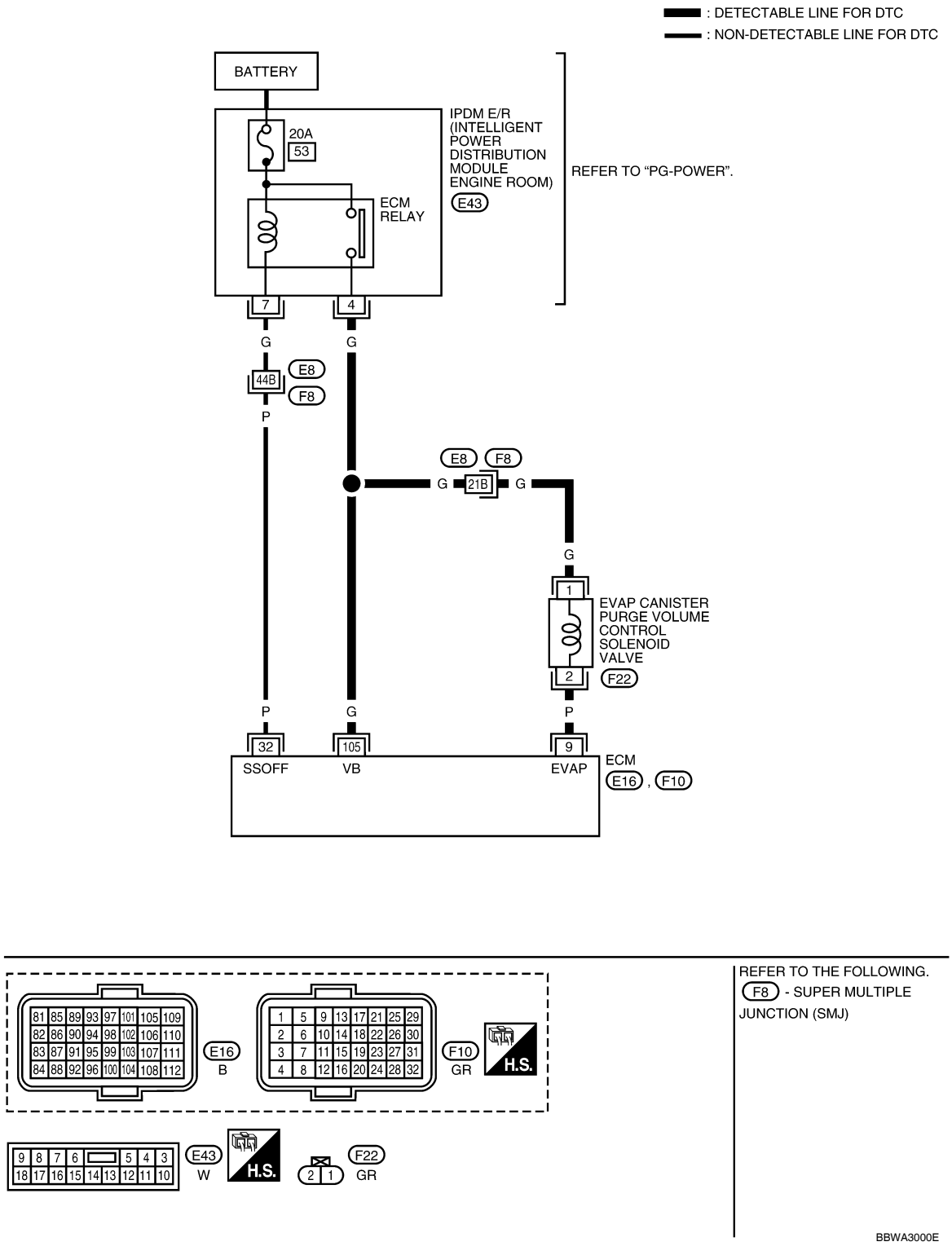
WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 20 seconds.
4. Select Service $07 with GST.
5. If 1st trip DTC is detected, go to EC-807, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537296

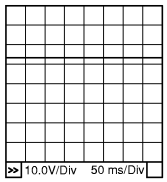
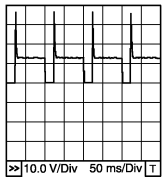
EC-PGC/V-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
9	P	EVAP canister purge volume control solenoid valve	**[Engine is running]** • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting.	BATTERY VOLTAGE (11 - 14V)  PBIB0050E
			[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V  PBIB0520E
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For 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)
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

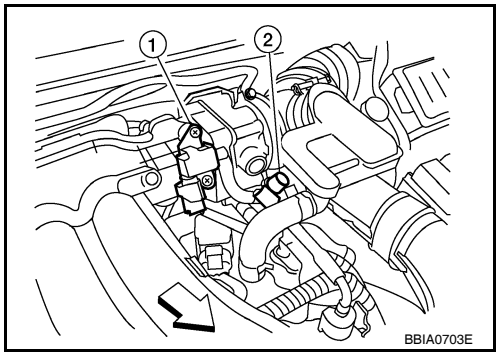
INFOID:0000000004537297

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

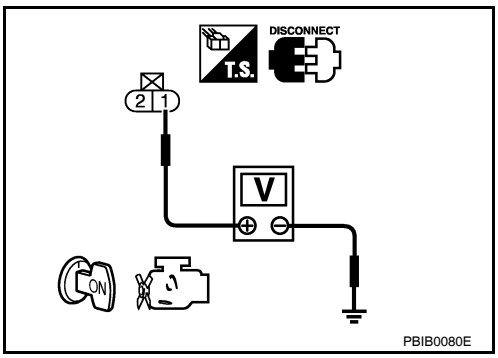
1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve (1) harness connector.

- EVAP service port (2)
- : Vehicle front

3. Turn ignition switch ON.



4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R

>> 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 harness continuity between ECM terminal 9 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

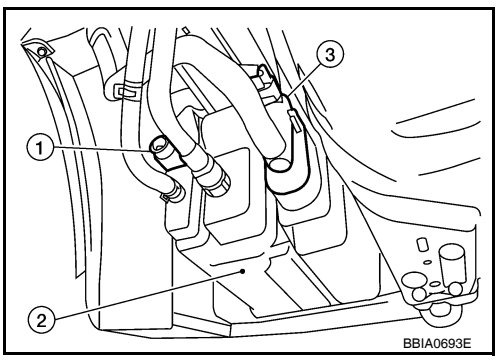
OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.

- EVAP control system pressure sensor (1)
- EVAP canister (2)
- EVAP canister vent control valve (3)

2. Check connectors for water.



Water should not exist.

OK or NG

OK >> GO TO 5.
NG >> Replace EVAP control system pressure sensor.

5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-838, "Component Inspection".

OK or NG

OK (With CONSULT-III)>>GO TO 6.
OK (Without CONSULT-III)>>GO TO 7.
NG >> Replace EVAP control system pressure sensor.

6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Start engine.

4. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III. Check that engine speed varies according to the valve opening.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-810, "Component Inspection".

OK or NG

OK >> GO TO 8.
NG >> Replace EVAP canister purge volume control solenoid valve.

8. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 9.
NG >> Clean the rubber tube using an air blower.

9. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-821, "Component Inspection".

OK or NG

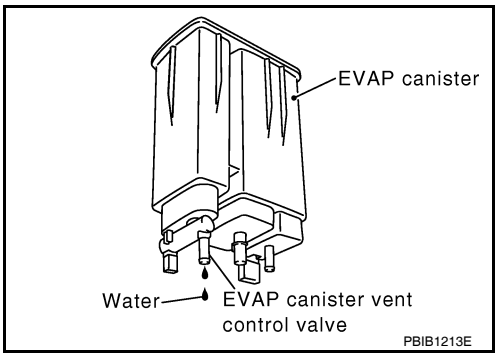
OK >> GO TO 10.
NG >> Replace EVAP canister vent control valve.

10. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?

YES or NO

YES >> GO TO 11.
NO >> GO TO 13.



11. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

13. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> INSPECTION END

Component Inspection

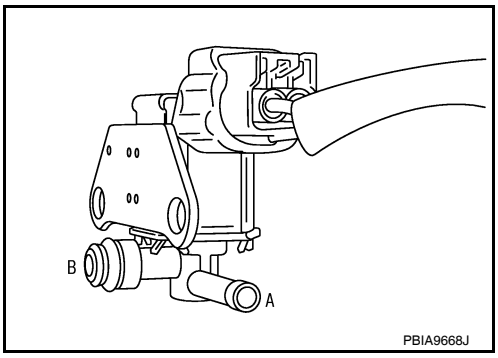
INFOID:0000000004537298

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

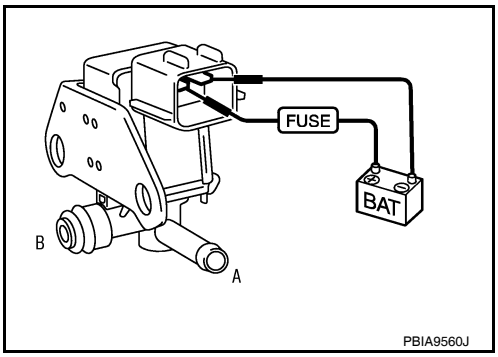
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100%	Yes
0%	No



Without CONSULT-III

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No



Removal and Installation

INFOID:0000000004537299

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EM-141.

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:0000000004537300

SYSTEM DESCRIPTION

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)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
ABS actuator and electric unit (control unit)	Vehicle speed*2		
Combination meter			

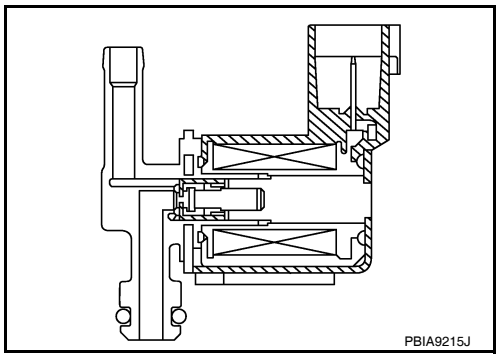
*1: The ECM determines the start signal status by the signal of engine speed and battery voltage.

*2: This signal is sent to the ECM through CAN communication line.

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve 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.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537301

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	• Engine: After warming up • Shift lever: N (A/T, CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle (Accelerator pedal is not depressed even slightly, after engine starting)	0%
		2,000 rpm	0 - 50%

On Board Diagnosis Logic

INFOID:0000000004537302

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444 0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	• Harness or connectors (EVAP canister purge volume control solenoid valve circuit is open or shorted.) • EVAP canister purge volume control solenoid valve
P0445 0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	• Harness or connectors (EVAP canister purge volume control solenoid valve circuit is shorted.) • EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

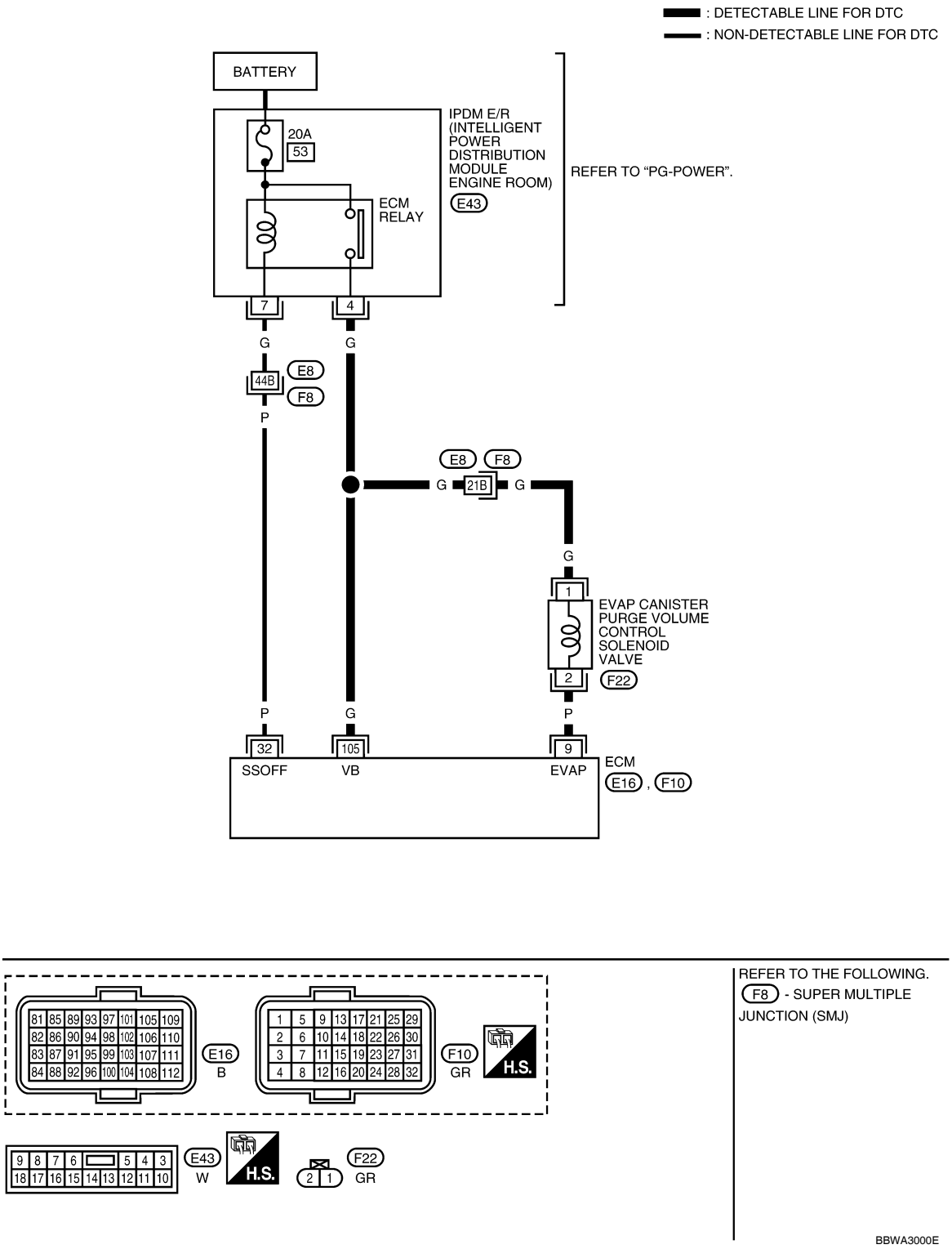
INFOID:0000000004537303

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm battery voltage is more than 11V at idle.
1. Start engine and let it idle for at least 13 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-814, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537304

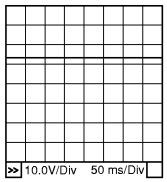
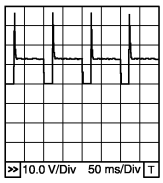
EC-PGC/V-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
9	P	EVAP canister purge volume control solenoid valve	**[Engine is running]** • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting.	BATTERY VOLTAGE (11 - 14V)  PBIB0050E
			[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V  PBIB0520E
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For 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)
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

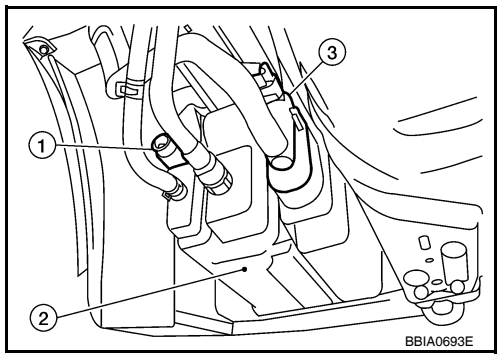
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004537305

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve (1) harness connector.
- EVAP canister port (2)
3. Turn ignition switch ON.



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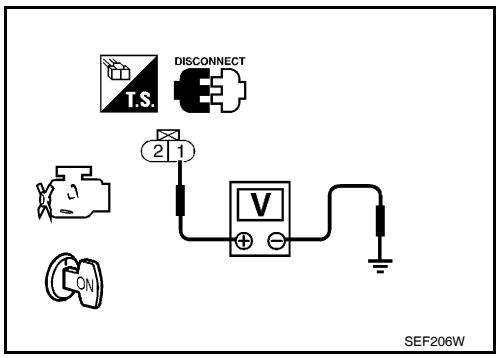
4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R

>> 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 harness continuity between ECM terminal 9 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK (With CONSULT-III)>>GO TO 4.
OK (Without CONSULT-III)>>GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

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.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-815, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace EVAP canister purge volume control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

Component Inspection

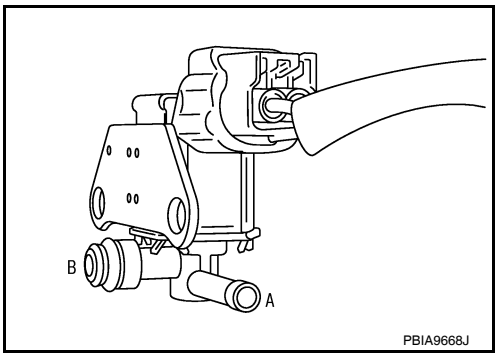
INFOID:0000000004537306

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

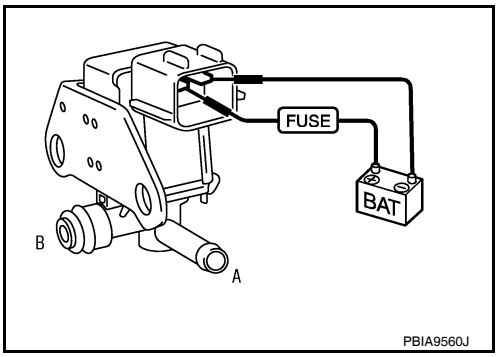
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100%	Yes
0%	No



Without CONSULT-III

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No



Removal and Installation

INFOID:0000000004537307

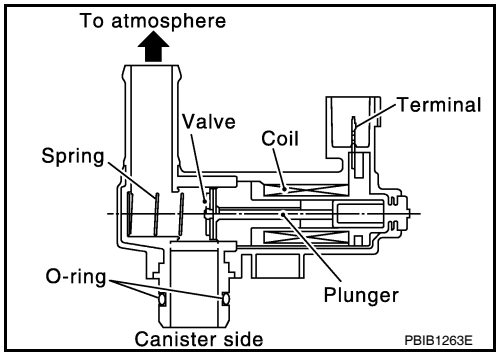
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Refer to EM-141.

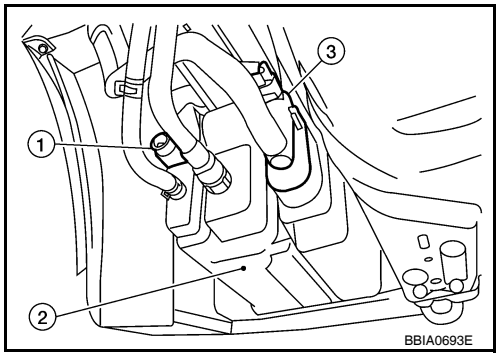
DTC P0447 EVAP CANISTER VENT CONTROL VALVE

Component Description

INFOID:0000000004537308

The EVAP canister vent control valve (3) is located on the EVAP canister (2) and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows EVAP control system diagnoses.
• EVAP control system pressure sensor (1)





CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537309

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

INFOID:0000000004537310

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0447 0447	EVAP canister vent control valve circuit open	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	• Harness or connectors (EVAP canister vent control valve circuit is open or shorted.) • EVAP canister vent control valve

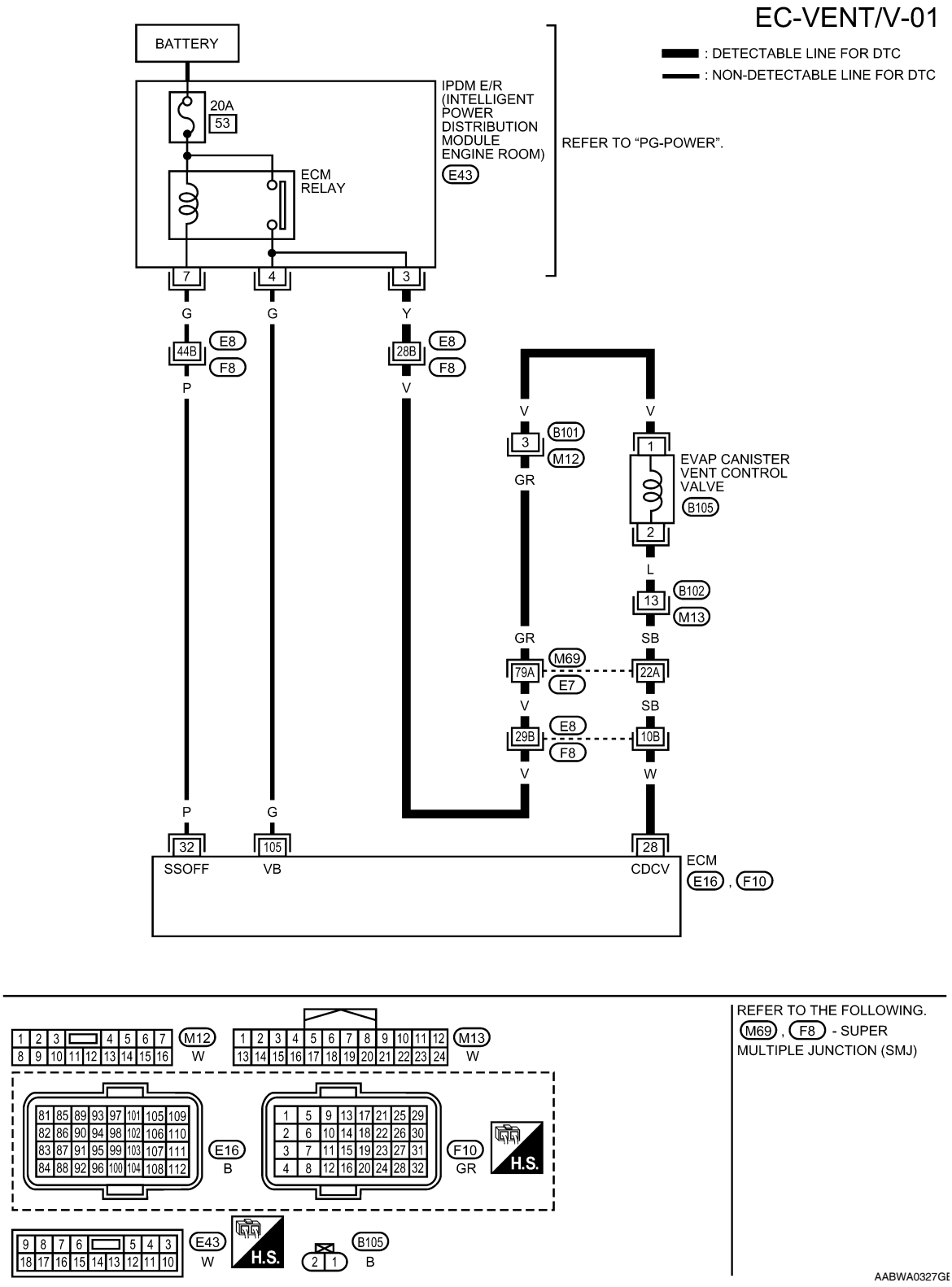
DTC Confirmation Procedure

INFOID:0000000004537311

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm battery voltage is more than 11V at idle.
1. Start engine and wait at least 8 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-819, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537312



Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	W	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For 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)
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:0000000004537313

1.INSPECTION START

1. Do you have CONSULT-III?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2.CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

With CONSULT-III

1. Turn ignition switch OFF and then turn ON.
2. Select “VENT CONTROL/V” in “ACTIVE TEST” mode with CONSULT-III.
3. Touch “ON/OFF” on CONSULT-III screen.
4. Check for operating sound of the valve.

Clicking noise should be heard.

OK or NG

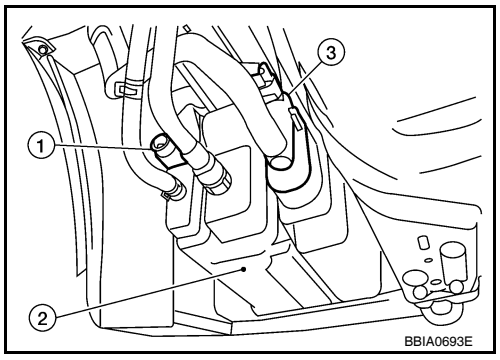
OK >> GO TO 8.
NG >> GO TO 3.

3.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister vent control valve (3) harness connector.

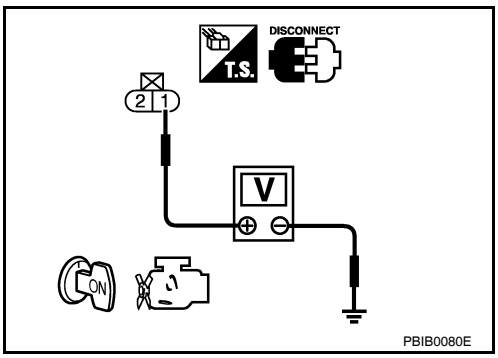
- EVAP control system pressure sensor (1)
- EVAP canister (2)

3. Turn ignition switch ON.



4. Check voltage between EVAP canister vent control valve terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors E7, M69
- Harness connectors M12, B101
- 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.

5. 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 harness continuity between ECM terminal 28 and EVAP canister vent control valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors E7, M69
- Harness connectors M13, B102
- Harness for open or short between EVAP canister vent control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 8.
NG >> Clean the rubber tube using an air blower.

8. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-821, "Component Inspection".

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP canister vent control valve.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

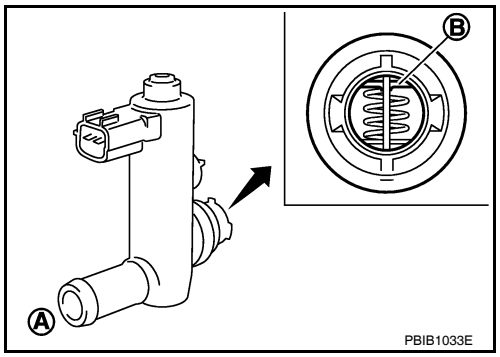
Component Inspection

INFOID:0000000004537314

EVAP CANISTER VENT CONTROL VALVE

With CONSULT-III

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.
   If NG, replace EVAP canister vent control valve.
   If OK, go to next step.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch ON.



5. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
6. Check air passage continuity and operation delay time.
   Make sure new O-ring is installed properly.

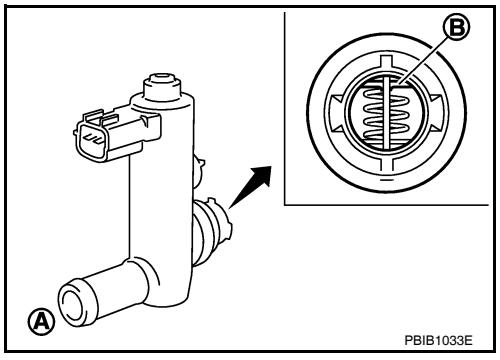
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.
If NG, replace EVAP canister vent control valve.
If OK, go to next step.

7. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform step 6 again.

Without CONSULT-III

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.

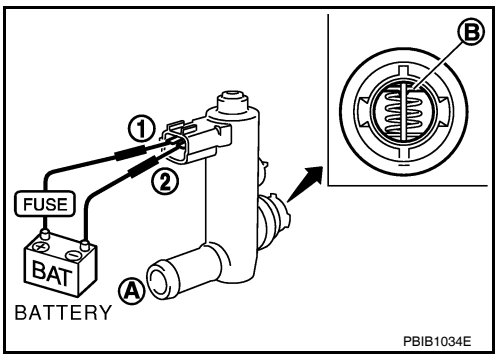


3. Check air passage continuity and operation delay time under the following conditions.
Make sure new O-ring is installed properly.

Condition	Air passage continuity between A and B
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.



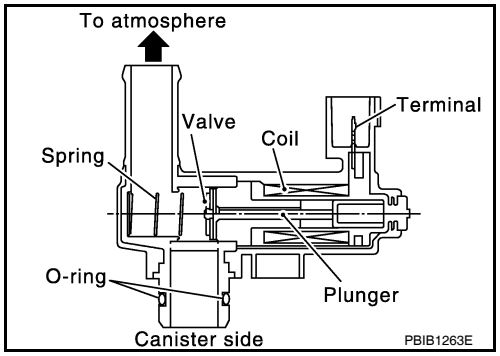
4. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform step 3 again.

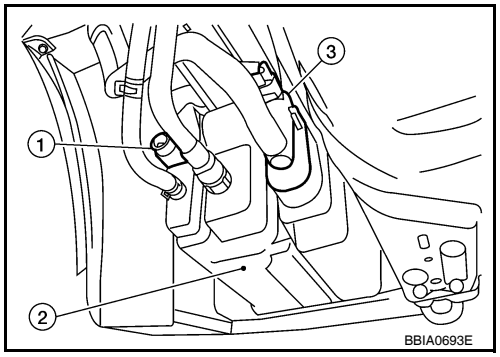
DTC P0448 EVAP CANISTER VENT CONTROL VALVE

Component Description

INFOID:0000000004537315

The EVAP canister vent control valve (3) is located on the EVAP canister (2) and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows EVAP control system diagnoses.
• EVAP control system pressure sensor (1)





CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537316

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

INFOID:0000000004537317

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0448 0448	EVAP canister vent control valve close	EVAP canister vent control valve remains closed under specified driving conditions.	• EVAP canister vent control valve • EVAP control system pressure sensor and the circuit • Blocked rubber tube to EVAP canister vent control valve • EVAP canister is saturated with water

DTC Confirmation Procedure

INFOID:0000000004537318

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 1 minute.
4. Repeat next procedures three times.

a. Increase the engine speed up to 3,000 to 3,500 rpm and keep it for 2 minutes and 50 seconds to 3 minutes.

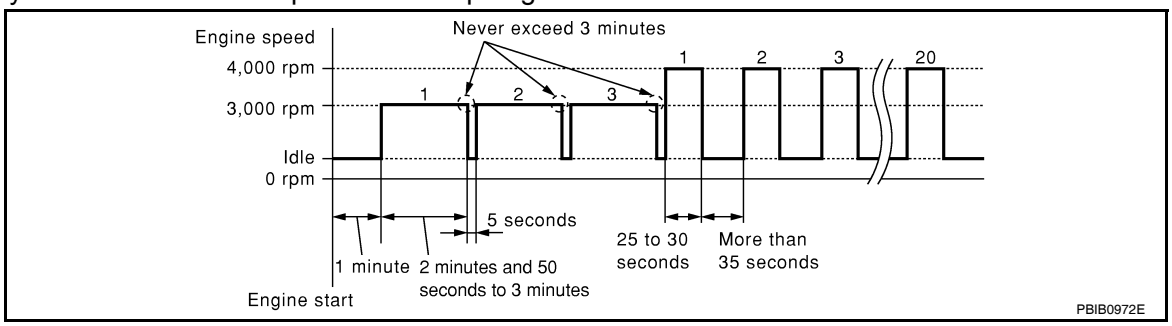
Never exceed 3 minutes.

b. Fully released accelerator pedal and keep engine idle for about 5 seconds.

5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to EC-826, "Diagnosis Procedure".
   If 1st trip DTC is not detected, go to the next step.
7. Repeat next procedure 20 times.

a. Quickly increase the engine speed up to 4,000 to 4,500 rpm or more and keep it for 25 to 30 seconds.

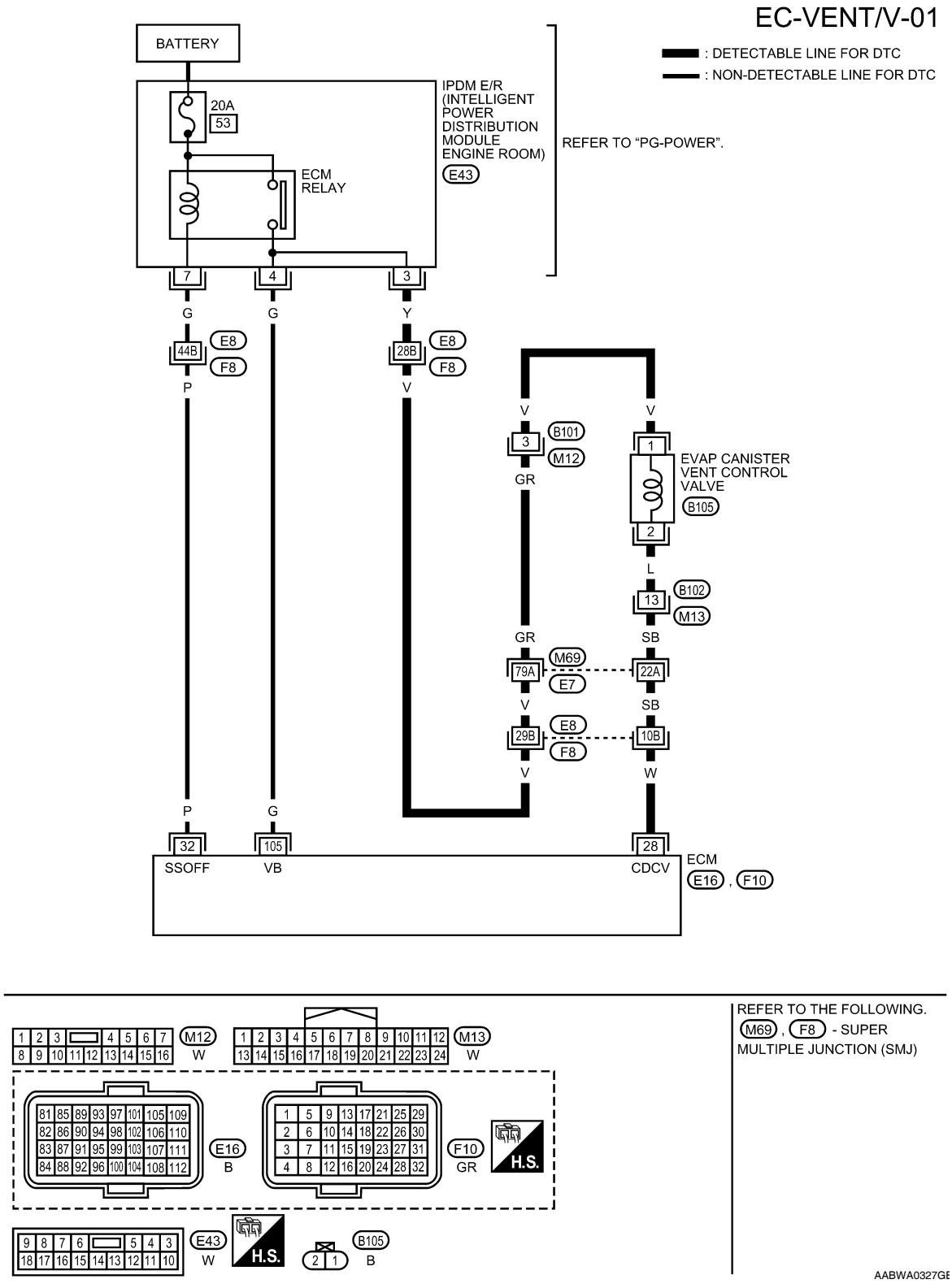
b. Fully released accelerator pedal and keep engine idle for at least 35 seconds.



8. Check 1st trip DTC.
9. If 1st trip DTC is detected, go to EC-826, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537319



Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	W	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For 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)
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

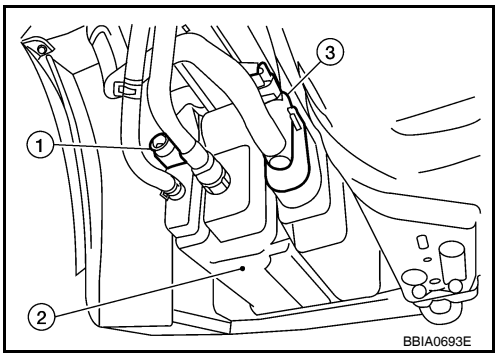
Diagnosis Procedure

INFOID:0000000004537320

1.CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Disconnect rubber tube connected to EVAP canister vent control valve (3).
3. Check the rubber tube for clogging.

- EVAP control system pressure sensor (1)
- EVAP canister (2)



OK or NG

OK >> GO TO 2.
NG >> Clean rubber tube using an air blower.

2.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-827, "Component Inspection".

OK or NG

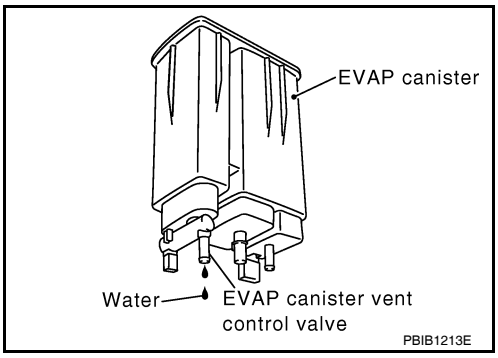
OK >> GO TO 3.
NG >> Replace EVAP canister vent control valve.

3.CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister.

Yes or No

Yes >> GO TO 4.
No >> GO TO 6.



4.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

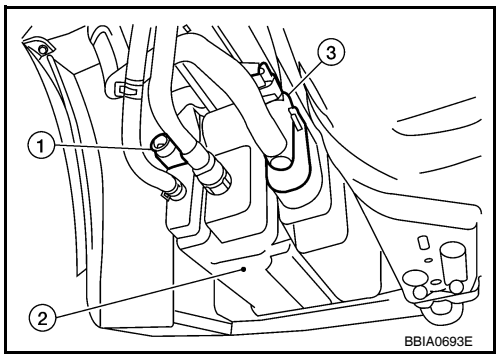
Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor (1) harness connector.
- EVAP canister (2)
- EVAP canister vent control valve (3)
2. Check connectors for water.

Water should not exist.



OK or NG

OK >> GO TO 7.
NG >> Replace EVAP control system pressure sensor.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-846, "Component Inspection".

OK or NG

OK >> GO TO 8.
NG >> Replace EVAP control system pressure sensor.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

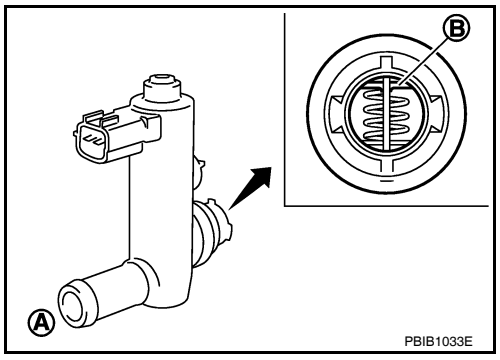
Component Inspection

INFOID:0000000004537321

EVAP CANISTER VENT CONTROL VALVE

With CONSULT-III

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.
   If NG, replace EVAP canister vent control valve.
   If OK, go to next step.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch ON.



5. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.

6. Check air passage continuity and operation delay time.

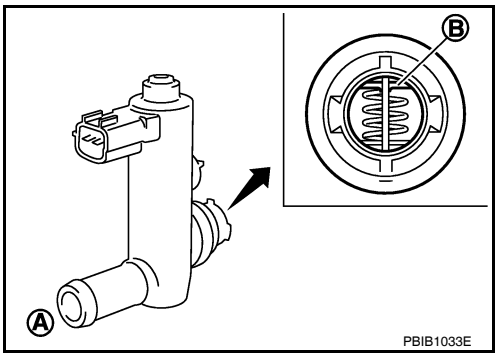
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.
Make sure new O-ring is installed properly.
If NG, replace EVAP canister vent control valve.
If OK, go to next step.

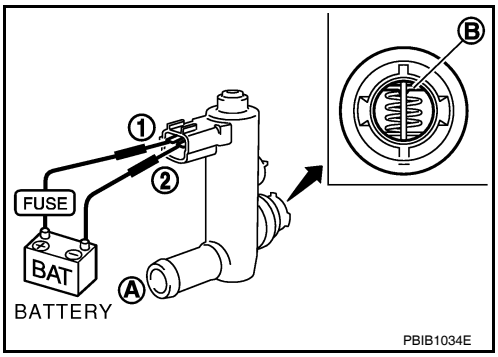
7. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform step 5 again.

Without CONSULT-III

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.



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.
Make sure new O-ring is installed properly.
If NG, replace EVAP canister vent control valve.
If OK, go to next step.

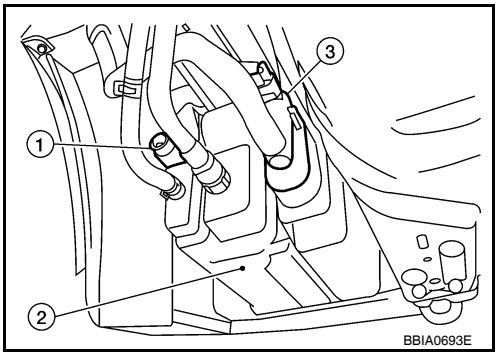
4. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform step 3 again.

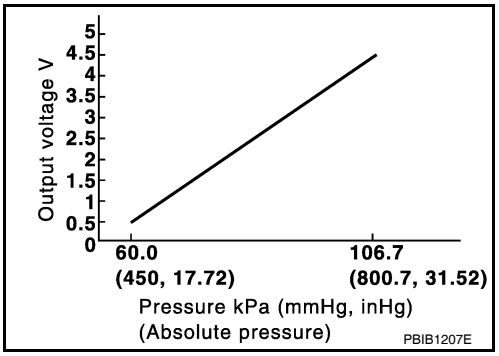
DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

Component Description

INFOID:0000000004537322

The EVAP control system pressure sensor (1) detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.
- EVAP canister (2)
- EVAP canister vent control valve (3)





CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537323

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 1.8 - 4.8V

On Board Diagnosis Logic

INFOID:0000000004537324

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0451 0451	EVAP control system pressure sensor performance	ECM detects a sloshing signal from the EVAP control system pressure sensor	• Harness or connectors [Crankshaft position sensor (POS) circuit is shorted.] (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Crankshaft position sensor (POS) • Accelerator pedal position sensor • Refrigerant pressure sensor

DTC Confirmation Procedure

INFOID:0000000004537325

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and wait at least 40 seconds.
   NOTE:

Do not depress accelerator pedal even slightly.

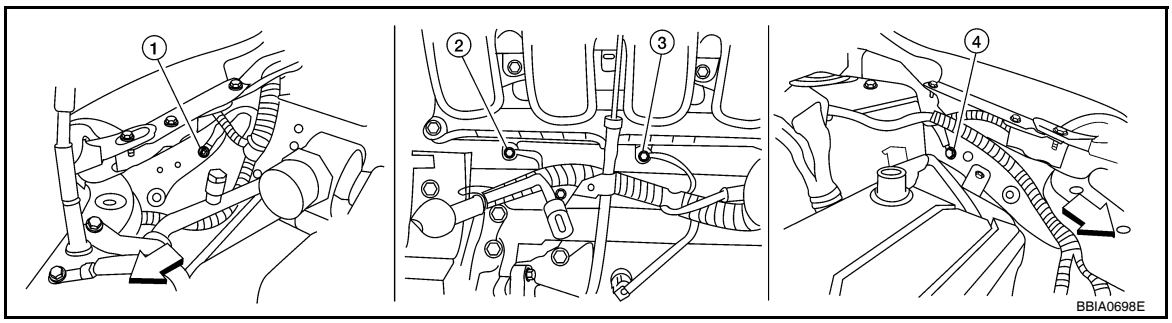
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-830, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004537326

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

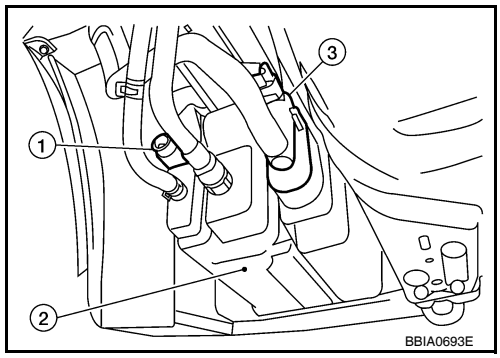
1. Body ground E24
2. Engine ground F9
3. engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK EVPA CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

1. Disconnect EVAP control system pressure sensor (1) harness connector.
- EVAP canister (2)
- EVAP canister vent control valve (3)
2. Check sensor harness connector for water.



Water should not exist.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace harness connector.

3.CHECK COMPONENTS POWER SUPPLY

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
74	Refrigerant pressure sensor terminal 3	EC-1006, "Wiring Diagram"
75	Crankshaft position sensor (POS) terminal 1	EC-776, "Wiring Diagram"
76	EVAP control system pressure sensor terminal 3	EC-834, "Wiring Diagram"
102	APP sensor terminal 5	EC-949, "Wiring Diagram"

OK or NG

OK >> GO TO 4.
NG >> Repair short to ground or short to power in harness or connectors.

4.CHECK COMPONENTS

Check the following.

- Refrigerant pressure sensor (Refer to MTC-37.)
- Crankshaft position sensor (POS) (Refer to EC-780, "Component Inspection".)

OK or NG

OK >> GO TO 5.
NG >> Replace malfunctioning components.

5.CHECK APP SENSOR

Refer to EC-952, "Component Inspection".

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-572, "Accelerator Pedal Released Position Learning".
3. Perform EC-572, "Throttle Valve Closed Position Learning".
4. Perform EC-572, "Idle Air Volume Learning".

>> **INSPECTION END**

7.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-831, "Component Inspection".

OK or NG

OK >> GO TO 8.
NG >> Replace EVAP control system pressure sensor.

8.CHECK INTERMITTENT INCIDENT

Refer to EC-626.
For wiring diagram, refer to EC-834, "Wiring Diagram".

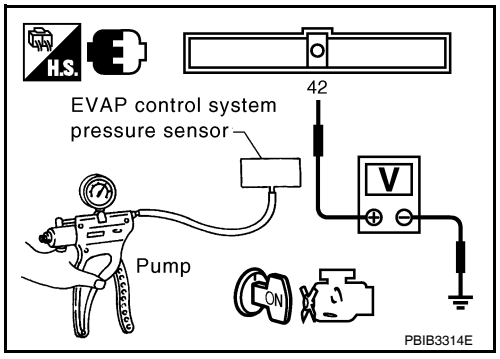
>> **INSPECTION END**

Component Inspection

INFOID:0000000004537327

EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 42 (EVAP control system pressure sensor signal) and ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**

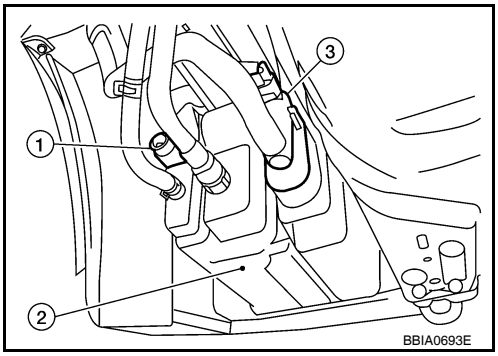
4. If NG, replace EVAP control system pressure sensor.

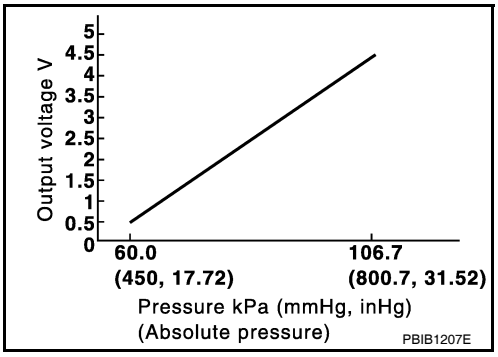
DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

Component Description

INFOID:0000000004537328

The EVAP control system pressure sensor (1) detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.
- EVAP canister (2)
- EVAP canister vent control valve (3)





CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537329

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 1.8 - 4.8V

On Board Diagnosis Logic

INFOID:0000000004537330

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0452 0452	EVAP control system pressure sensor low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Crankshaft position sensor (POS) • Accelerator pedal position sensor • Refrigerant pressure sensor

DTC Confirmation Procedure

INFOID:0000000004537331

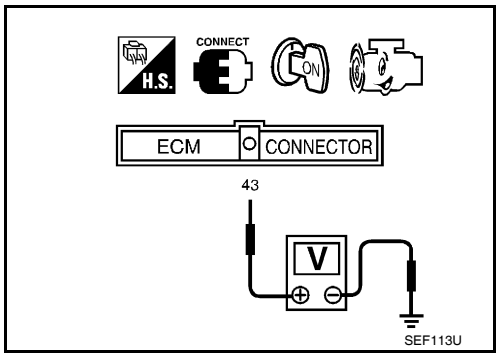
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Make sure that “FUEL T/TMP SE” is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to EC-835, "Diagnosis Procedure".

WITH GST

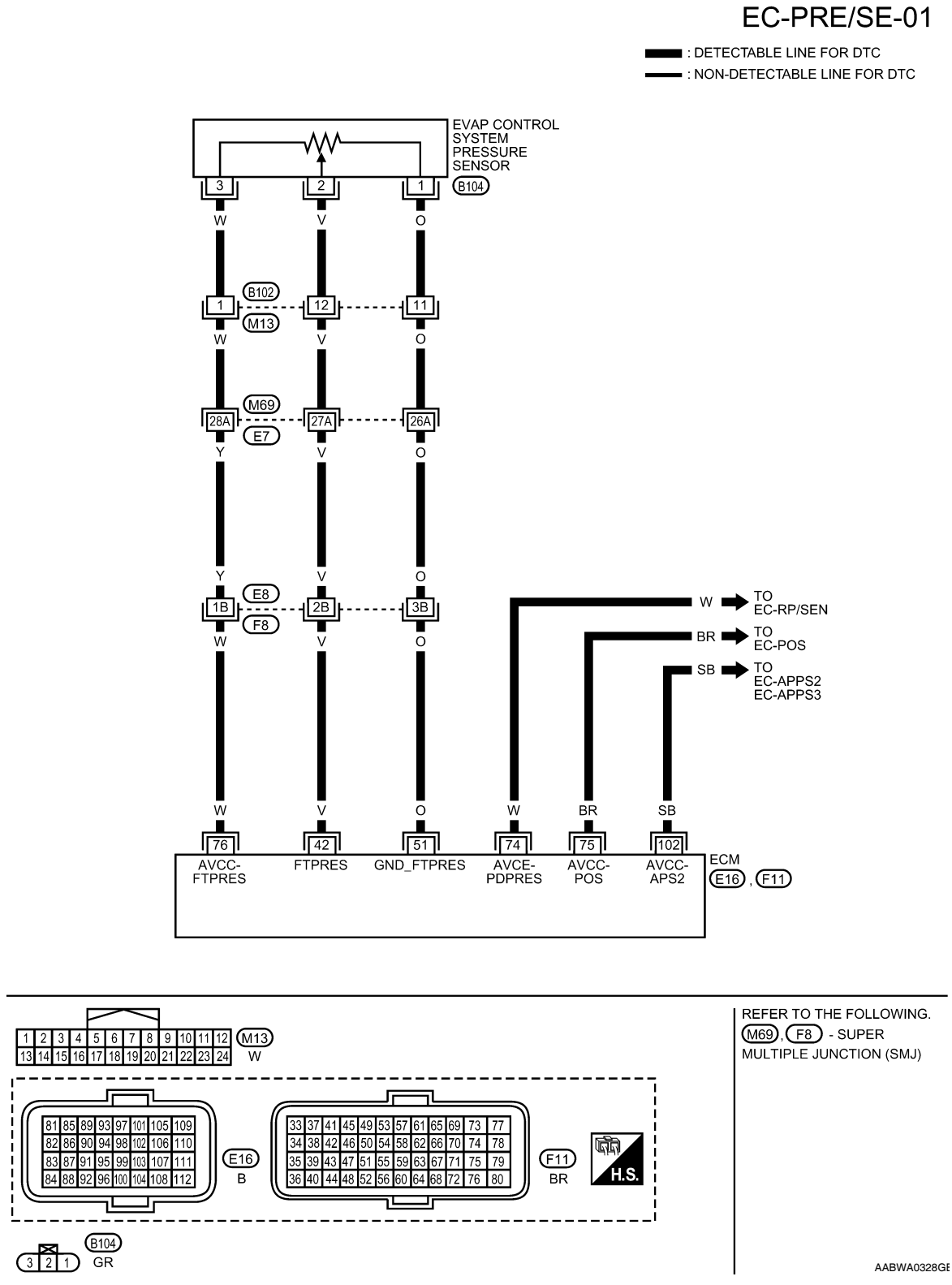
1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 43 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and wait at least 20 seconds.
5. Select Service $07 with GST.
   If 1st trip DTC is detected, go to EC-835, "Diagnosis Procedure".



Wiring Diagram

INFOID:0000000004537332

EC-PRE/SE-01



Specification data are reference values and are measured between each terminal 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.

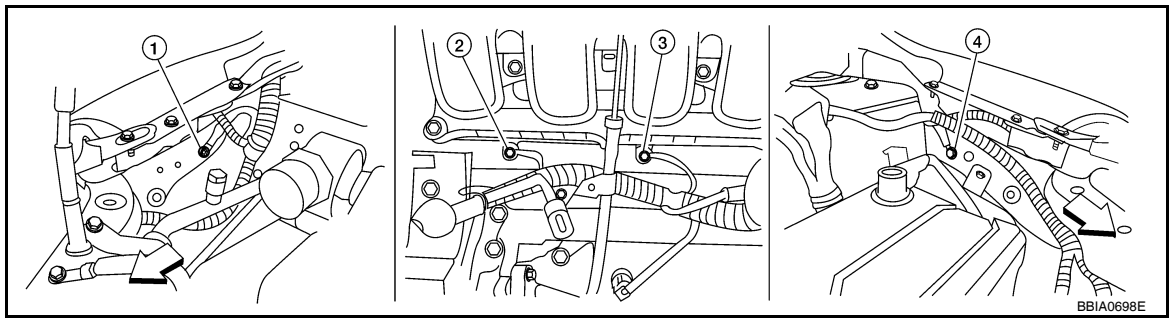
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	V	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8V
51	O	Sensor ground (EVAP control system pressure sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
74	W	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
75	BR	Sensor power supply [Crankshaft position sensor (POS)]	**[Ignition switch: ON]**	Approximately 5V
76	W	EVAP control system pressure sensor power supply	**[Ignition switch: ON]**	Approximately 5V
102	SB	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V

Diagnosis Procedure

INFOID:0000000004537333

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

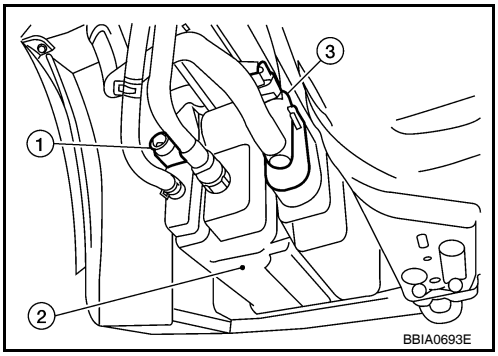
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor (1) harness connector.
- EVAP canister (2)
- EVAP canister vent control valve (3)
2. Check sensor harness connector for water.



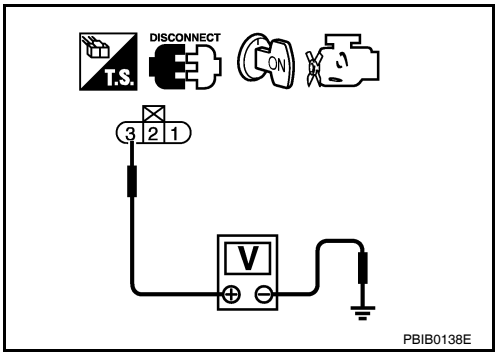
Water should not exist.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace harness connector.

3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-III or tester.



Voltage: Approximately 5V

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 3 and ECM terminal 76.

Continuity should exist.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK COMPONENTS POWER SUPPLY

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
74	Refrigerant pressure sensor terminal 3	EC-1006, "Wiring Diagram"
75	Crankshaft position sensor (POS) terminal 1	EC-776, "Wiring Diagram"
76	EVAP control system pressure sensor terminal 3	EC-834, "Wiring Diagram"
102	APP sensor terminal 5	EC-949, "Wiring Diagram"

OK or NG

OK >> GO TO 8.
NG >> Repair short to ground or short to power in harness or connectors.

8.CHECK COMPONENTS

Check the following.
- Refrigerant pressure sensor (Refer to MTC-37.)
- Crankshaft position sensor (POS) (Refer to EC-780, "Component Inspection".)

OK or NG

OK >> GO TO 9.
NG >> Replace malfunctioning components.

9.CHECK APP SENSOR

Refer to EC-952, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-572, "Accelerator Pedal Released Position Learning".
3. Perform EC-572, "Throttle Valve Closed Position Learning".
4. Perform EC-572, "Idle Air Volume Learning".

>> **INSPECTION END**

11.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 51. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

13.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 42 and EVAP control system pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between ECM and EVAP control system pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-838, "Component Inspection".

OK or NG

OK >> GO TO 16.
NG >> Replace EVAP control system pressure sensor.

16. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

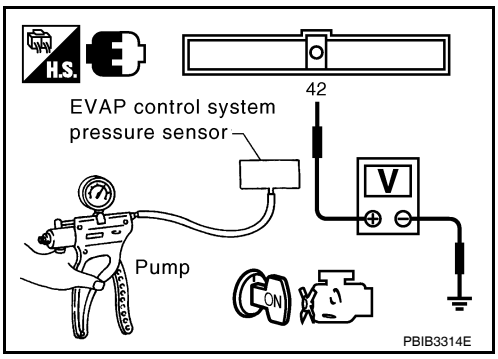
>> **INSPECTION END**

Component Inspection

INFOID:0000000004537334

EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 42 (EVAP control system pressure sensor signal) and ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**

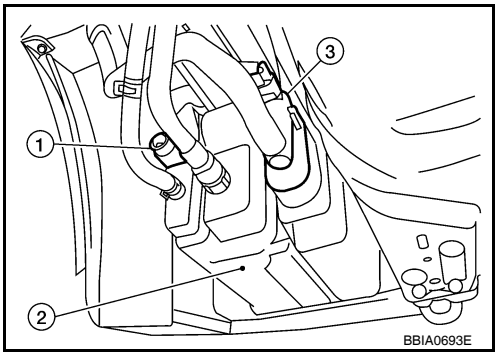
4. If NG, replace EVAP control system pressure sensor.

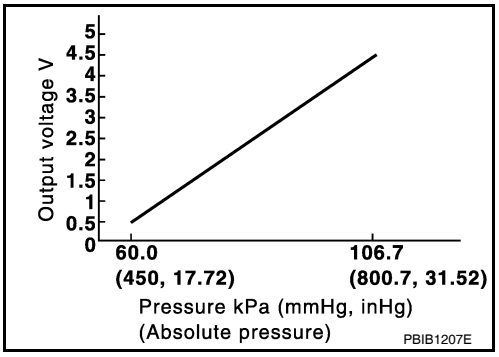
DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

Component Description

INFOID:0000000004537335

The EVAP control system pressure sensor (1) detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.
- EVAP canister (2)
- EVAP canister vent control valve (3)





CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537336

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 1.8 - 4.8V

On Board Diagnosis Logic

INFOID:0000000004537337

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0453 0453	EVAP control system pressure sensor high input	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Crankshaft position sensor (POS) • Accelerator pedal position sensor • Refrigerant pressure sensor • EVAP canister vent control valve • EVAP canister • Rubber hose to EVAP canister vent control valve

DTC Confirmation Procedure

INFOID:0000000004537338

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

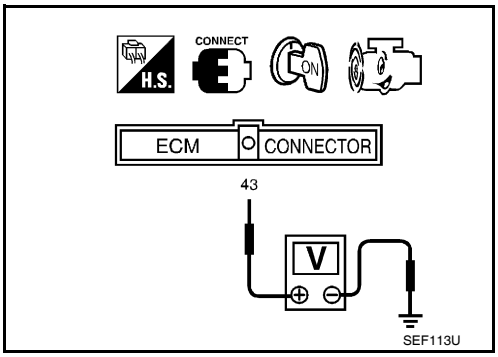
Always perform test at a temperature of 5°C (41°F) or more.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Make sure that “FUEL T/TMP SE” is more than 0°C (32°F).
6. Wait at least 10 seconds.
7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to EC-842, "Diagnosis Procedure".

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 43 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Wait at least 10 seconds.
5. Select Service $07 with GST.
   If 1st trip DTC is detected, go to EC-842, "Diagnosis Procedure".

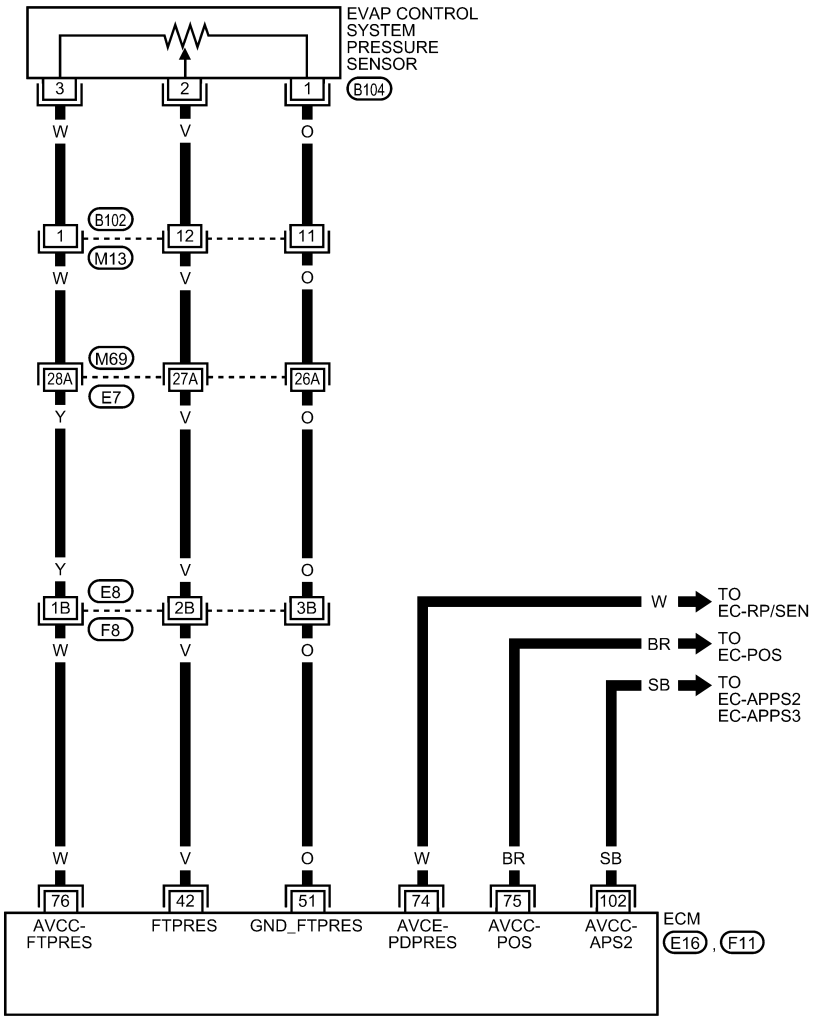


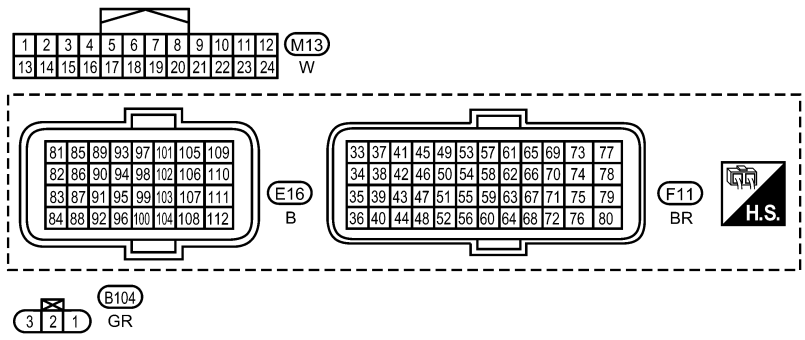
Wiring Diagram

INFOID:0000000004537339

EC-PRE/SE-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





REFER TO THE FOLLOWING.
M69, F8 - SUPER MULTIPLE JUNCTION (SMJ)

AABWA0328GE

Specification data are reference values and are measured between each terminal 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.

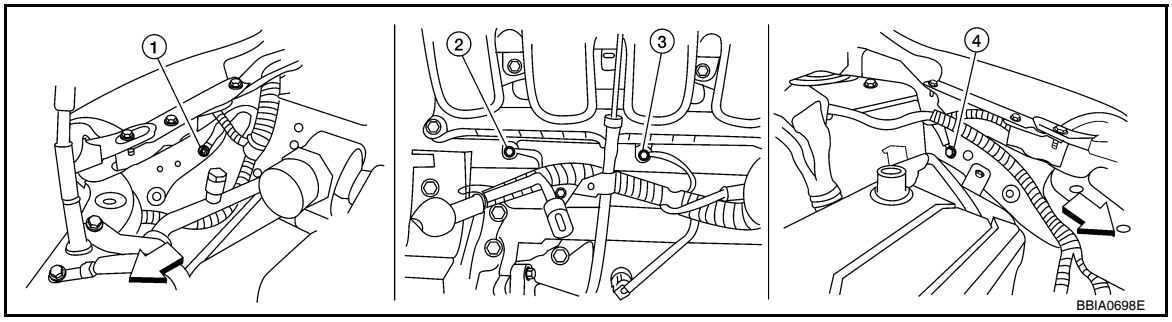
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	V	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8V
51	O	Sensor ground (EVAP control system pressure sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
74	W	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
75	BR	Sensor power supply [Crankshaft position sensor (POS)]	**[Ignition switch: ON]**	Approximately 5V
76	W	EVAP control system pressure sensor power supply	**[Ignition switch: ON]**	Approximately 5V
102	SB	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V

Diagnosis Procedure

INFOID:0000000004537340

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

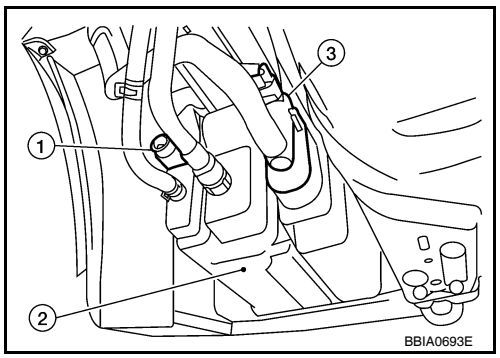
1. Engine ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor (1) harness connector.
- EVAP canister (2)
- EVAP canister vent control valve (3)
2. Check sensor harness connector for water.



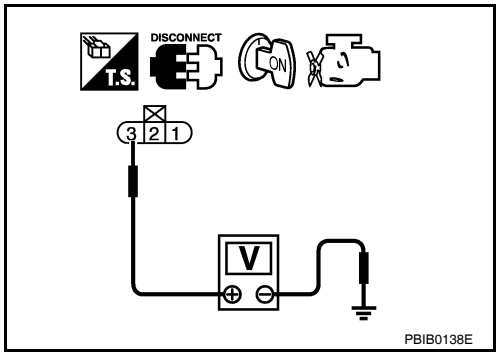
Water should not exist.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace harness connector.

3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-III or tester.



Voltage: Approximately 5V

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 3 and ECM terminal 76.

Continuity should exist.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK COMPONENTS POWER SUPPLY

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
74	Refrigerant pressure sensor terminal 3	EC-1006, "Wiring Diagram"
75	Crankshaft position sensor (POS) terminal 1	EC-776, "Wiring Diagram"
76	EVAP control system pressure sensor terminal 3	EC-834, "Wiring Diagram"
102	APP sensor terminal 5	EC-949, "Wiring Diagram"

OK or NG

OK >> GO TO 8.
NG >> Repair short to ground or short to power in harness or connectors.

8.CHECK COMPONENTS

Check the following.
- Refrigerant pressure sensor (Refer to MTC-37.)
- Crankshaft position sensor (POS) (Refer to EC-780, "Component Inspection".)

OK or NG

OK >> GO TO 9.
NG >> Replace malfunctioning components.

9.CHECK APP SENSOR

Refer to EC-952, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-572, "Accelerator Pedal Released Position Learning".
3. Perform EC-572, "Throttle Valve Closed Position Learning".
4. Perform EC-572, "Idle Air Volume Learning".

>> **INSPECTION END**

11.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 51. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E85, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

13.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 42 and EVAP control system pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between ECM and EVAP control system pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK RUBBER TUBE

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging, vent and kinked.

OK or NG

OK >> GO TO 16.
NG >> Clean the rubber tube using an air blower, repair or replace rubber tube.

16. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-821, "Component Inspection".

OK or NG

OK >> GO TO 17.
NG >> Replace EVAP canister vent control valve.

17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-846, "Component Inspection".

OK or NG

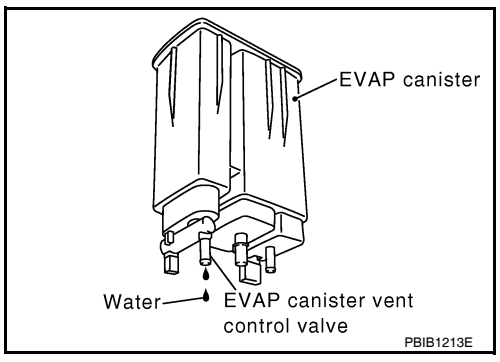
OK >> GO TO 18.
NG >> Replace EVAP control system pressure sensor.

18. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 19.
No >> GO TO 21.



19. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensorattached.
The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK >> GO TO 21.
NG >> GO TO 20.

20. DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose connected to EVAP canister for clogging or poor connection

>> Repair hose or replace EVAP canister.

21. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

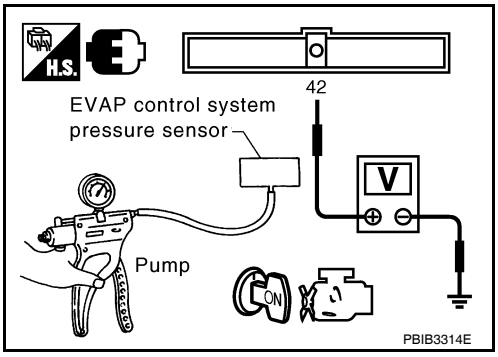
>> **INSPECTION END**

Component Inspection

INFOID:0000000004537341

EVAP CONTROL PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 42 (EVAP control system pressure sensor signal) and ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**

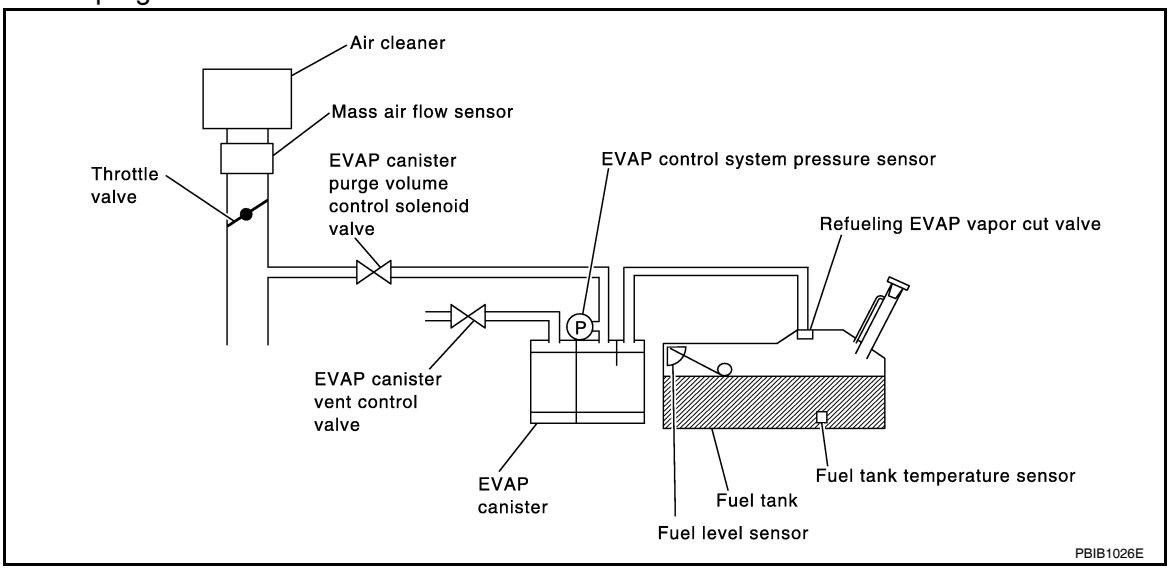
4. If NG, replace EVAP control system pressure sensor.

DTC P0455 EVAP CONTROL SYSTEM

On Board Diagnosis Logic

INFOID:0000000004537342

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in EVAP system between the fuel tank and EVAP canister purge volume control solenoid valve.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0455 0455	EVAP control system gross leak detected	• EVAP control system has a very large leak such as fuel filler cap fell off. • EVAP control system does not operate properly.	• Fuel filler cap remains open or fails to close. • Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent. • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Fuel tank temperature sensor • O-ring of EVAP canister vent control valve is missing or damaged. • EVAP control system pressure sensor • Refueling EVAP vapor cut valve • ORVR system leaks

CAUTION:
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC Confirmation Procedure

INFOID:0000000004537343

CAUTION:
Never remove fuel filler cap during the DTC Confirmation Procedure.
NOTE:

- **Make sure that EVAP hose are connected to EVAP canister purge volume control solenoid valve properly.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedure.**

WITH CONSULT-III

1. Tighten fuel filler cap securely until reteaching sound is heard.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
5. Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 60°C (32 - 140°F)
6. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
   Follow the instruction displayed.
   NOTE:
   If the engine speed cannot be maintained within the range displayed on the CONSULT-III screen, go to EC-566, "Basic Inspection".
7. Make sure that "OK" is displayed.
   If "NG" is displayed, select "SELF-DIAG RESULTS" mode with CONSULT-III and make sure that "EVAP GROSS LEAK [P0455]" is displayed. If it is displayed, refer to EC-848, "Diagnosis Procedure".
   If P0442 is displayed, perform Diagnostic Procedure for DTC P0442, EC-798, "Diagnosis Procedure".

WITH GST

NOTE:
Be sure to read the explanation of Driving Pattern on EC-542, "Emission-related Diagnostic Information" before driving vehicle.

1. Start engine.
2. Drive vehicle according to Driving Pattern, EC-542, "Emission-related Diagnostic Information".
3. Stop vehicle.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ignition switch ON.
5. Select Service $07 with GST.

- If P0441 is displayed on the screen, go to EC-793, "Diagnosis Procedure" for DTC P0441.
- If P0442 is displayed on the screen, go to EC-798, "Diagnosis Procedure" for DTC P0442.
- If P0455 is displayed on the screen, go to EC-848, "Diagnosis Procedure".

Diagnosis Procedure

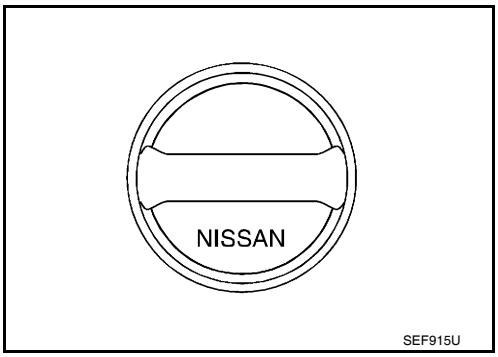
INFOID:0000000004537344

1.CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.

OK or NG

OK >> GO TO 2.
NG >> Replace with genuine NISSAN fuel filler cap.



2.CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK >> GO TO 3.
NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
2. Retighten until reteaching sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-529, "Component Inspection".

OK or NG

OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

5. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection.
Refer to EC-527.

OK or NG

OK >> GO TO 6.
NG >> Repair or reconnect the hose.

6. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 7.

7. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.
- EVAP canister vent control is installed properly.
  Refer to EC-531, "Removal and Installation".
- EVAP canister vent control valve.
  Refer to EC-821, "Component Inspection".

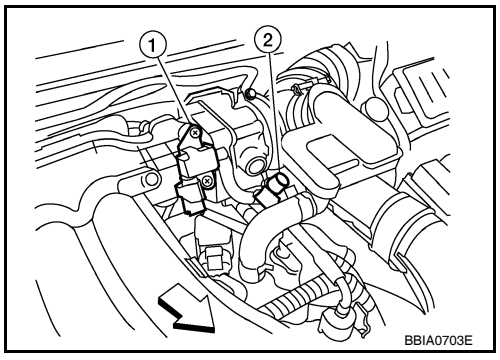
OK or NG

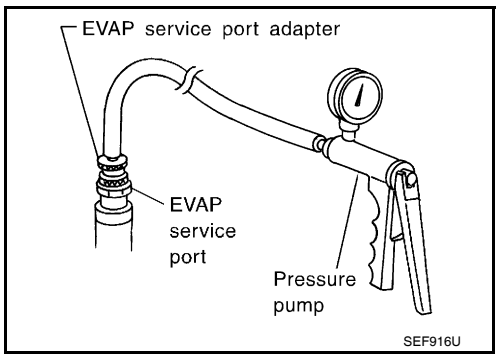
OK >> GO TO 8.
NG >> Repair or replace EVAP canister vent control valve and O-ring.

8. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.
For the location of EVAP service port (2), refer to EC-527, "Description".
- EVAP canister purge volume control solenoid valve (1)
- : Vehicle front

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.





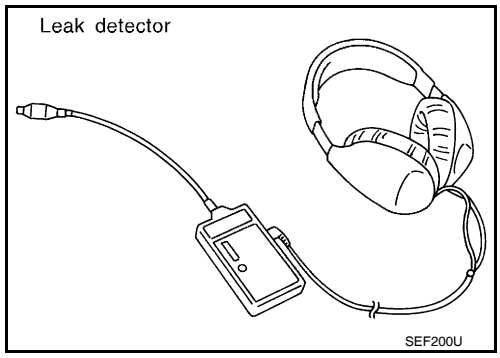
With CONSULT-III>>GO TO 9.
Without CONSULT-III>>GO TO 10.

9. CHECK FOR EVAP LEAK

With CONSULT-III

1. Turn ignition switch ON.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-III.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   CAUTION:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-527, "Description".



OK or NG

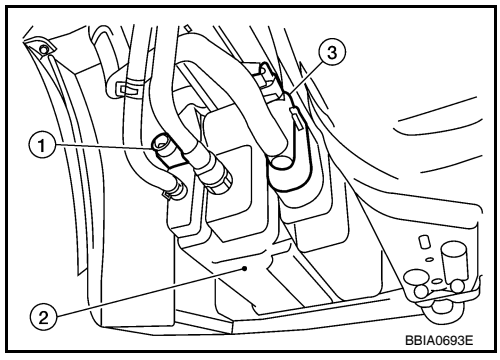
OK >> GO TO 11.
NG >> Repair or replace.

10. CHECK FOR EVAP LEAK

Without CONSULT-III

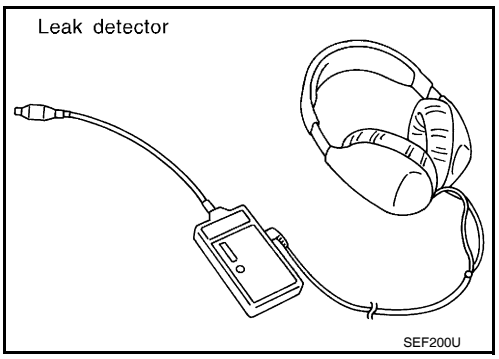
1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve (3). The valve will close. (Continue to apply 12 volts until the end of test.)

- EVAP control system pressure sensor (1)
- EVAP canister (2)



3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.
   CAUTION:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-527, "Description".



OK or NG

OK >> GO TO 12.
NG >> Repair or replace.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-III screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum.

Vacuum should exist.

OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK >> GO TO 15.
NG >> GO TO 13.

13. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-594, "Vacuum Hose Drawing".

OK or NG

OK (With CONSULT-III)>>GO TO 14.
OK (Without CONSULT-III)>>GO TO 15.
NG >> Repair or reconnect the hose.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III. Check that engine speed varies according to the valve opening.

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-815, "Component Inspection".

OK or NG

OK >> GO TO 16.
NG >> Replace EVAP canister purge volume control solenoid valve.

16. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-755, "Component Inspection".

OK or NG

OK >> GO TO 17.
NG >> Replace fuel level sensor unit.

17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-838, "Component Inspection".

OK or NG

OK >> GO TO 18.
NG >> Replace EVAP control system pressure sensor.

18. CHECK EVAP/ORVR LINE

Check refueling EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-533.

OK or NG

OK >> GO TO 19.
>> Repair or replace hoses and tubes.

19. CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 20.
>> Repair or replace hoses, tubes or filler neck tube.

20. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-535, "Component Inspection".

OK or NG

OK >> GO TO 21.
>> Replace refueling EVAP vapor cut valve with fuel tank.

21. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

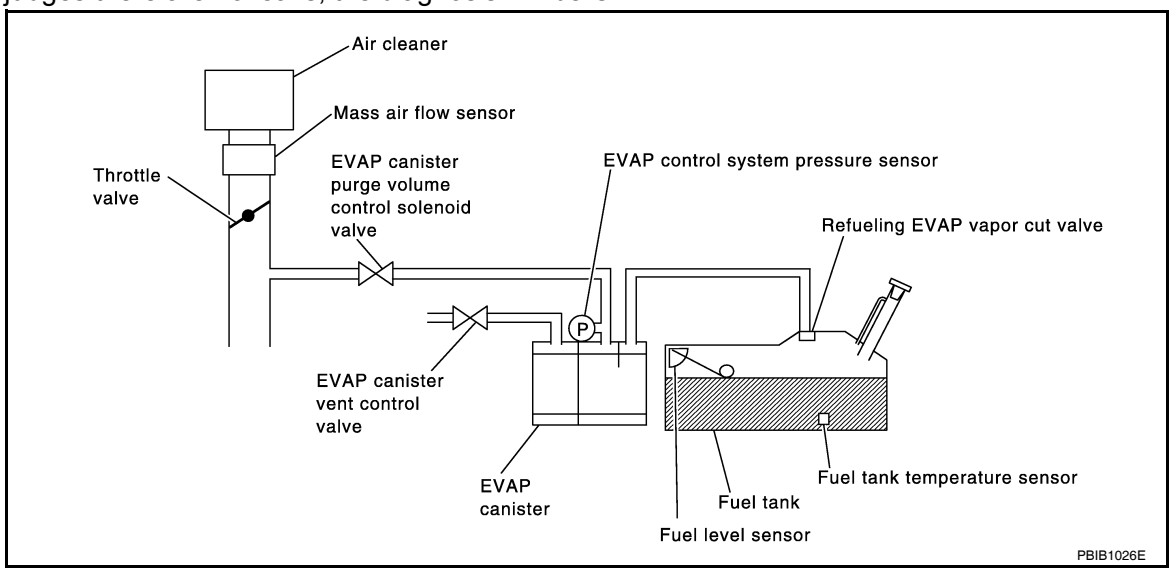
>> **INSPECTION END**

DTC P0456 EVAP CONTROL SYSTEM

On Board Diagnosis Logic

INFOID:0000000004537345

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.
If ECM judges a leak which corresponds to a very small leak, the very small leak P0456 will be detected.
If ECM judges a leak equivalent to a small leak, EVAP small leak P0442 will be detected.
If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0456 0456	Evaporative emission control system very small leak (negative pressure check)	• EVAP system has a very small leak. • EVAP system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or fails to close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Fuel tank temperature sensor • O-ring of EVAP canister vent control valve is missing or damaged • EVAP canister is saturated with water • EVAP control system pressure sensor • Refueling EVAP vapor cut valve • ORVR system leaks • Fuel level sensor and the circuit • Foreign matter caught in EVAP canister purge volume control solenoid valve

CAUTION:
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC Confirmation Procedure

INFOID:0000000004537346

NOTE:
- **If DTC P0456 is displayed with P0442, first perform trouble diagnosis for DTC P0456.**
- **After repair, make sure that the hoses and clips are installed properly.**
- 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:
- **Open engine hood before conducting following procedure.**
- **If any of following conditions are met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.**
- **Fuel filler cap is removed.**
- **Refilled or drained the fuel.**
- **EVAP component parts is/are removed.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Make sure the following conditions are met.
   FUEL LEVEL SE: 0.25 - 1.4V
   COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
   FUEL T/TMP SE: 0 - 35°C (32 - 95°F)
   INT/A TEMP SE: More than 0°C (32°F)
   If NG, turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the “FUEL LEVEL SE” meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “EVAP V/S LEAK P0456” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-III.
   Follow the instruction displayed.
6. Make sure that “OK” is displayed.
   If “NG” is displayed, refer to EC-855, "Diagnosis Procedure".
   NOTE:
   - **If the engine speed cannot be maintained within the range displayed on CONSULT-III screen, go to EC-566, "Basic Inspection".**
   - **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

Overall Function Check

INFOID:0000000004537347

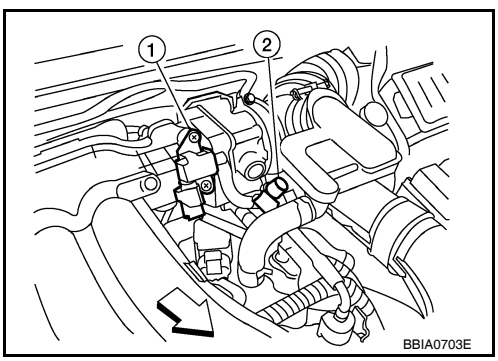
WITH GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

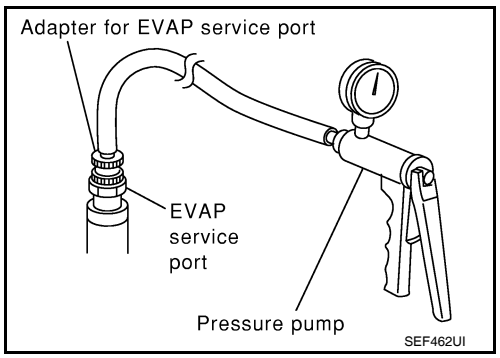
CAUTION:
- **Never use compressed air, doing so may damage the EVAP system.**
- **Do not start engine.**
- **Do not exceeded 4.12 kPa (0.042 kg/cm^2, 0.6 psi).**

1. Attach the EVAP service port adapter securely to the EVAP service port (2).

- EVAP canister purge volume control solenoid valve (1)
- : Vehicle front



2. Set the pressure pump and a hose.
3. Also set the pressure pump with pressure gauge to the EVAP service port adapter.
4. Turn ignition switch ON.
5. Connect GST and select Service $08.
6. Using Service $08 control the EVAP canister vent control valve (close).
7. Apply pressure and make sure the following conditions are satisfied.
   Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)
   Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg).
   If NG, go to EC-855, "Diagnosis Procedure".
   If OK, go to next step.
8. Disconnect GST.
9. Start engine and warm it up to normal operating temperature.
10. Turn ignition switch OFF and wait at least 10 seconds.
11. Restart engine and let it idle for 90 seconds.
12. Keep engine speed at 2,000 rpm for 30 seconds.
13. Turn ignition switch OFF.
    NOTE:
    For more information, refer to GST Instruction Manual.



Diagnosis Procedure

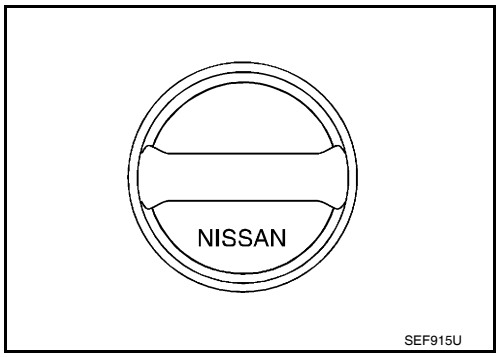
INFOID:0000000004537348

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.

OK or NG

OK >> GO TO 2.
NG >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK >> GO TO 3.
NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
2. Retighten until reteaching sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-529, "Component Inspection".

OK or NG

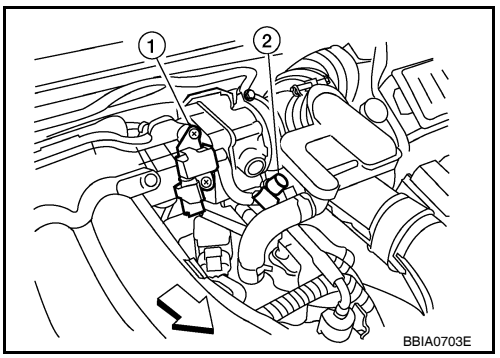
OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

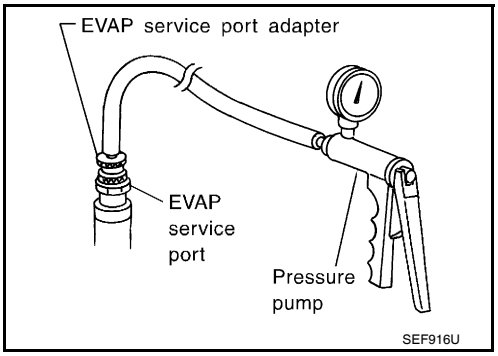
5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely. For the location of EVAP service port (2), refer to EC-527, "Description".

- EVAP canister purge volume control solenoid valve (1)
- : Vehicle front

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.



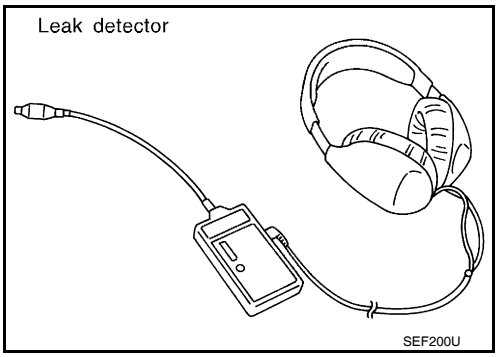


With CONSULT-III>>GO TO 6.
Without CONSULT-III>>GO TO 7.

6. CHECK FOR EVAP LEAK

With CONSULT-III

1. Turn ignition switch ON.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-III.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   CAUTION:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**
4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-527, "Description".



OK or NG

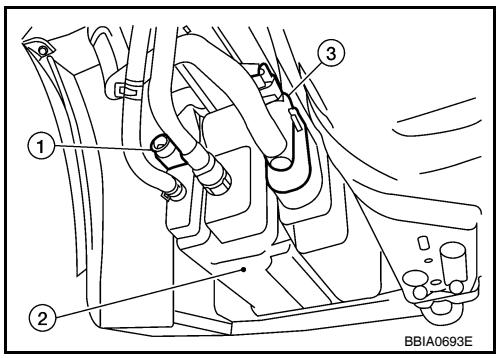
OK >> GO TO 8.
NG >> Repair or replace.

7. CHECK FOR EVAP LEAK

Without CONSULT-III

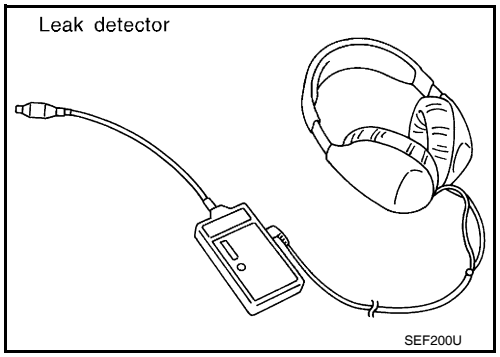
1. Turn ignition switch OFF.

2. Apply 12 volts DC to EVAP canister vent control valve (3). The valve will close. (Continue to apply 12 volts until the end of test.)
- EVAP control system pressure sensor (1)
- EVAP canister (2)



3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.
CAUTION:
- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
Refer to EC-527, "Description".



OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK EVAP CANISTER VENT CONTROL VALVE

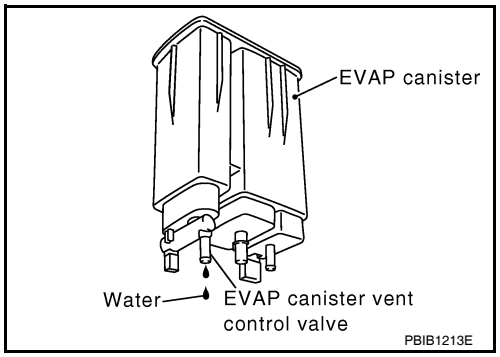
Check the following.
- EVAP canister vent control valve is installed properly.
  Refer to EC-531, "Removal and Installation".
- EVAP canister vent control valve.
  Refer to EC-821, "Component Inspection".

OK or NG

OK >> GO TO 9.
NG >> Repair or replace EVAP canister vent control valve and O-ring.

9. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Does water drain from the EVAP canister?



Yes or No

Yes >> GO TO 10.
No (With CONSULT-III)>>GO TO 12.
No (Without CONSULT-III)>>GO TO 13.

10. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK (With CONSULT-III)>>GO TO 12.
OK (Without CONSULT-III)>>GO TO 13.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-III screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum.

Vacuum should exist.

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK >> GO TO 16.
NG >> GO TO 14.

14. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-594, "Vacuum Hose Drawing".

OK or NG

OK >> GO TO 15.
NG >> Repair or reconnect the hose.

15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-815, "Component Inspection".

OK or NG

OK >> GO TO 16.
NG >> Replace EVAP canister purge volume control solenoid valve.

16. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-755, "Component Inspection".

OK or NG

OK >> GO TO 17.
NG >> Replace fuel level sensor unit.

17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-838, "Component Inspection".

OK or NG

OK >> GO TO 18.
NG >> Replace EVAP control system pressure sensor.

18. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-527, "Description".

OK or NG

OK >> GO TO 19.
NG >> Repair or reconnect the hose.

19. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 20.

20. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-533.

OK or NG

OK >> GO TO 21.
NG >> Repair or replace hoses and tubes.

21. CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 22.
NG >> Repair or replace hose, tube or filler neck tube.

22. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-535, "Component Inspection".

OK or NG

OK >> GO TO 23.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

23. CHECK FUEL LEVEL SENSOR

Refer to FL-5.

OK or NG

OK >> GO TO 24.
NG >> Replace fuel level sensor unit.

24. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

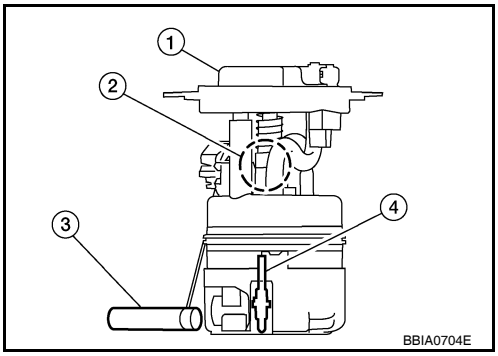
DTC P0460 FUEL LEVEL SENSOR

Component Description

INFOID:0000000004537349

The fuel level sensor (3) is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line.
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel tank temperature sensor (4)



On Board Diagnosis Logic

INFOID:0000000004537350

NOTE:

- **If DTC P0460 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-633.**
- **If DTC P0460 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-635.**
- When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0460 0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.	• Harness or connectors (CAN communication line is open or shorted) • Harness or connectors (Fuel level sensor circuit is open or shorted) • Combination meter • Fuel level sensor

DTC Confirmation Procedure

INFOID:0000000004537351

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Start engine and wait maximum of 2 consecutive minutes.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-860, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004537352

1.CHECK FUEL GAUGE OPERATION

Refer to DI-10, "Self-Diagnosis Mode of Combination Meter".

OK or NG

OK >> GO TO 2.
NG >> Follow the instruction of DI-10, "Self-Diagnosis Mode of Combination Meter".

2.CHECK FUEL LEVEL SENSOR AND CIRCUIT

Refer to DI-16, "Fuel Level Sensor Signal Inspection".

OK or NG

OK >> GO TO 3.
NG >> Repair or replace malfunctioning parts.

3.CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

Removal and Installation

INFOID:0000000004537353

FUEL LEVEL SENSOR

Refer to FL-5.

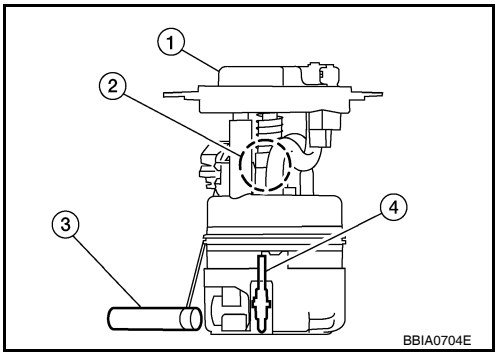
DTC P0461 FUEL LEVEL SENSOR

Component Description

INFOID:0000000004537354

The fuel level sensor (3) is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line.
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel tank temperature sensor (4)



On Board Diagnosis Logic

INFOID:0000000004537355

NOTE:

- **If DTC P0461 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-633.**
- **If DTC P0461 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-635.**
- This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.Driving long distances naturally affect fuel gauge level.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0461 0461	Fuel level sensor circuit range/performance	The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.	• Harness or connectors (CAN communication line is open or shorted) • Harness or connectors (Fuel level sensor circuit is open or shorted) • Combination meter • Fuel level sensor

Overall Function Check

INFOID:0000000004537356

Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

WARNING:
When performing following procedure, be sure to observe the handling of the fuel.
Refer to FL-4.
TESTING CONDITION:
Before starting overall function check, preparation of draining fuel and refilling fuel is required.

WITH CONSULT-III

NOTE:
Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-574, "Fuel Pressure Check".
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.
6. Select “FUEL LEVEL SE” in “DATA MONITOR” mode with CONSULT-III.
7. Check “FUEL LEVEL SE” output voltage and note it.
8. Select “FUEL PUMP RELAY” in “ACTIVE TEST” mode with CONSULT-III.
9. Touch “ON” and drain fuel approximately 30 (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10. Check “FUEL LEVEL SE” output voltage and note it.

11. Fill fuel into the fuel tank for 30 (7-7/8 US gal, 6-5/8 Imp gal).
12. Check “FUEL LEVEL SE” output voltage and note it.
13. Confirm whether the voltage changes more than 0.03V during step 7 to 10 and 10 to 12.
    If NG, go to EC-863, "Diagnosis Procedure".

WITH GST

NOTE:
Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-574, "Fuel Pressure Check".
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch ON.
6. Drain fuel by 30 (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
7. Confirm that the fuel gauge indication varies.
8. Fill fuel into the fuel tank for 30 (7-7/8 US gal, 6-5/8 Imp gal).
9. Confirm that the fuel gauge indication varies.
10. If NG, go to EC-863, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004537357

1.CHECK FUEL GAUGE OPERATION

Refer to DI-10, "Self-Diagnosis Mode of Combination Meter".

OK or NG

OK >> GO TO 2.
NG >> Follow the instruction of DI-10, "Self-Diagnosis Mode of Combination Meter".

2.CHECK FUEL LEVEL SENSOR AND CIRCUIT

Refer to DI-16, "Fuel Level Sensor Signal Inspection".

OK or NG

OK >> GO TO 3.
NG >> Repair or replace malfunctioning parts.

3.CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

Removal and Installation

INFOID:0000000004537358

FUEL LEVEL SENSOR
Refer to FL-5.

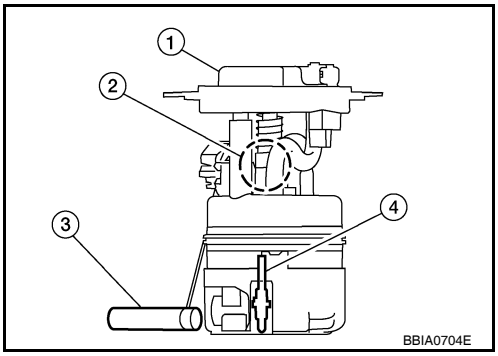
DTC P0462, P0463 FUEL LEVEL SENSOR

Component Description

INFOID:0000000004537359

The fuel level sensor (3) is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter. sends the fuel level sensor signal to the ECM through CAN communication line.
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel tank temperature sensor (4)



On Board Diagnosis Logic

INFOID:0000000004537360

NOTE:

- **If DTC P0462 or P0463 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-633.**
- **If DTC P0462 or P0463 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-635.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0462 0462	Fuel level sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (CAN communication line is open or shorted) • Harness or connectors (Fuel level sensor circuit is open or shorted) • Combination meter • Fuel level sensor
P0463 0463	Fuel level sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

INFOID:0000000004537361

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch ON.

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-864, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004537362

1.CHECK FUEL GAUGE OPERATION

Refer to DI-10, "Self-Diagnosis Mode of Combination Meter".

OK or NG

OK >> GO TO 2.
NG >> Follow the instruction of DI-10, "Self-Diagnosis Mode of Combination Meter".

2.CHECK FUEL LEVEL SENSOR AND CIRCUIT

Refer to DI-16, "Fuel Level Sensor Signal Inspection".

OK or NG

OK >> GO TO 3.
NG >> Repair or replace malfunctioning parts.

3.CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

Removal and Installation

INFOID:0000000004537363

FUEL LEVEL SENSOR

Refer to FL-5.

DTC P0500 VSS

Description

INFOID:0000000004537364

NOTE:
- **If DTC P0500 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-633.**
- **If DTC P0500 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-635.**

The vehicle speed signal is sent from “ABS actuator and electric unit (control unit)” or combination meter through CAN communication line.

On Board Diagnosis Logic

INFOID:0000000004537365

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500 0500	Vehicle speed sensor	The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	• Harness or connectors (CAN communication line is open or shorted.) • Harness or connectors (Vehicle speed signal circuit is open or shorted) • ABS actuator and electric unit (control unit) • Combination meter

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode.

Detected item	Engine operating condition in fail-safe mode
Vehicle speed sensor	When the fail-safe system for vehicle speed sensor is activated, the cooling fan operates (High) while engine is running.

DTC Confirmation Procedure

INFOID:0000000004537366

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

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.
   If NG, go to EC-867, "Diagnosis Procedure".
   If OK, go to following step.
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Warm engine up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	More than 1,600 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	5.5 - 31.8 msec
Shift lever	Suitable position
PW/ST SIGNAL	OFF

6. Check 1st trip DTC.

7. If 1st trip DTC is detected, go to EC-867, "Diagnosis Procedure".

Overall Function Check

INFOID:0000000004537367

Use this procedure to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed signal in Service $01 with GST.
   The vehicle speed signal on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4. If NG, go to EC-867, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004537368

1.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-8.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK COMBINATION METER

Refer to DI-3.

>> **INSPECTION END**

DTC P0506 ISC SYSTEM

Description

INFOID:0000000004537369

NOTE:
If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.
The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The ECM calculates the actual engine speed from signals of crankshaft position sensor (POS) and camshaft position sensor (PHASE).
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

On Board Diagnosis Logic

INFOID:0000000004537370

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0506 0506	Idle speed control system RPM lower than expected	The idle speed is less than the target idle speed by 100 rpm or more.	• Electric throttle control actuator • Intake air leak

DTC Confirmation Procedure

INFOID:0000000004537371

NOTE:
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- **If the target idle speed is out of the specified value, perform EC-572, "Idle Air Volume Learning", before conducting DTC Confirmation Procedure. For the target idle speed, refer to the EC-1012.**

TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**
- **Always perform the test at a temperature above −10°C (14°F).**

1. Open engine hood.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and run it for at least 1 minute at idle speed.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to EC-868, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004537372

1.CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 2.
NG >> Discover air leak location and repair.

2.REPLACE ECM

1. Stop engine.
2. Replace ECM.
3. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-249, "ECM Re-communicating Function".
4. Perform EC-572, "VIN Registration".
5. Perform EC-572, "Accelerator Pedal Released Position Learning".
6. Perform EC-572, "Throttle Valve Closed Position Learning".

7. Perform EC-572, "Idle Air Volume Learning".

>> **INSPECTION END**

DTC P0507 ISC SYSTEM

Description

INFOID:0000000004537373

NOTE:
If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.
The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The ECM calculates the actual engine speed from signals of camshaft position sensor (POS) and camshaft position sensor (PHASE).
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

On Board Diagnosis Logic

INFOID:0000000004537374

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0507 0507	Idle speed control system RPM higher than expected	The idle speed is more than the target idle speed by 200 rpm or more.	• Electric throttle control actuator • Intake air leak • PCV system

DTC Confirmation Procedure

INFOID:0000000004537375

NOTE:
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- **If the target idle speed is out of the specified value, perform EC-572, "Idle Air Volume Learning", before conducting DTC Confirmation Procedure. For the target idle speed, refer to the EC-1012.**

TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**
- **Always perform the test at a temperature above −10°C (14°F).**

1. Open engine hood.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and run it for at least 1 minute at idle speed.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to EC-870, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004537376

1.CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 3.
NG >> Discover air leak location and repair.

3.REPLACE ECM

1. Stop engine.

2. Replace ECM.
3. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-249, "ECM Re-communicating Function".
4. Perform EC-572, "VIN Registration".
5. Perform EC-572, "Accelerator Pedal Released Position Learning".
6. Perform EC-572, "Throttle Valve Closed Position Learning".
7. Perform EC-572, "Idle Air Volume Learning".

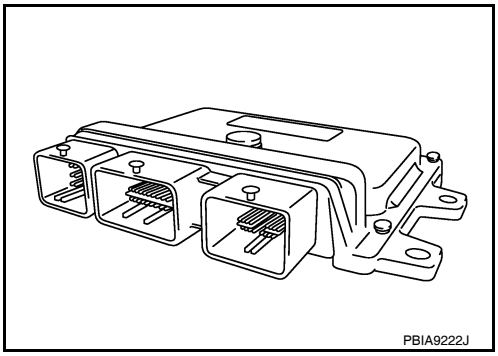
>> **INSPECTION END**

DTC P0605 ECM

Component Description

INFOID:0000000004537377

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.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On Board Diagnosis Logic

INFOID:0000000004537378

This self-diagnosis has one or two trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605 0605	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.	

FAIL-SAFE MODE

ECM enters fail-safe mode when malfunction A is detected.

Detected items	Engine operation condition in fail-safe mode
Malfunction A	• 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.

DTC Confirmation Procedure

INFOID:0000000004537379

Perform PROCEDURE FOR MALFUNCTION A first. If the 1st trip DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B. If there is no malfunction on PROCEDURE FOR MALFUNCTION B, perform PROCEDURE FOR MALFUNCTION C.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

1. Turn ignition switch ON.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-873, "Diagnosis Procedure".

PROCEDURE FOR MALFUNCTION B

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-873, "Diagnosis Procedure".

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 3 for 32 times.

4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to EC-873, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004537380

1.INSPECTION START

1. Erase DTC.
2. **Perform DTC Confirmation Procedure.**
   See EC-872, "DTC Confirmation Procedure".
3. Is the 1st trip DTC P0605 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2.REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS(NATS) system and registration of all NVIS(NATS) ignition key IDs.
   Refer to BL-249, "ECM Re-communicating Function".
3. Perform EC-572, "VIN Registration".
4. Perform EC-572, "Accelerator Pedal Released Position Learning".
5. Perform EC-572, "Throttle Valve Closed Position Learning".
6. Perform EC-572, "Idle Air Volume Learning".

>> **INSPECTION END**

DTC P0643 SENSOR POWER SUPPLY

On Board Diagnosis Logic

INFOID:0000000004537381

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0643 0643	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	• Harness or connectors (APP sensor 1 circuit is shorted.) (Throttle position sensor circuit is shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] • Accelerator pedal position sensor • Throttle position sensor • Camshaft position sensor (PHASE)

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

INFOID:0000000004537382

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

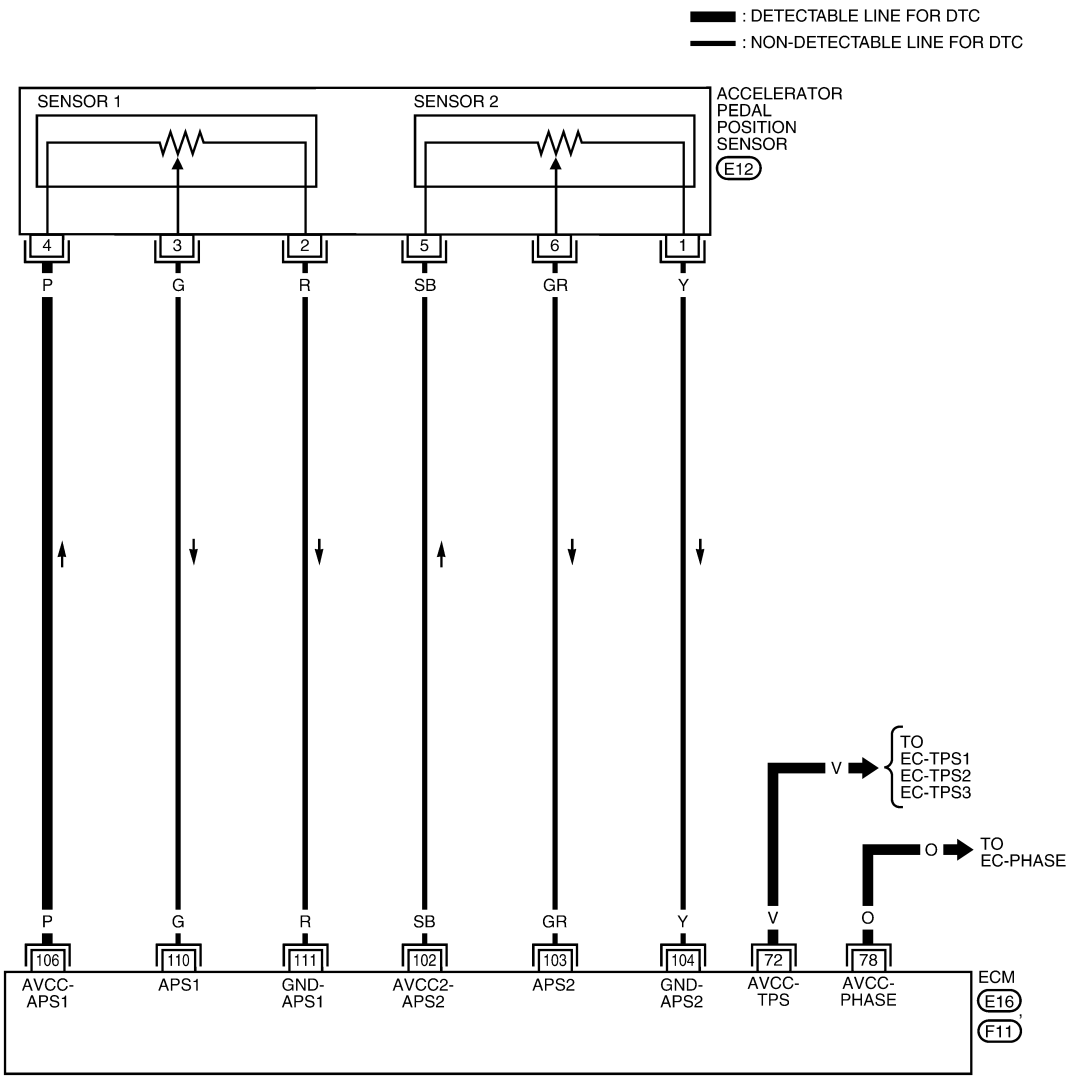
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

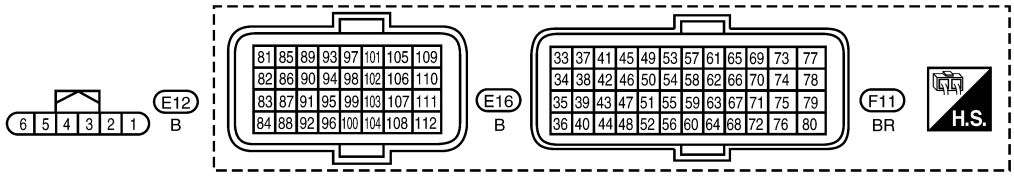
1. Start engine and let it idle for 1 second.
2. Check 1st trip DTC.
3. If DTC is detected, go to EC-876, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537383

EC-SEN/PW-01





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Specification data are reference values and are measured between each terminal 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.

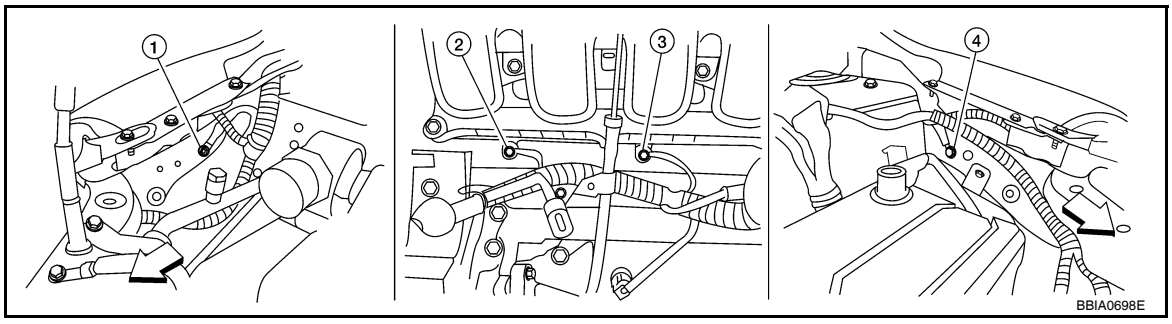
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
72	V	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
78	O	Sensor power supply [Camshaft position sensor (PHASE)]	**[Ignition switch: ON]**	Approximately 5V
102	SB	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V
103	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4V
104	Y	Sensor ground (APP sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
106	P	Sensor power supply (APP sensor 1)	**[Ignition switch: ON]**	Approximately 5V
110	G	Accelerator pedal position sensor 1	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7V
111	R	Sensor ground (APP sensor 1)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:0000000004537384

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

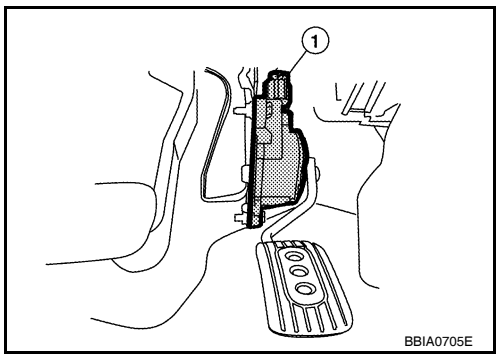
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

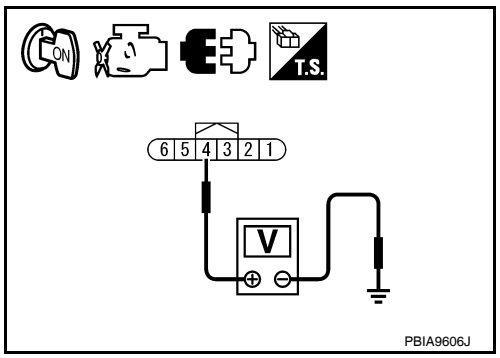
2. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 4 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

3. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 4 and ECM terminal 106. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
72	Throttle position sensor terminal 1	EC-955, "Wiring Diagram"
78	Camshaft position sensor (PHASE) terminal 1	EC-782, "Wiring Diagram"
106	APP sensor terminal 4	EC-875, "Wiring Diagram"

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-785, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace camshaft position sensor (PHASE).

6. CHECK THROTTLE POSITION SENSOR

Refer to EC-958, "Component Inspection".

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-572, "Throttle Valve Closed Position Learning".
3. Perform EC-572, "Idle Air Volume Learning".

>> **INSPECTION END**

8. CHECK APP SENSOR

Refer to EC-965, "Component Inspection".

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-572, "Accelerator Pedal Released Position Learning".
3. Perform EC-572, "Throttle Valve Closed Position Learning".
4. Perform EC-572, "Idle Air Volume Learning".

>> **INSPECTION END**

10. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

DTC P0850 PNP SWITCH

Component Description

INFOID:0000000004537385

When the shift lever position is P or N (A/T, CVT), Neutral (M/T), park/neutral position (PNP) switch is ON. ECM detects the position because the continuity of the line (the ON signal) exists.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537386

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	• Ignition switch: ON	Shift lever: P or N (A/T, CVT), Neutral (M/T)	ON
		Shift lever: Except above	OFF

On Board Diagnosis Logic

INFOID:0000000004537387

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0850 0850	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	• Harness or connectors [Park/neutral position (PNP) switch circuit is open or shorted.] • Park/neutral position (PNP) switch • TCM (CVT models)

DTC Confirmation Procedure

INFOID:0000000004537388

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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 (A/T, CVT) Neutral position (M/T)	ON
Except above	OFF

If NG, go to EC-882, "Diagnosis Procedure".
If OK, go to following step.

3. Select “DATA MONITOR” mode with CONSULT-III.
4. Start engine and warm it up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	More than 1,100 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.5 - 31.8 msec
VHCL SPEED SE	More than 64km/h (29 MPH)
Shift lever	Suitable position

6. Check 1st trip DTC.
7. If 1st trip DTC is detected, go to EC-882, "Diagnosis Procedure".

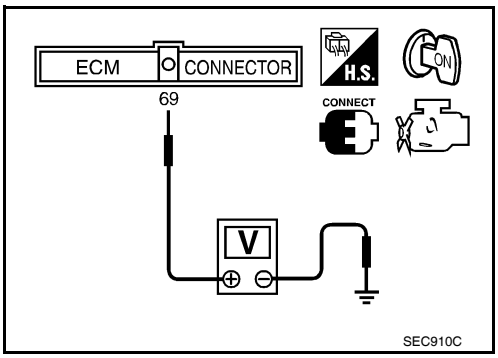
Overall Function Check

INFOID:0000000004537389

Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 69 (PNP switch signal) and ground under the following conditions.



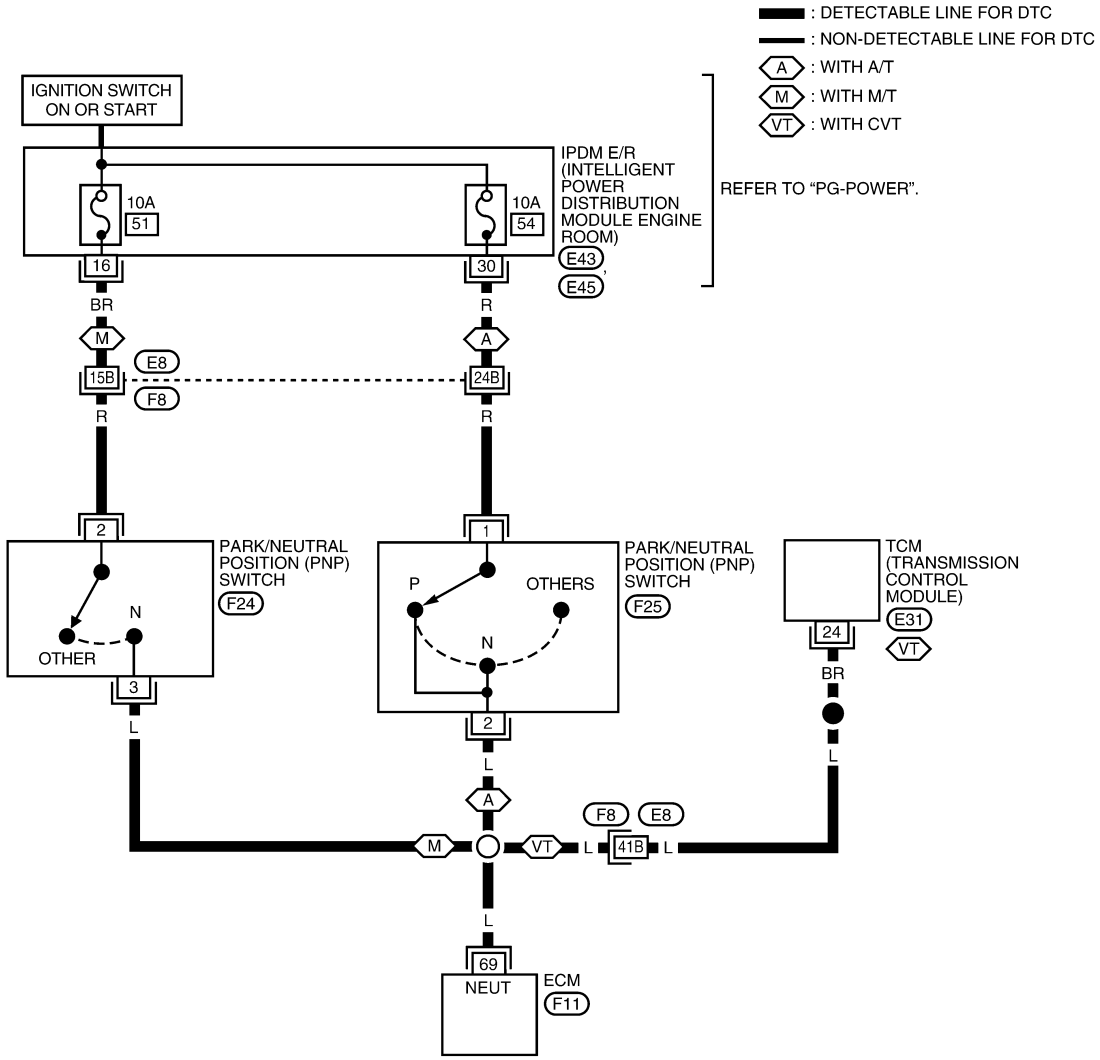
Condition (Shift lever)	Voltage V (Known-good data)
P or N position (A/T, CVT) Neutral position (M/T)	Approx. 0
Except above	BATTERY VOLTAGE (11 - 14V)

3. If NG, go to EC-882, "Diagnosis Procedure".

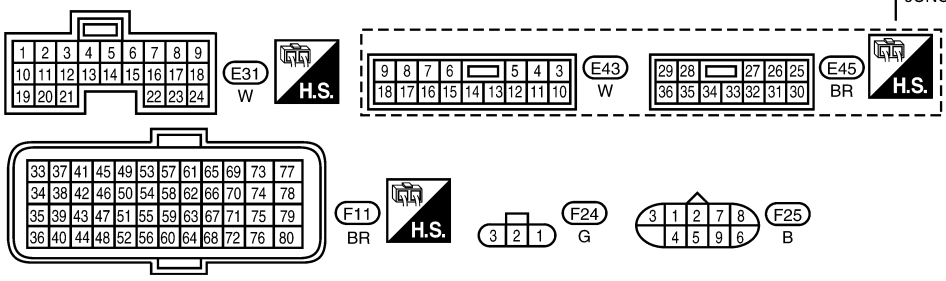
Wiring Diagram

INFOID:0000000004537390

EC-PNP/SW-01



REFER TO THE FOLLOWING.
F8 - SUPER MULTIPLE JUNCTION (SMJ)



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Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
69	L	Park/neutral position (PNP) switch	**[Ignition switch: ON]** • Shift lever: P or N (A/T, CVT), Neutral (M/T)	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] • Except above	Approximately 0V

Diagnosis Procedure

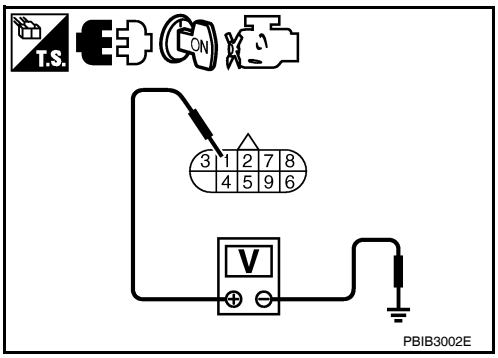
INFOID:0000000004537391

A/T MODELS

1.CHECK PNP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect PNP switch harness connector.
3. Turn ignition switch ON.
4. Check voltage between PNP switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between PNP switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between PNP switch terminal 2 and ECM terminal 69. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK PNP SWITCH

Refer to AT-95, "Component Inspection".

OK or NG

OK >> GO TO 5.
NG >> Replace PNP switch.

5.CHECK INTERMITTENT INCIDENT

Refer to EC-626.

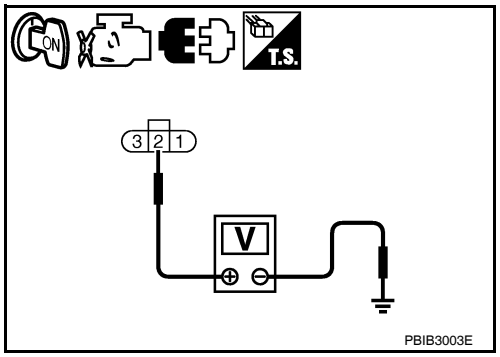
>> **INSPECTION END**

M/T MODELS

1.CHECK PNP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect PNP switch harness connector.
3. Turn ignition switch ON.
4. Check voltage between PNP switch terminal 2 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between PNP switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between PNP switch terminal 3 and ECM terminal 69. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK PNP SWITCH

Refer to MT-54.

OK or NG

OK >> GO TO 5.
NG >> Replace PNP switch.

5.CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

CVT MODELS

1.CHECK DTC WITH TCM

Refer to CVT-209, "OBD-II Diagnostic Trouble Code (DTC)".

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK STARTING SYSTEM

Turn ignition switch OFF, then turn it to START.
Does starter motor operate?

Yes or No

Yes >> GO TO 3.
No >> Refer to SC-9.

3.CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM and TCM harness connectors.
3. Check harness continuity between TCM terminal 24 and ECM terminal 69.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F8, E8
- Harness for open or short between TCM and ECM.

>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

DTC P1148 CLOSED LOOP CONTROL

On Board Diagnosis Logic

INFOID:0000000004537392

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1148 1148	Closed loop control function	The closed loop control function does not operate even when vehicle is driving in the specified condition.	• Harness or connectors [Air fuel ratio (A/F) sensor 1 circuit is open or shorted.] • Air fuel ratio (A/F) sensor 1 • Air fuel ratio (A/F) sensor 1 heater

NOTE:
DTC P1148 is displayed with another DTC for air fuel ratio (A/F) sensor 1.
Perform the trouble diagnosis for the corresponding DTC.

DTC P1217 ENGINE OVER TEMPERATURE

System Description

INFOID:0000000004537393

SYSTEM DESCRIPTION

NOTE:

- **If DTC P1217 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-633.**
- **If DTC P1217 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-635.**

Cooling Fan Control

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 relays)
Battery	Battery voltage*1		
ABS actuator and electric unit (control unit)	Vehicle speed*2		
Combination meter			
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner ON signal*2		
Refrigerant pressure sensor	Refrigerant pressure		

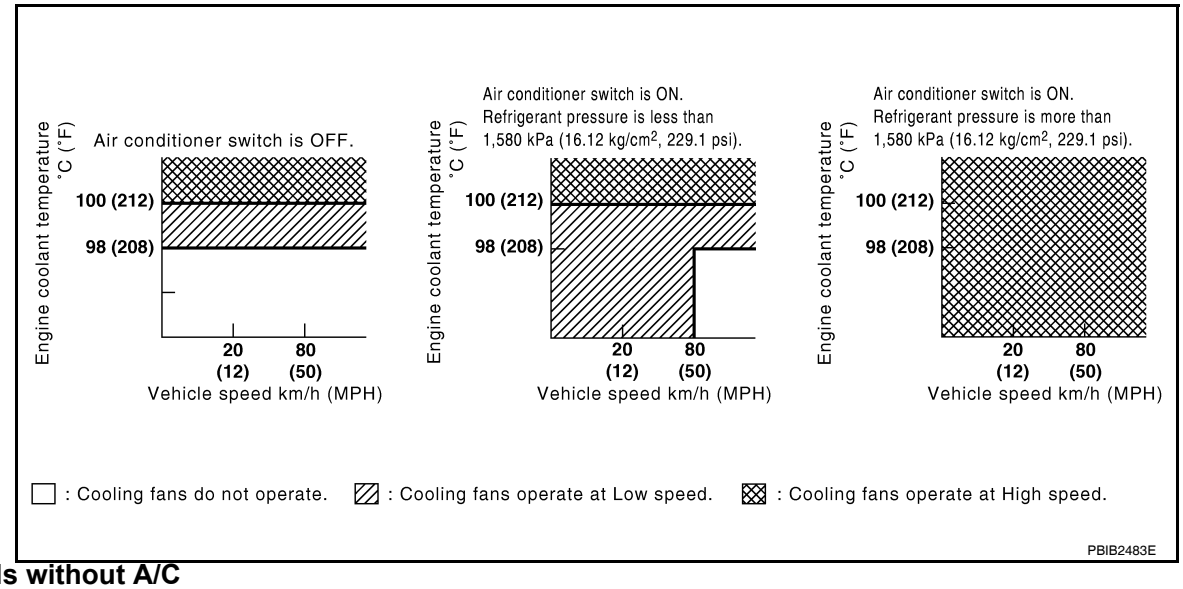
*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to ECM through CAN communication line.

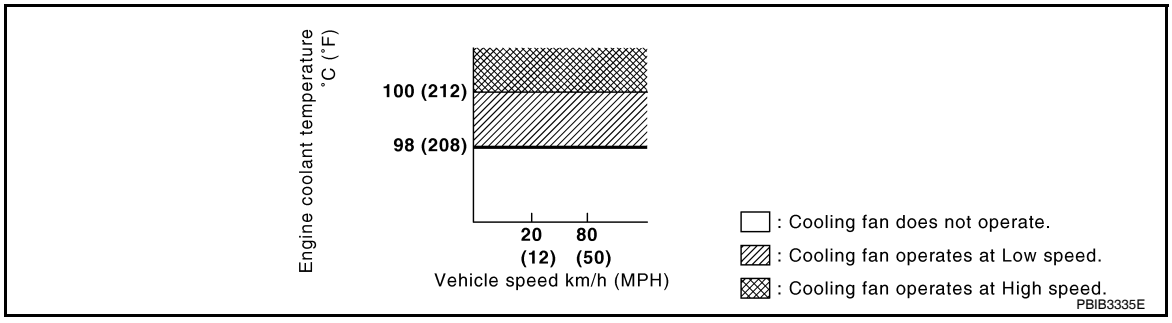
The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

Cooling Fan Operation

Models with A/C



Models without A/C



Cooling Fan Relay Operation

The ECM controls cooling fan relays in the IPDM E/R through CAN communication line.

Cooling fan speed	Cooling fan relay		
	1	2	3
Stop (OFF)	OFF	OFF	OFF
Low (LOW)	ON	OFF	OFF
High (HI)	ON	ON	ON

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537394

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
COOLING FAN	• Engine: After warming up, idle the engine • Air conditioner switch: OFF	Engine coolant temperature: 97°C (207°F) or less	OFF
		Engine coolant temperature: Between 98°C (208°F) and 99°C (210°F)	LOW
		Engine coolant temperature: 100°C (212°F) or more	HIGH

On Board Diagnosis Logic

INFOID:0000000004537395

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.

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217 1217	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 (Cooling fan circuit is open or shorted.) • Cooling fan • IPDM E/R (Cooling fan relays) • Radiator hose • Radiator • Reservoir tank • Radiator cap • Water pump • Thermostat • Water control valve For more information, refer to EC-893, "Main 13 Causes of Overheating".

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-17, "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-15, "Anti-freeze Coolant Mixture Ratio".**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

INFOID:0000000004537396

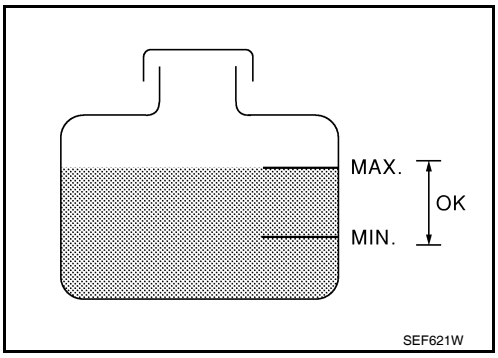
Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the reservoir tank or 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.

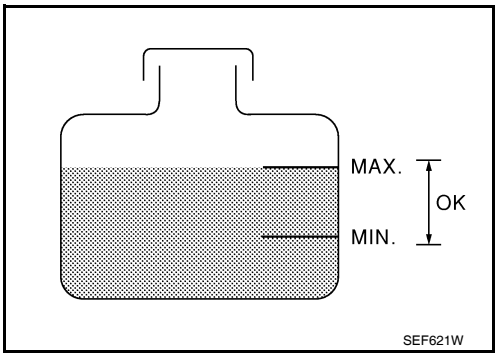
WITH CONSULT-III

1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-890, "Diagnosis Procedure" or EC-890, "Diagnosis Procedure".
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-890, "Diagnosis Procedure" or EC-890, "Diagnosis Procedure".
3. Turn ignition switch ON.
4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
5. If the results are NG, go to EC-890, "Diagnosis Procedure" or EC-890, "Diagnosis Procedure".



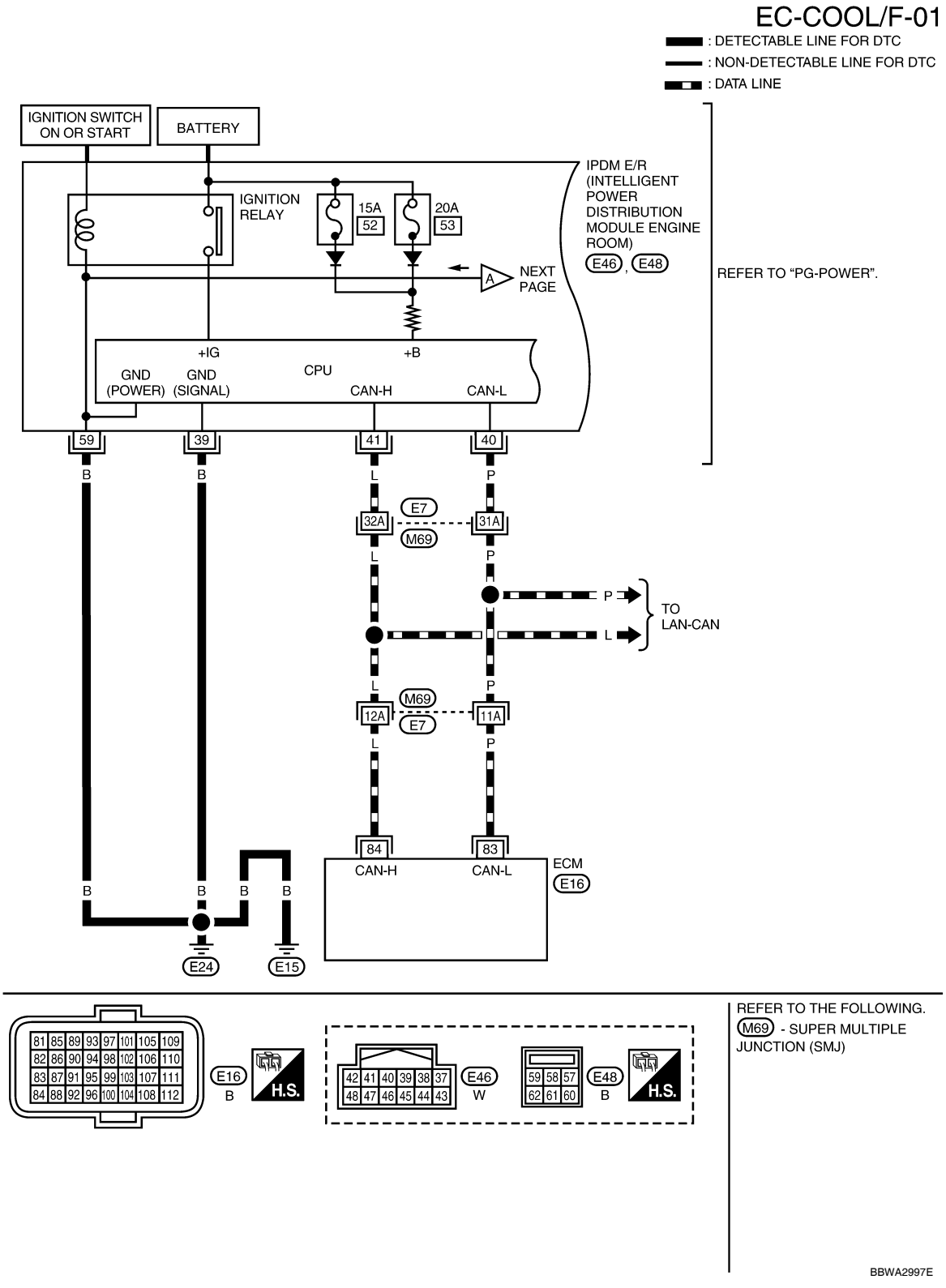
WITH GST

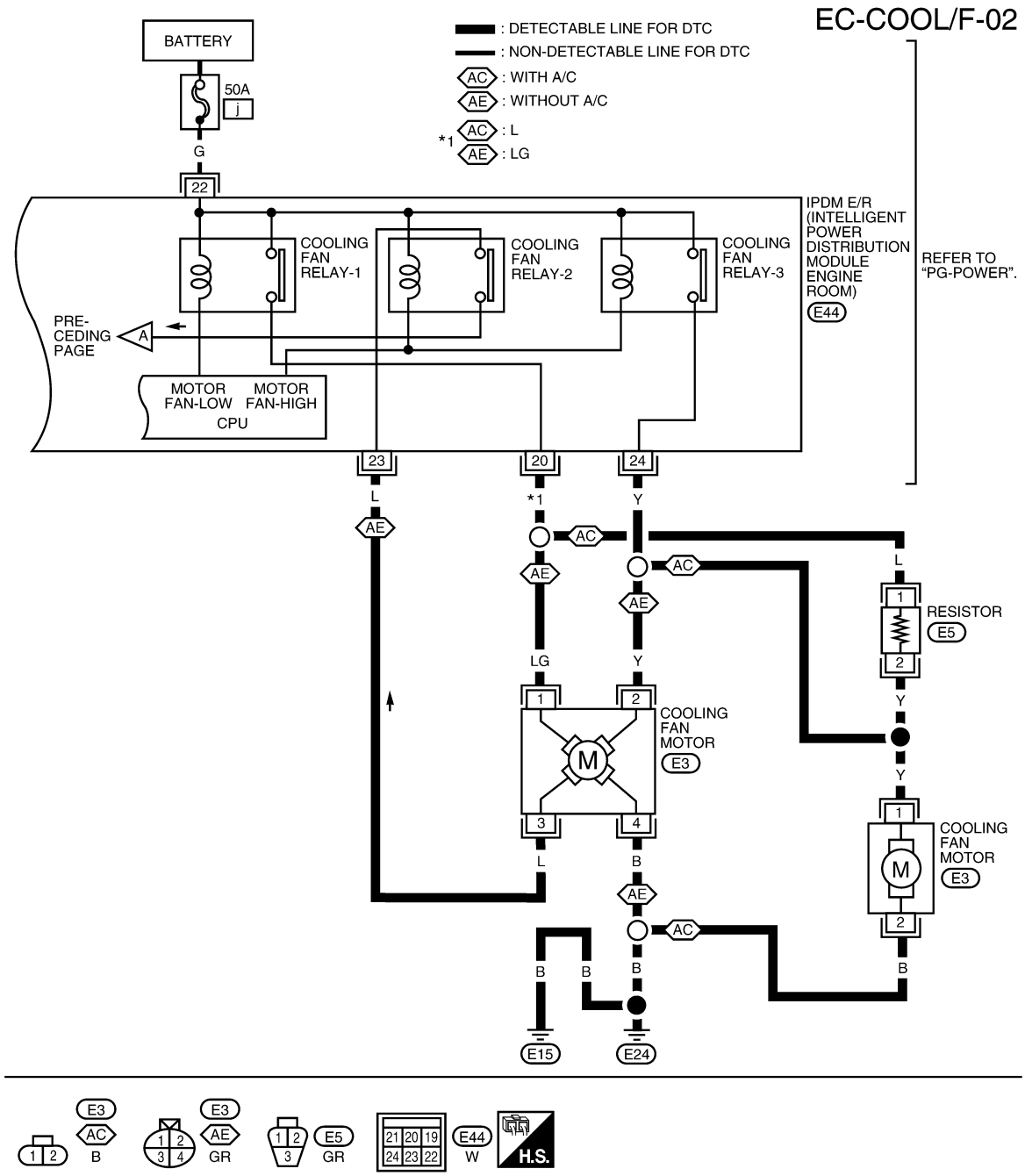
1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-890, "Diagnosis Procedure".
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-890, "Diagnosis Procedure".
3. Perform IPDM/ER auto active test and check cooling fan motor operation. Refer to PG-19, "Auto Active Test".
4. If NG, go to EC-890, "Diagnosis Procedure".



Wiring Diagram

INFOID:0000000004537397





BBWA3001E

Diagnosis Procedure

INFOID:0000000004537398

1.INSPECTION START

Do you have CONSULT-III?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2.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 operates at each speed.

OK or NG

OK >> GO TO 4.
NG >> GO TO 8.

3.CHECK COOLING FAN OPERATION

Without CONSULT-III

1. Perform IPDM E/R auto active test and check cooling fan operation.
   Refer to PG-19, "Auto Active Test".
2. Make sure that cooling fan operates at each speed.

OK or NG

OK >> GO TO 4.
NG >> GO TO 8.

4.CHECK COOLING SYSTEM FOR LEAK

Refer to CO-35, "Inspection".

OK or NG

OK >> GO TO 5.
NG >> Check the following for leak. Refer to CO-35, "Inspection".
- Hose
- Radiator
- Water pump

5.CHECK RADIATOR CAP

Refer to CO-40, "Checking Radiator Cap".

OK or NG

OK >> GO TO 6.
NG >> Replace radiator cap.

6.CHECK COMPONENT PARTS

Check the following.
- Thermostat. (Refer to CO-45.)
- Water control valve. (Refer to CO-47.)
- Engine coolant temperature sensor. (Refer to EC-678.)

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning component.

7.CHECK MAIN 13 CAUSES

If the cause cannot be isolated, go to EC-893, "Main 13 Causes of Overheating".

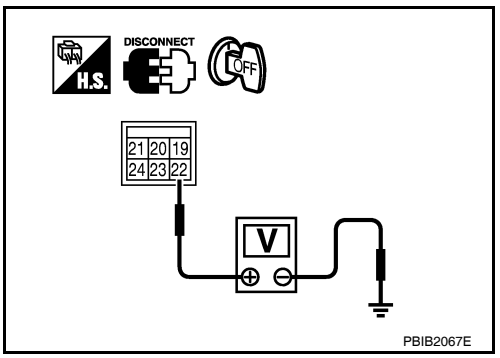
>> **INSPECTION END**

8.CHECK IPDM E/R POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E44.

3. Check voltage between IPDM E/R terminal 22 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- 50A fusible link
- Harness for open or short between IPDM E/R and battery

>> Repair open circuit or short to ground in harness or connectors.

10. CHECK IPDM E/R GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connectors E46 and E48.
3. Check harness continuity between IPDM E/R terminals 59, 39 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK (Models with A/C)>>GO TO 11.
OK (Models without A/C)>>GO TO 13.
NG >> Repair open circuit or short to power in harness or connectors.

11. CHECK COOLING FAN MOTOR CIRCUIT

1. Disconnect cooling fan motor harness connector.
2. Check harness continuity between the followings;
   Cooling fan motor terminal 1 and IPDM E/R terminals 20, 24.
   Cooling fan motor terminal 2 and ground.
   Refer to wiring diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 15.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground
- Resistor E5

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK COOLING FAN MOTOR CIRCUIT

1. Disconnect cooling fan motor harness connector.
2. Check harness continuity between the followings;
   Cooling fan motor terminal 1 and IPDM E/R terminal 20.

Cooling fan motor terminal 2 and IPDM E/R terminal 24.
Cooling fan motor terminal 3 and IPDM E/R terminal 23.
Cooling fan motor terminal 4 and ground.
Refer to wiring diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground

>> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK COOLING FAN MOTOR

Refer to EC-894, "Component Inspection".

OK or NG

OK >> GO TO 16.
NG >> Replace cooling fan motor.

16. CHECK INTERMITTENT INCIDENT

Perform EC-626.

OK or NG

OK >> Replace IPDM E/R. Refer to PG-27, "Removal and Installation of IPDM E/R".
NG >> Repair or replace harness or connector.

Main 13 Causes of Overheating

INFOID:0000000004537399

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	See MA-15, "Anti-freeze Coolant Mixture Ratio".	
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See CO-35, "Inspection".
	4	• Radiator cap	• Pressure tester	See CO-40, "Checking Radiator Cap".	
ON*2	5	• Coolant leaks	• Visual	No leaks	See CO-35, "Inspection".
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-45, and CO-47
ON*1	7	• Cooling fan	• CONSULT-III	Operating	See trouble diagnosis for DTC P1217 (EC-890, "Diagnosis Procedure").
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	See CO-35, "Changing Engine Coolant".

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See CO-35, "Inspection".
OFF	11	• Water control valve	• Remove and inspect the valve	Within the specified value	See CO-47, "Removal and Installation"
OFF	12	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-185.
	13	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See EM-199.

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to CO-32.

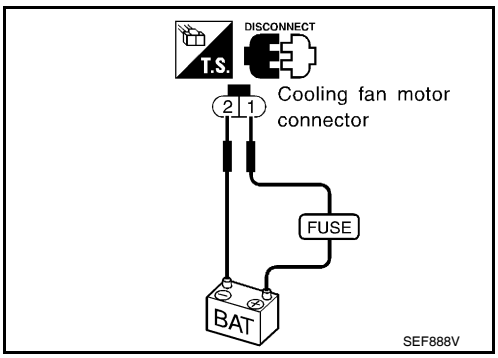
Component Inspection

INFOID:0000000004537400

COOLING FAN MOTOR

Model with A/C

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

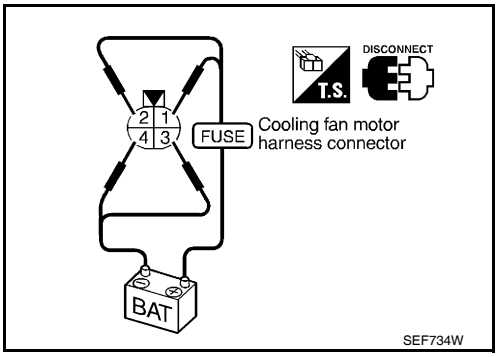


	Terminals	
	(+)	(-)
Cooling fan motor	1	2

Cooling fan motor should operate.
If NG, replace cooling fan motor.

Models without A/C

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.



	Speed	terminals	
		(+)	(–)
Cooling fan motor	Low	1	4
		2	3
	High	1 and 2	3 and 4

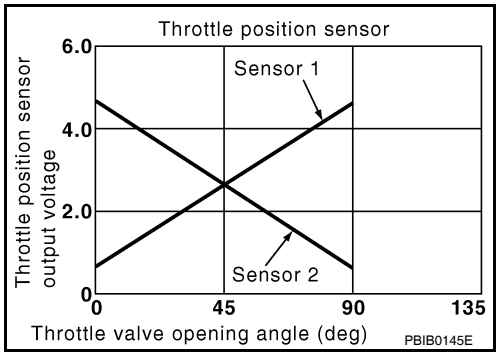
Cooling fan motor should operate.
If NG, replace cooling fan motor.

DTC P1225 TP SENSOR

Component Description

INFOID:0000000004537401

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.



On Board Diagnosis Logic

INFOID:0000000004537402

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225 1225	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC Confirmation Procedure

INFOID:0000000004537403

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

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.
5. If 1st trip DTC is detected, go to EC-895, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004537404

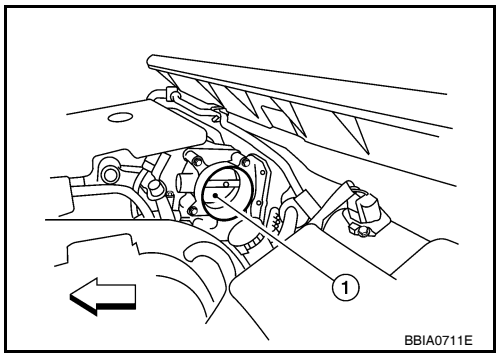
1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

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.

- : Vehicle front

OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-572, "Throttle Valve Closed Position Learning".
3. Perform EC-572, "Idle Air Volume Learning".

>> **INSPECTION END**

Removal and Installation

INFOID:0000000004537405

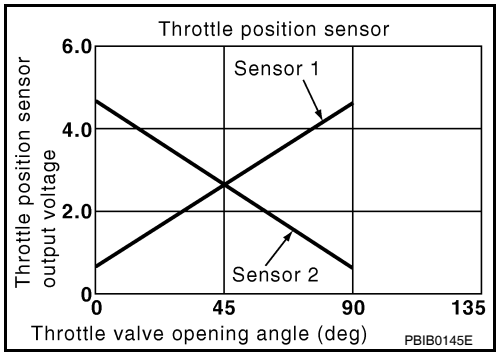
ELECTRIC THROTTLE CONTROL ACTUATOR
Refer to EM-141.

DTC P1226 TP SENSOR

Component Description

INFOID:0000000004537406

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.



On Board Diagnosis Logic

INFOID:0000000004537407

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226 1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC Confirmation Procedure

INFOID:0000000004537408

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 3 and 4 for 32 times.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to EC-897, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004537409

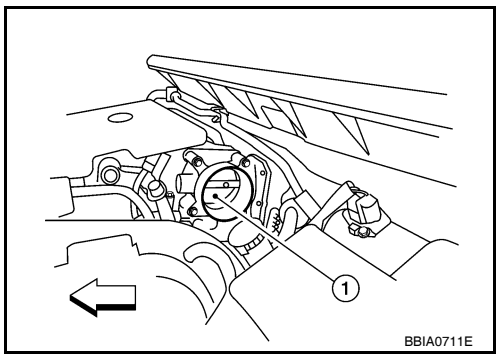
1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

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.

- : Vehicle front

OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-572, "Throttle Valve Closed Position Learning".

3. Perform EC-572, "Idle Air Volume Learning".

>> **INSPECTION END**

Removal and Installation

INFOID:0000000004537410

ELECTRIC THROTTLE CONTROL ACTUATOR
Refer to EM-141.

DTC P1421 COLD START CONTROL

Description

INFOID:0000000004537411

ECM controls ignition timing and engine idle speed when engine is started with prewarming up condition. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

On Board Diagnosis Logic

INFOID:0000000004537412

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1421 1421	Cold start emission reduction strategy monitoring	ECM does not control ignition timing and engine idle speed properly when engine is started with prewarming up condition.	• Lack of intake air volume • Fuel injection system • ECM

DTC Confirmation Procedure

INFOID:0000000004537413

NOTE:
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- **If DTC P1421 is displayed with other DTC, first perform the trouble diagnosis for other DTC.**

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Check that the “COOLAN TEMP/S” indication is between 4°C (39°F) and 36°C (97°F).
   If “COOLAN TEMP/S” indication is within the specified value, go to the following step.
   If “COOLAN TEMP/S” indication is out of the specified value, cool engine down or warm engine up and go to step 1.
5. Start engine and let it idle for 5 minutes.
6. Check 1st trip DTC.
7. If 1st trip DTC is detected, go to EC-899, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004537414

1.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-572, "Idle Air Volume Learning".
Is Idle Air Volume Learning carried out successfully?
Yes or No

Yes >> GO TO 2.
No >> Follow the instruction of Idle Air Volume Learning.

2.CHECK INTAKE SYSTEM

Check for the cause of intake air volume lacking. Refer to the following.
- Crushed intake air passage
- Intake air passage clogging

OK or NG

OK >> GO TO 3.
NG >> Repair or replace malfunctioning part

3.CHECK FUEL INJECTION SYSTEM FUNCTION

Perform EC-740, "DTC Confirmation Procedure" for DTC P0171.

OK or NG

OK >> GO TO 4.

NG >> Go to EC-743, "Diagnosis Procedure" for DTC P0171.

4. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. **Perform DTC Confirmation Procedure.**
   See EC-899, "DTC Confirmation Procedure".
3. Is the 1st trip DTC P1421 displayed again?

Yes or No

Yes >> GO TO 5.
No >> **INSPECTION END**

5. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs.
   Refer to BL-249, "ECM Re-communicating Function".
3. Perform EC-572, "VIN Registration".
4. Perform EC-572, "Accelerator Pedal Released Position Learning".
5. Perform EC-572, "Throttle Valve Closed Position Learning".
6. Perform EC-572, "Idle Air Volume Learning".

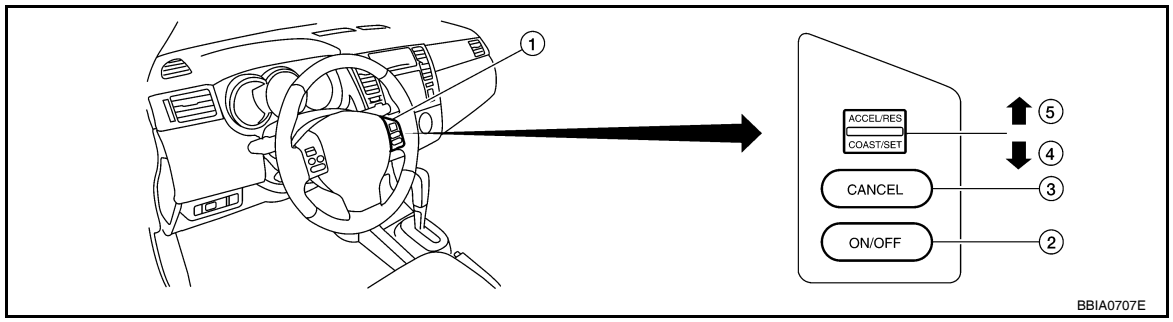
>> **INSPECTION END**

DTC P1564 ASCD STEERING SWITCH

Component Description

INFOID:0000000004537415

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.



1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. RESUME/ACCELERATE switch
5. SET/COAST switch

Refer to EC-524 for the ASCD function.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537416

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
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

On Board Diagnosis Logic

INFOID:0000000004537417

This self-diagnosis has the one trip detection logic.
The MIL will not light up for this diagnosis.
NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605.
Refer to EC-872.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1564 1564	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 (ASCD switch circuit is open or shorted.) • ASCD steering switch • ECM

DTC Confirmation Procedure

INFOID:0000000004537418

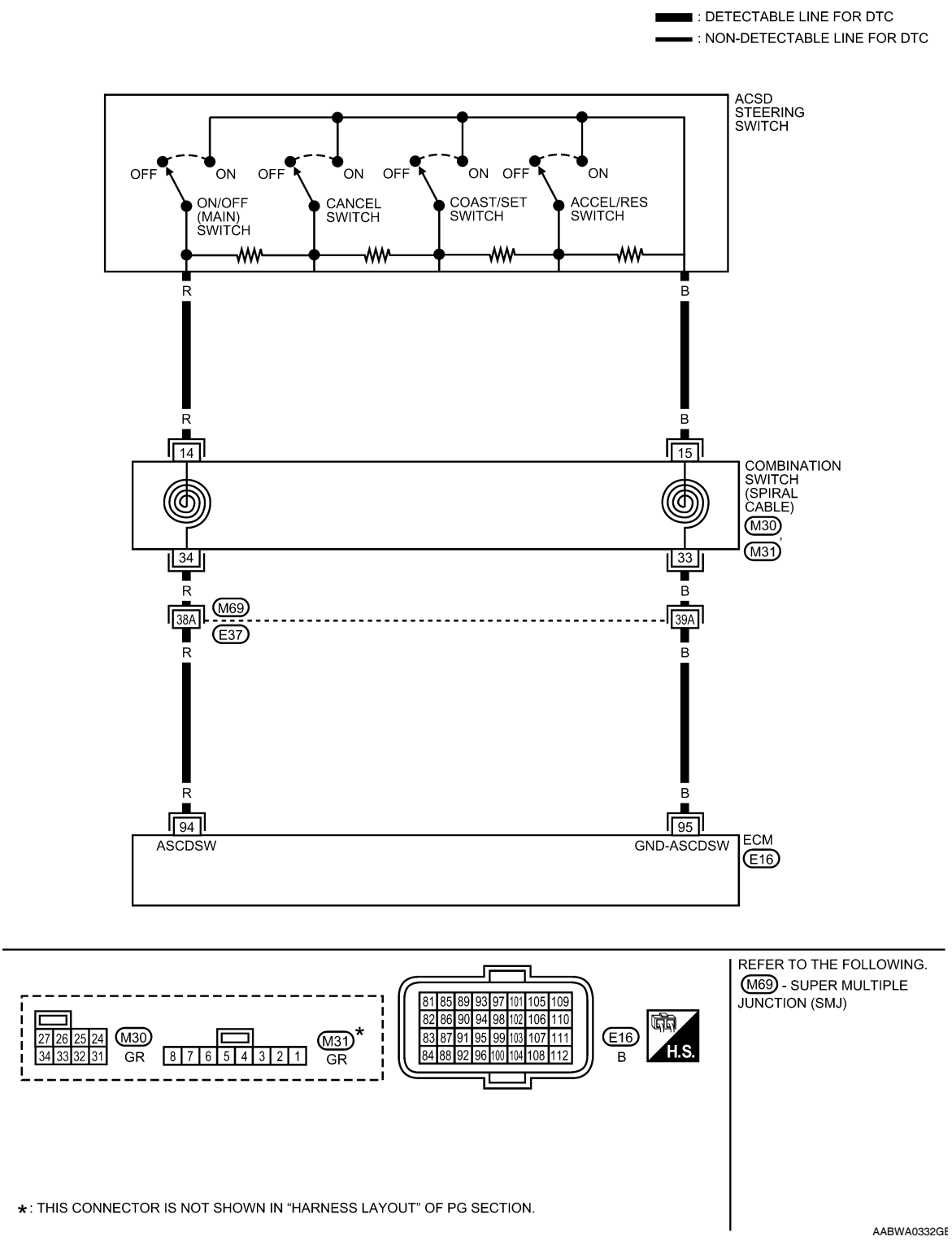
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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.
7. If DTC is detected, go to EC-904, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537419

EC-ASC/SW-01



Specification data are reference values and are measured between each terminal 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.

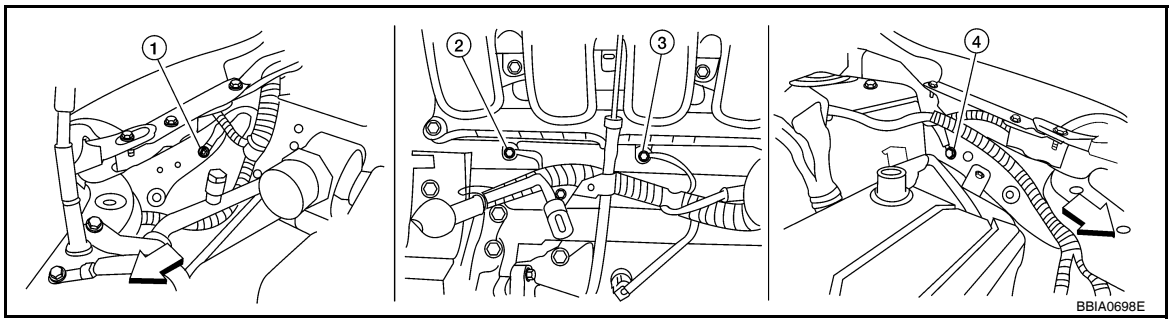
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
94	R	ASCD steering switch	**[Ignition switch: ON]** • ASCD steering switch: OFF	Approximately 4V
			[Ignition switch: ON] • MAIN switch: Pressed	Approximately 0V
			[Ignition switch: ON] • CANCEL switch: Pressed	Approximately 1V
			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	Approximately 3V
			[Ignition switch: ON] • SET/COAST switch: Pressed	Approximately 2V
95	B	Sensor ground	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:0000000004537420

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-III

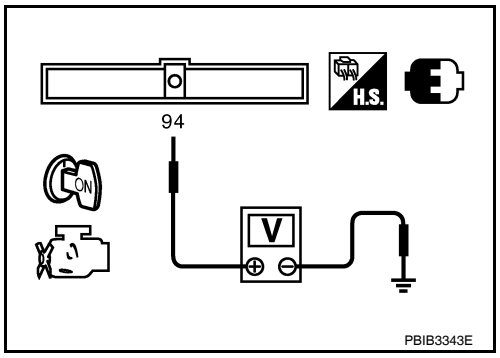
1. Turn ignition switch ON.
2. Select “MAIN SW”, “RESUME/ACC SW”, “SET SW and “CANCEL SW” in “DATA MONITOR” mode with CONSULT-III.
3. Check each item indication under the following conditions.

Switch	Monitor item	Condition	Indication
MAIN switch	MAIN SW	Pressed	ON
		Released	OFF
CANCEL switch	CANCEL SW	Pressed	ON
		Released	OFF

Switch	Monitor item	Condition	Indication
RESUME/ACCELERATE switch	RESUME/ACC SW	Pressed	ON
		Released	OFF
SET/COAST switch	SET SW	Pressed	ON
		Released	OFF

Without CONSULT-III

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 94 and ground with pressing each button.



Switch	Condition	Voltage [V]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4.0
CANCEL switch	Pressed	Approx. 1.0
	Released	Approx. 4.0
RESUME/ACCELERATE switch	Pressed	Approx. 3.0
	Released	Approx. 4.0
SET/COAST switch	Pressed	Approx. 2.0
	Released	Approx. 4.0

OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

3. CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect combination switch harness connector M31.
3. Disconnect ECM harness connector.
4. Check harness continuity between combination switch terminal 15 and ECM terminal 95. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 94 and combination switch terminal 14. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD STEERING SWITCH

Refer to EC-906, "Component Inspection".

OK or NG

OK >> GO TO 8.
NG >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

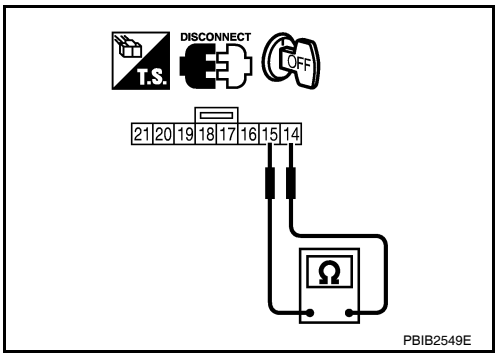
>> **INSPECTION END**

Component Inspection

INFOID:0000000004537421

ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector M31.
2. Check continuity between combination switch (spiral cable) terminals 14 and 15 with pushing each switch.



Switch	Condition	Resistance [Ω]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4,000
CANCEL switch	Pressed	Approx. 250
	Released	Approx. 4,000
RESUME/ACCELERATE switch	Pressed	Approx. 1,480
	Released	Approx. 4,000
SET/COAST switch	Pressed	Approx. 660
	Released	Approx. 4,000

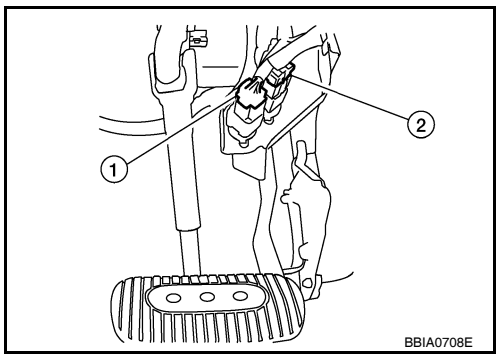
If NG, replace ASCD steering switch.

DTC P1572 ASCD BRAKE SWITCH

Component Description

INFOID:0000000004537422

When the brake pedal is depressed, ASCD brake switch (2) is turned OFF and stop lamp switch (1) is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to EC-524 for the ASCD function.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537423

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1 (ASCD brake switch)	• Ignition switch: ON	• Brake pedal: Fully released (A/T, CVT) • Brake pedal and clutch pedal: Fully released (M/T)	ON
		• Brake pedal: Slightly depressed (A/T, CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	OFF
BRAKE SW2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

INFOID:0000000004537424

This self-diagnosis has the one trip detection logic.
The MIL will not light up for this diagnosis.
NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-872.**
- **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 1572	ASCD brake switch	A)	When the vehicle speed is above 30km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to ECM at the same time.	• Harness or connectors (Stop lamp switch circuit is shorted.) • Harness or connectors (ASCD brake switch circuit is shorted.) • Harness or connectors (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

INFOID:0000000004537425

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- Procedure for malfunction 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.

TESTING CONDITION:
Steps 4 and 5 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. Select “DATA MONITOR” mode with CONSULT-III.
3. Press MAIN switch and make sure that CRUISE indicator lights up.
4. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Shift lever	Suitable position

5. Check 1st trip DTC.
   If 1st trip DTC is detected, go to EC-910, "Diagnosis Procedure".
   If 1st trip DTC is not detected, go to the following step.
6. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Shift lever	Suitable position
Driving location	Depress the brake pedal for more than 5 seconds so as not to come off from the above-mentioned vehicle speed.

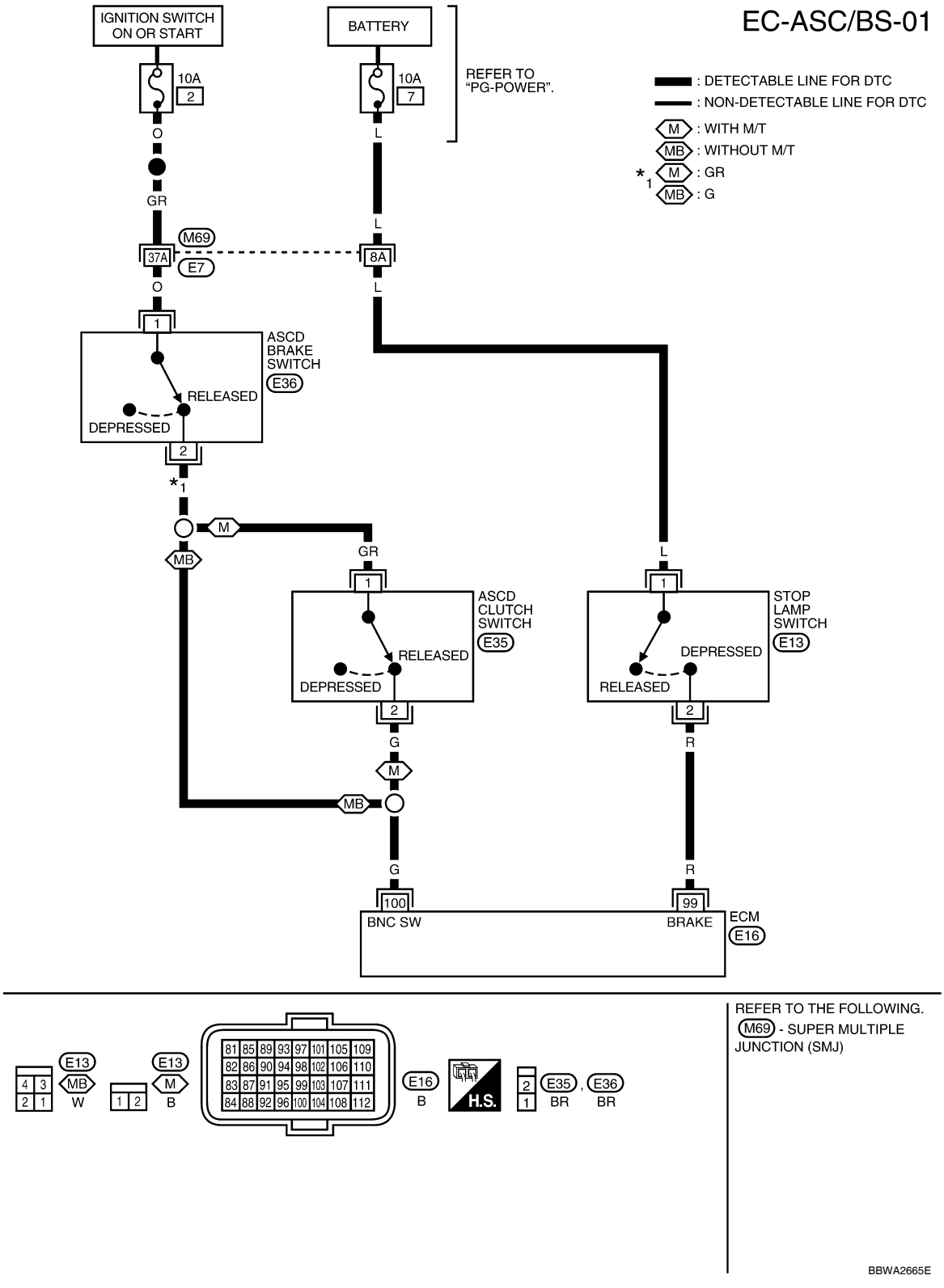
7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to EC-910, "Diagnosis Procedure".

WITH GST

Follow the procedure “WITH CONSULT-III” above.

Wiring Diagram

INFOID:0000000004537426



Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
99	R	Stop lamp switch	**[Ignition switch: ON]** • Brake pedal: Fully released	Approximately 0V
			[Ignition switch: ON] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
100	G	ASCD brake switch	• Brake pedal: Slightly depressed (A/T, CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	Approximately 0V
			• Brake pedal: Fully released (A/T, CVT) • Brake pedal and clutch pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:0000000004537427

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.

M/T models

CONDITION	INDICATION
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON

A/T and CVT models

CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON

Without CONSULT-III

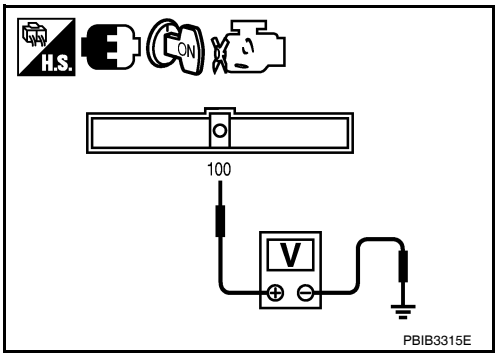
1. Turn ignition switch ON.
2. Check voltage between ECM terminal 100 and ground under the following conditions.

M/T models

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage

A/T and CVT models

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage



OK or NG

OK >> GO TO 2.
NG (M/T models) >>GO TO 3.
NG (A/T and CVT models) >>GO TO 4.

2.CHECK OVERALL FUNCTION-II

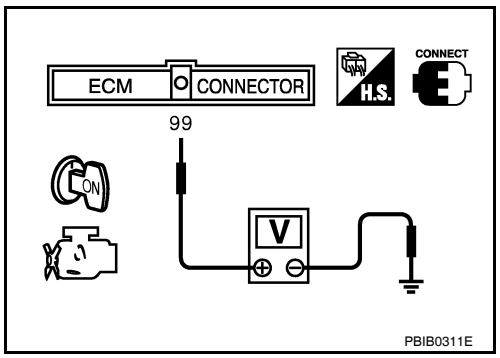
With CONSULT-III

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON

Without CONSULT-III

Check voltage between ECM terminal 99 and ground under the following conditions.



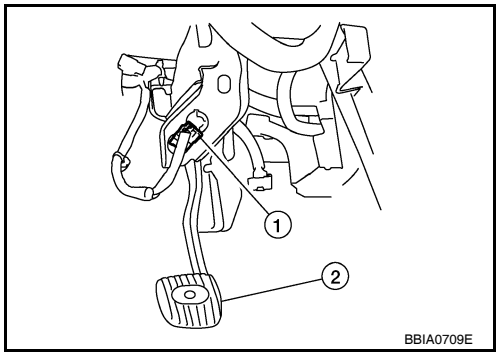
CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

OK or NG

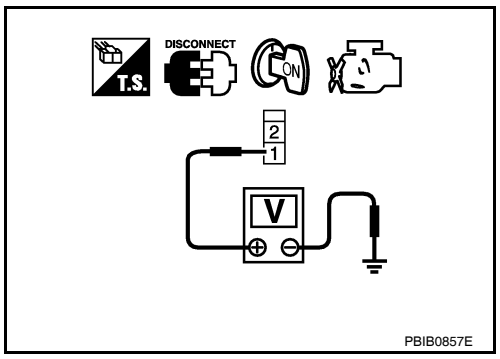
OK >> GO TO 15.
NG >> GO TO 11.

3. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch (1) harness connector.
- Clutch pedal (2)
3. Turn ignition switch ON.



4. Check voltage between ASCD clutch switch terminal 1 and ground under the following conditions with CONSULT-III or tester.



CONDITION	VOLTAGE
Brake pedal: Fully released	Battery voltage
Brake pedal: Slightly depressed	Approx. 0V

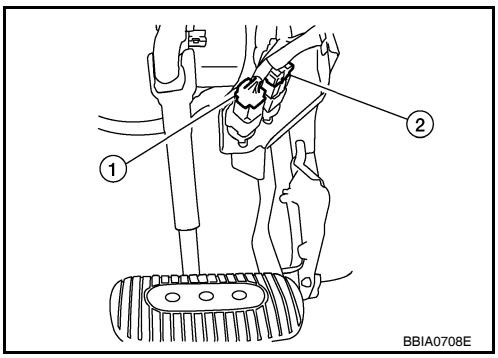
OK or NG

OK >> GO TO 9.
NG >> GO TO 4.

4. CHECK ASCD BRAKE SWITCH POWER SUPPLY

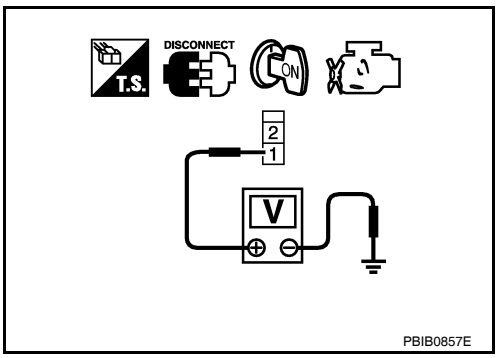
1. Turn ignition switch OFF.

2. Disconnect ASCD brake switch (2) harness connector.
- Stop lamp switch (1)
3. Turn ignition switch ON.



4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK (M/T models) >>GO TO 6.
OK (A/T and CVT models) >>GO TO 7.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 100 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK ASCD BRAKE SWITCH

Refer to EC-914, "Component Inspection".

OK or NG

OK >> GO TO 15.
NG >> Replace ASCD brake switch.

9. CHECK ASCD CLUTCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 100 and ASCD clutch switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ASCD CLUTCH SWITCH

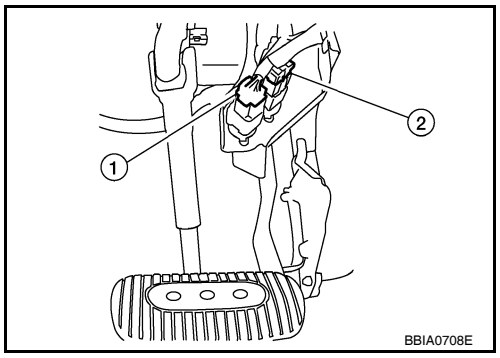
Refer to EC-914, "Component Inspection"

OK or NG

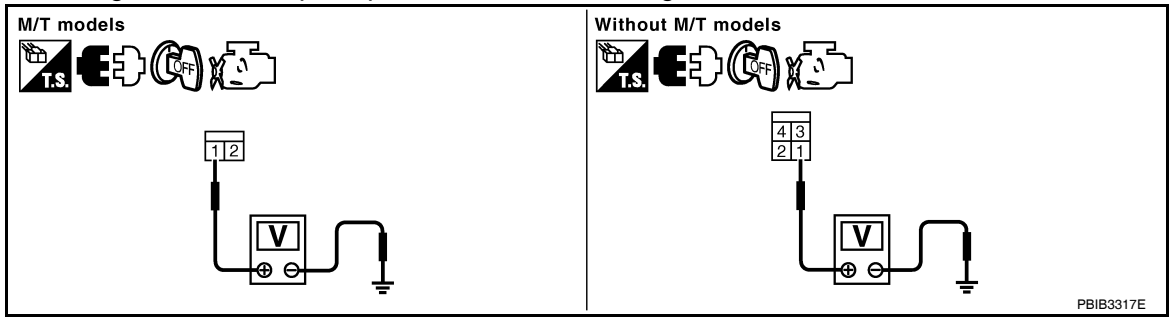
OK >> GO TO 15.
NG >> Replace ASCD clutch switch.

11. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch (1) harness connector.
- ASCD brake switch (2)



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- 10A fuse

• Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 99 and stop lamp switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 14.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK STOP LAMP SWITCH

Refer to EC-914, "Component Inspection"

OK or NG

OK >> GO TO 15.
NG >> Replace stop lamp switch.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

Component Inspection

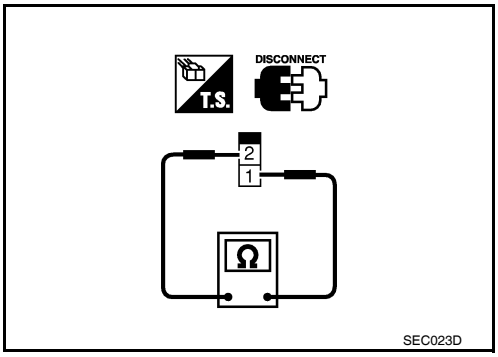
INFOID:0000000004537428

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released.	Should exist.
Brake pedal: Slightly depressed.	Should not exist.

If NG, adjust ASCD brake switch installation, refer to BR-6, and perform step 3 again.



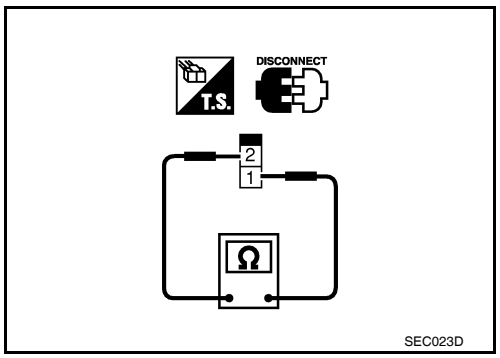
ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.

3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

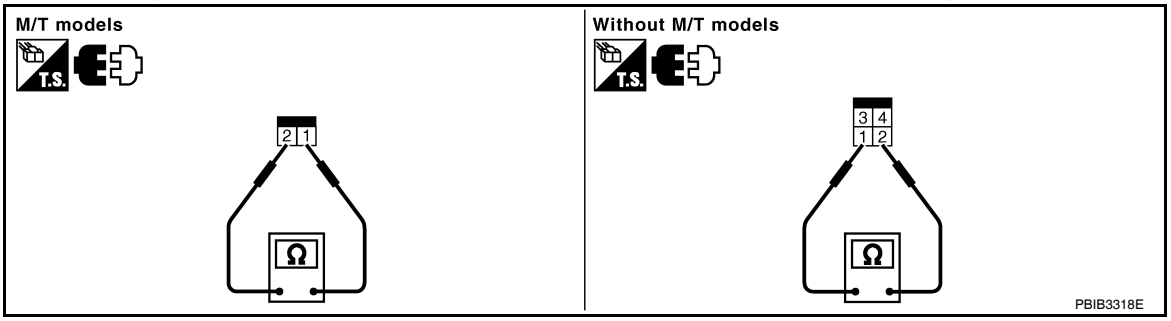
Condition	Continuity
Clutch pedal: Fully released.	Should exist.
Clutch pedal: Slightly depressed.	Should not exist.

If NG, adjust ASCD clutch switch installation, refer to CL-5, and perform step 3 again.



STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released.	Should not exist.
Brake pedal: Slightly depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to BR-6, and perform step 3 again.

DTC P1574 ASCD VEHICLE SPEED SENSOR

Component Description

INFOID:0000000004537429

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from "ABS actuator and electric unit (control unit)" or combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-524 for ASCD functions.

On Board Diagnosis Logic

INFOID:0000000004537430

This self-diagnosis has the one trip detection logic.
The MIL will not light up for this diagnosis.
NOTE:
- **If DTC P1574 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-633.**
- **If DTC P1574 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-635.**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-866.**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-872.**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1574 1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	• Harness or connectors (CAN communication line is open or shorted.) • Harness or connectors (Combination meter circuit is open or shorted.) • TCM (A/T and CVT models) • ABS actuator and electric unit (control unit) • Combination meter • ECM

DTC Confirmation Procedure

INFOID:0000000004537431

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Step 3 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

1. Start engine.
2. Drive the vehicle at more than 40 km/h (25MPH).
3. Check DTC.
4. If DTC is detected, go to EC-916, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004537432

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-39 (A/T) or CVT-209 (CVT).

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT”

Refer to BRC-8.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK COMBINATION METER

Check combination meter function.
Refer to DI-3.

>> **INSPECTION END**

DTC P1715 INPUT SPEED SENSOR (TURBINE REVOLUTION SENSOR)

Description

INFOID:0000000004537433

ECM receives turbine revolution sensor signal from TCM through CAN communication line. ECM uses this signal for engine control.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537434

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
I/P PULLY SPD	• Vehicle speed: More than 20 km/h (12MPH)	Almost the same speed as the tachometer indication

On Board Diagnosis Logic

INFOID:0000000004537435

NOTE:
- **If DTC P1715 is displayed with DTC U1000, U1001 first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-633.**
- **If DTC P1715 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-635.**
- **If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to EC-775.**
- **If DTC P1715 is displayed with DTC P0340 first perform the trouble diagnosis for DTC P0340. Refer to EC-781.**
- **If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-872.**

The MIL will not lights up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715 1715	Input speed sensor (Turbine revolution sensor) (TCM output)	Turbine revolution sensor signal is different from the theoretical value calculated by ECM from revolution sensor signal and engine rpm signal.	• Harness or connectors (CAN communication line is open or shorted) • Harness or connectors (Turbine revolution sensor circuit is open or shorted) • TCM

Diagnosis Procedure

INFOID:0000000004537436

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-39.

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM. Refer to AT-42.

>> **INSPECTION END**

DTC P1715 INPUT SPEED SENSOR (PRIMARY SPEED SENSOR)

Description

INFOID:0000000004537437

ECM receives primary speed sensor signal from TCM through CAN communication line.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537438

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
I/P PULLY SPD	• Vehicle speed: More than 20 km/h (12MPH)	Almost the same speed as the tachometer indication

On Board Diagnosis Logic

INFOID:0000000004537439

NOTE:
- **If DTC P1715 is displayed with DTC U1000 or U1001 first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-633.**
- **If DTC P1715 is displayed with DTC U1010, first perform the trouble diagnosis for DTC U1010. Refer to EC-635.**
- **If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to EC-775.**
- **If DTC P1715 is displayed with DTC P0340 first perform the trouble diagnosis for DTC P0340. Refer to EC-781.**
- **If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-872.**

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715 1715	Input speed sensor (Primary speed sensor) (TCM output)	Primary speed sensor signal is different from the theoretical value calculated by ECM from secondary speed sensor signal and engine rpm signal.	• Harness or connectors (CAN communication line is open or shorted) • Harness or connectors (Primary speed sensor circuit is open or shorted) • TCM

DTC Confirmation Procedure

INFOID:0000000004537440

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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.
4. If 1st trip DTC is detected, go to EC-919, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004537441

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to CVT-209.

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM. Refer to CVT-340.

>> **INSPECTION END**

DTC P1805 BRAKE SWITCH

Description

INFOID:0000000004537442

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.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537443

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

INFOID:0000000004537444

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805 1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	• Harness or connectors (Stop lamp switch circuit is open or shorted.) • Stop lamp switch

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters in fail-safe mode.

Engine operation condition in fail-fail safe mode	
ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.	
Vehicle condition	Driving condition
Engine: Idling	Normal
Accelerating	Poor acceleration

DTC Confirmation Procedure

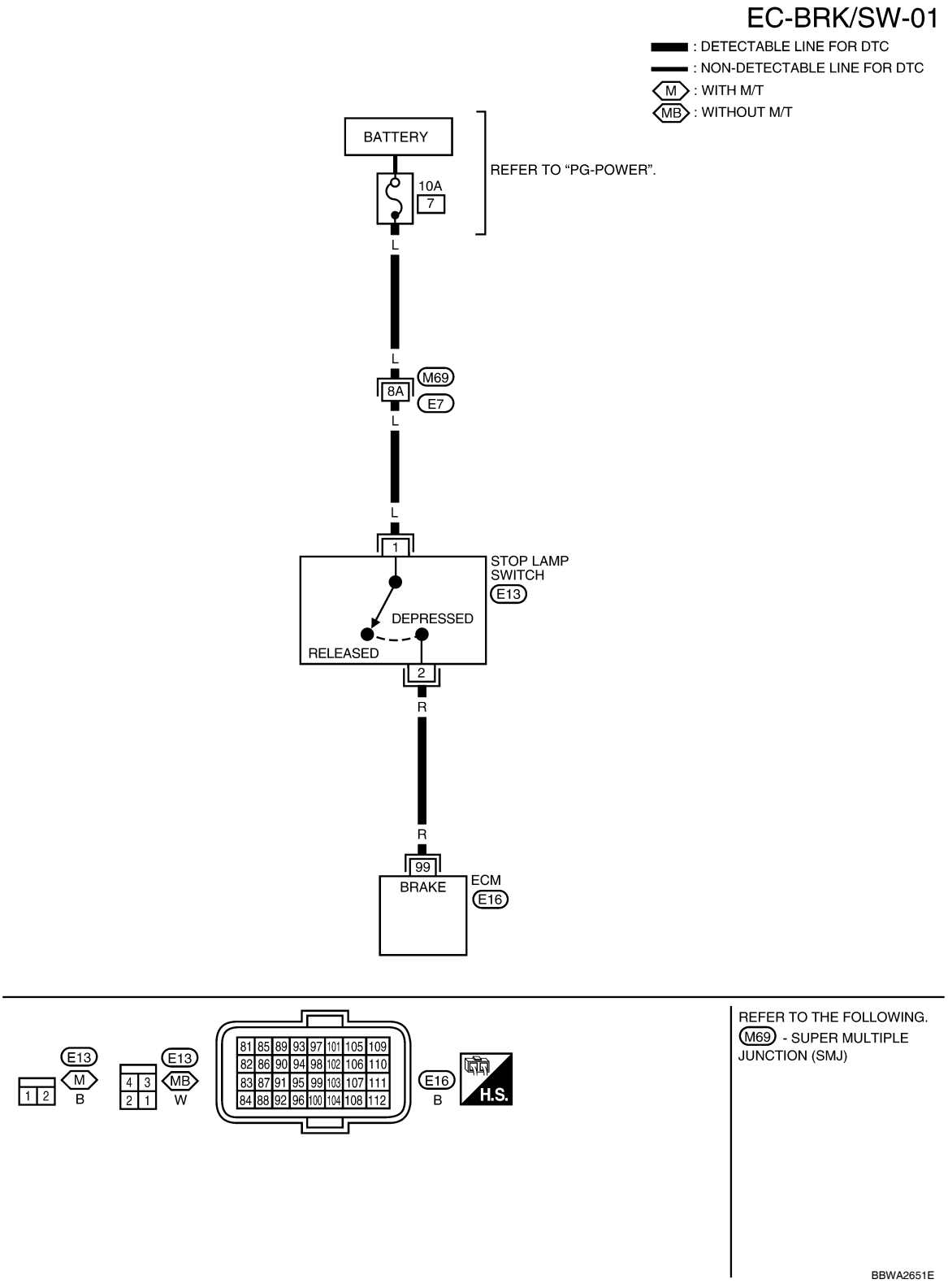
INFOID:0000000004537445

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.
5. If 1st trip DTC is detected, go to EC-923, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537446

EC-BRK/SW-01



Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
99	R	Stop lamp switch	**[Ignition switch: OFF]** • Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:0000000004537447

1.CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

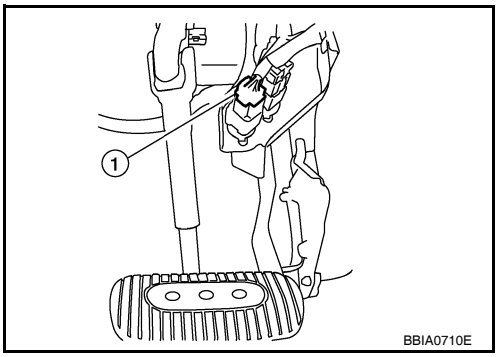
Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

OK or NG

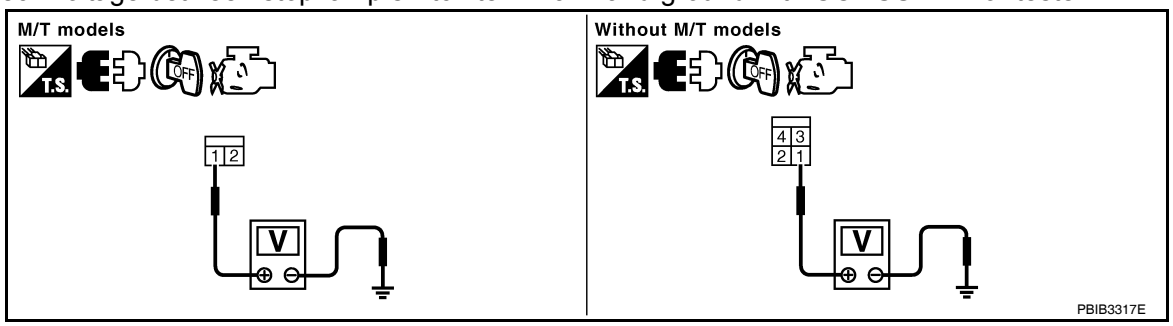
OK >> GO TO 4.
NG >> GO TO 2.

2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch (1) harness connector.
- Brake pedal (2)



2. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- 10A fuse
- Harness for open and 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 stop lamp switch (1) harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between stop lamp switch terminal 2 and ECM terminal 99. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness connectors.

5. CHECK STOP LAMP SWITCH

Refer to EC-924, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace stop lamp switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

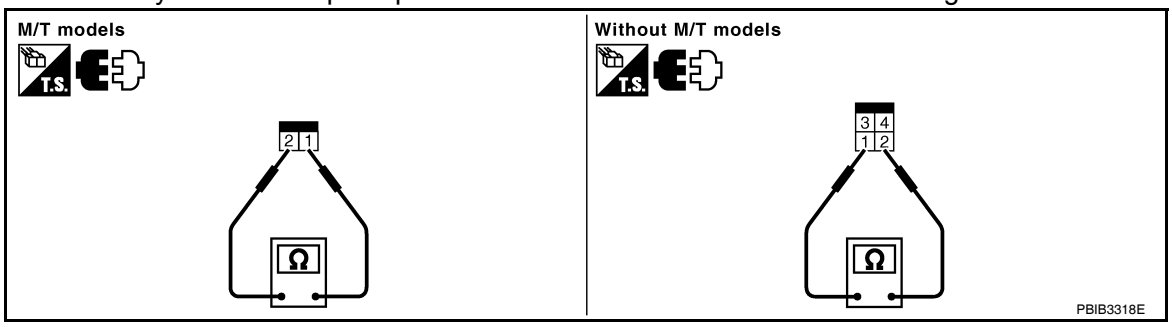
>> **INSPECTION END**

Component Inspection

INFOID:0000000004537448

STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released.	Should not exist.
Brake pedal: Slightly depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to BR-6, and perform step 3 again.

DTC P2100, P2103 THROTTLE CONTROL MOTOR RELAY

Component Description

INFOID:0000000004537449

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.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537450

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	• Ignition switch: ON	ON

On Board Diagnosis Logic

INFOID:0000000004537451

These self-diagnoses have one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2100 2100	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 2103	Throttle control motor relay circuit short	ECM detects the throttle control motor relay is stuck ON.	• Harness or connectors (Throttle control motor relay circuit is shorted) • Throttle control motor relay

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

INFOID:0000000004537452

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR 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 1st trip DTC.
4. If DTC is detected, go to EC-927, "Diagnosis Procedure".

PROCEDURE FOR DTC P2103

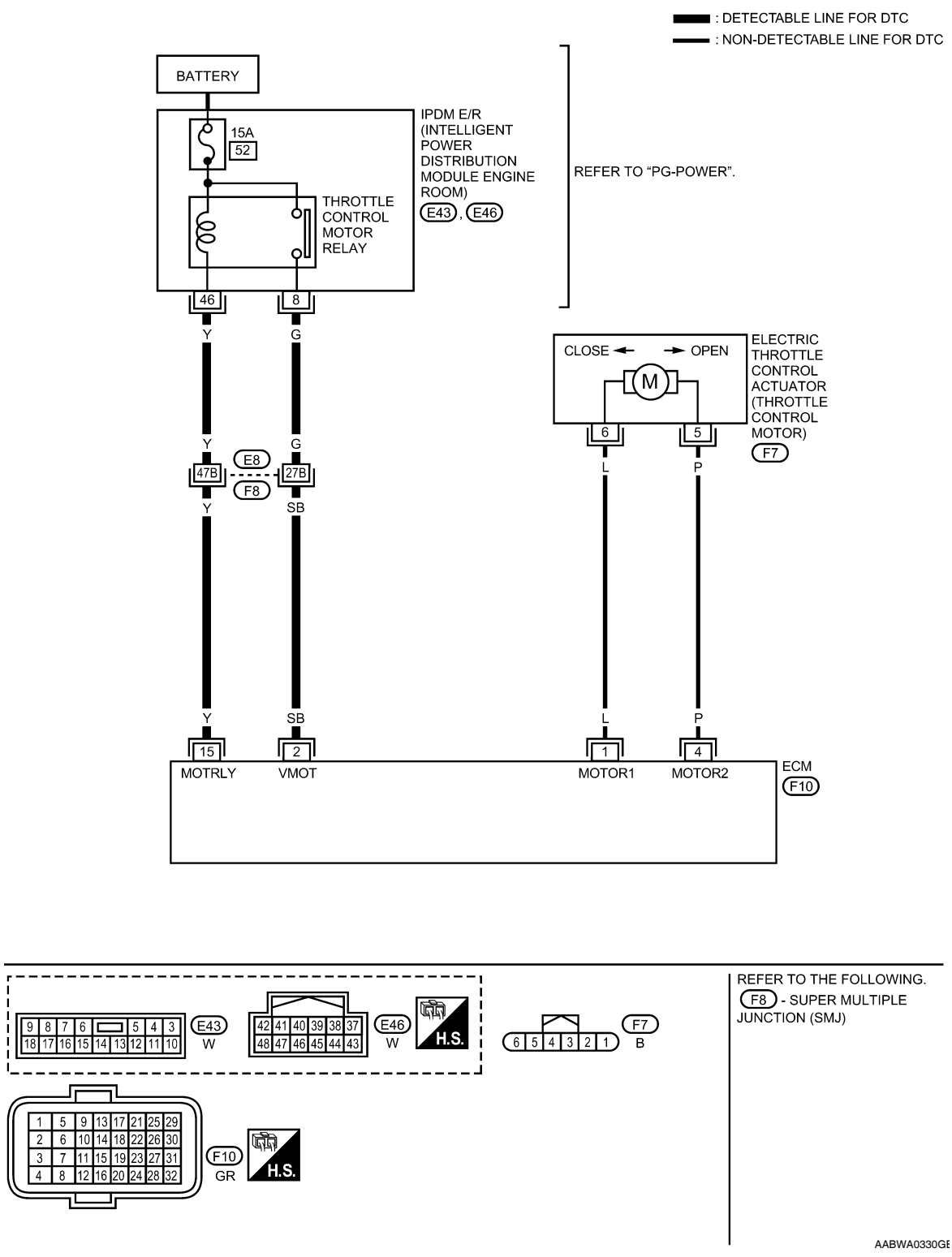
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-927, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537453

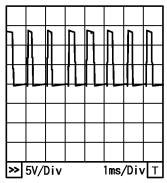
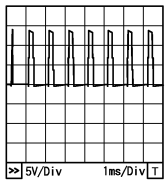
EC-ETC2-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L	Throttle control motor (Open)	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Approximately 3.2V  PBIA8150J
2	SB	Throttle control motor power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	P	Throttle control motor (Close)	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	Approximately 1.8V  PBIA8149J
15	Y	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004537454

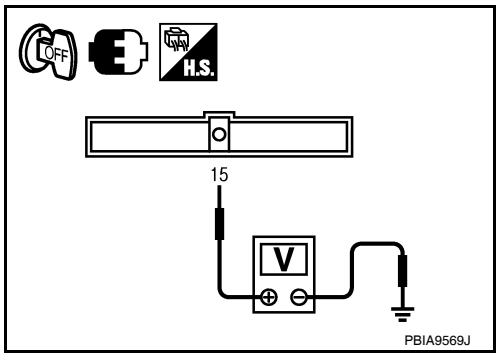
1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Check voltage between ECM terminal 15 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 2.



PBIA9569J

2. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E46.
3. Check continuity between ECM terminal 15 and IPDM E/R terminal 46. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUSE

1. Disconnect 15A fuse.
2. Check 15A fuse for blown.

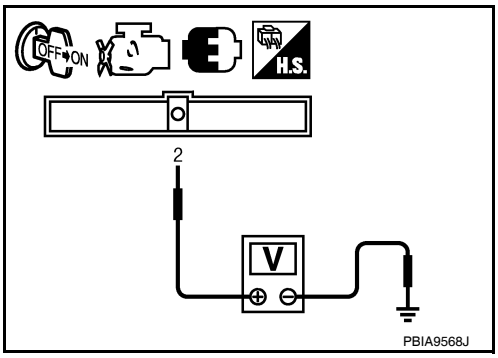
OK or NG

OK >> GO TO 8.
NG >> Replace 15A fuse.

5.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

Check voltage between ECM terminal 2 and ground under the following conditions with CONSULT-III or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)



OK or NG

OK >> GO TO 8.
NG >> GO TO 6.

6.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector E43.
4. Check continuity between ECM terminal 2 and IPDM E/R terminal 8. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK INTERMITTENT INCIDENT

Refer to EC-626.

OK or NG

OK >> Replace IPDM E/R. Refer to PG-27, "Removal and Installation of IPDM E/R".
NG >> Repair or replace harness or connectors.

DTC P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:0000000004537455

NOTE:
If DTC P2101 is displayed with DTC P2100 or P2119, first perform the trouble diagnosis for DTC P2100 or P2119. Refer to EC-925or EC-940.
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.

On Board Diagnosis Logic

INFOID:0000000004537456

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2101 2101	Electric throttle control performance	Electric throttle control function does not operate properly.	• Harness or connectors (Throttle control motor circuit is open or shorted) • Electric throttle control actuator

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

INFOID:0000000004537457

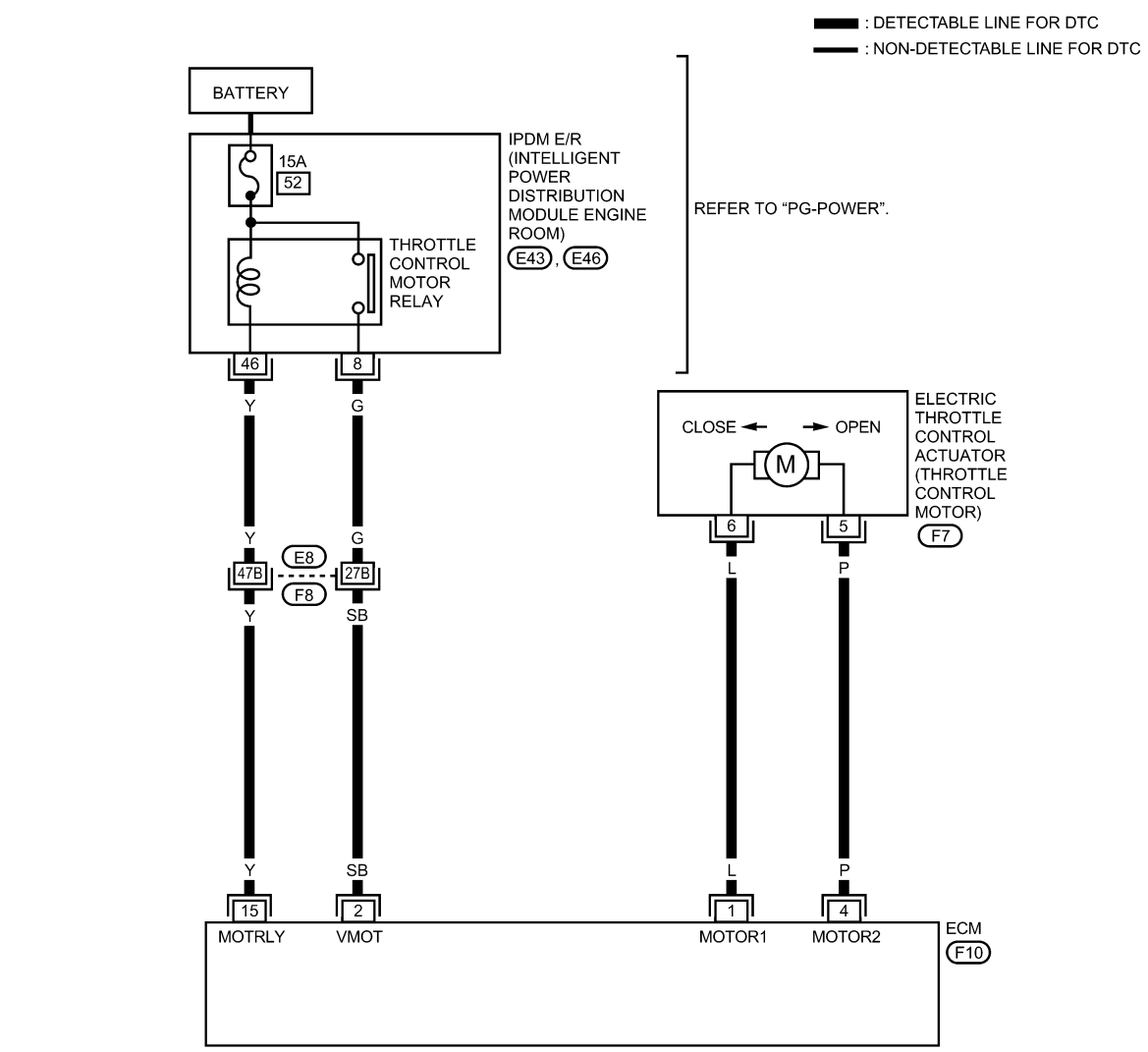
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V when engine is running.

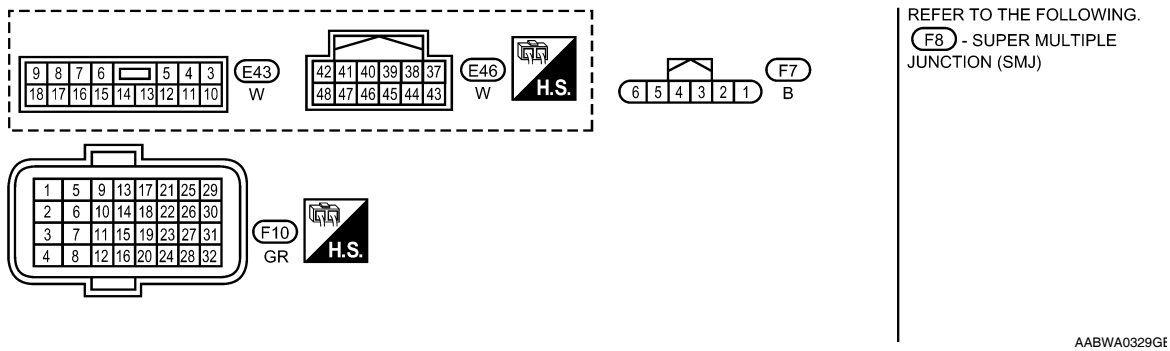
1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.
4. If DTC is detected, go to EC-931, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537458

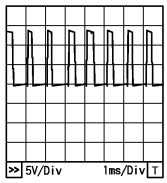
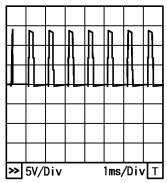
EC-ETC1-01





Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L	Throttle control motor (Open)	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Approximately 3.2V  PBIA8150J
2	SB	Throttle control motor power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	P	Throttle control motor (Close)	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	Approximately 1.8V  PBIA8149J
15	Y	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

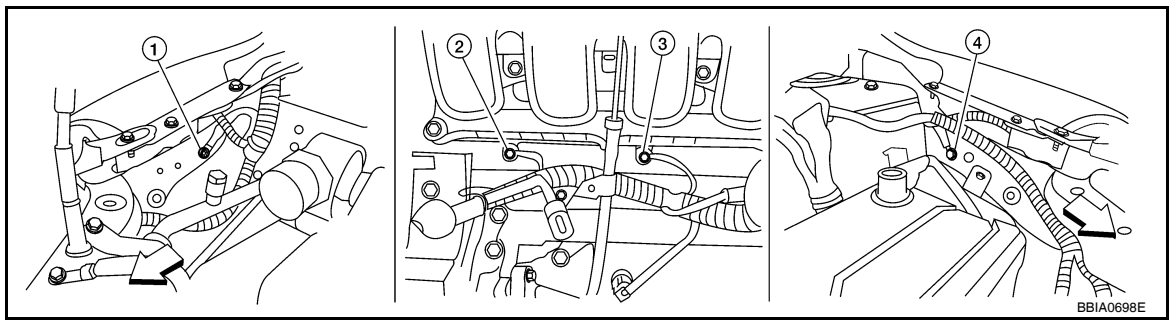
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004537459

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

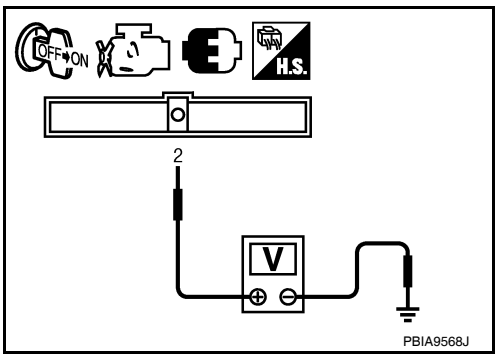
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

Check voltage between ECM terminal 2 and ground under the following conditions with CONSULT-III or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)



OK or NG

OK >> GO TO 10.
NG >> GO TO 3.

3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector E43.
4. Check continuity between ECM terminal 2 and IPDM E/R terminal 8. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

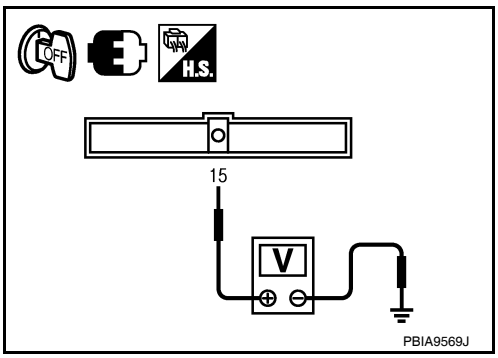
Check the following.
- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Reconnect all harness connectors disconnected.
2. Check voltage between ECM terminal 15 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 9.
NG >> GO TO 6.

6. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E46.
3. Check harness continuity between ECM terminal 15 and IPDM E/R terminal 46. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK FUSE

1. Disconnect 15A fuse.
2. Check 15A fuse for blown.

OK or NG

OK >> GO TO 9.
NG >> Replace 15A fuse.

9.CHECK INTERMITTENT INCIDENT

Refer to EC-626.

OK or NG

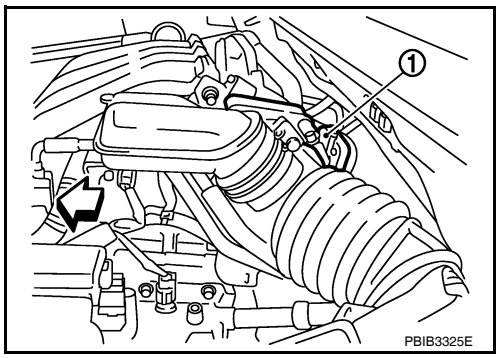
OK >> Replace IPDM E/R. Refer to PG-27, "Removal and Installation of IPDM E/R".
NG >> Repair or replace harness or connectors.

10.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator (1) harness connector.

- : Vehicle front

3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.



Electric throttle control actuator terminal	ECM terminal	Continuity
5	1	Should not exist.
	4	Should exist.
6	1	Should exist.
	4	Should not exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

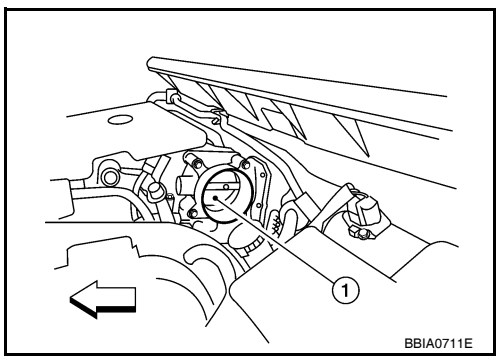
11.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve (1) and the housing.

- : Vehicle front

OK or NG

OK >> GO TO 12.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



12.CHECK THROTTLE CONTROL MOTOR

Refer to EC-934, "Component Inspection".

OK or NG

OK >> GO TO 13.
NG >> GO TO 14.

13. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

OK or NG

OK >> GO TO 14.
NG >> Repair or replace harness or connectors.

14. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-572, "Throttle Valve Closed Position Learning".
3. Perform EC-572, "Idle Air Volume Learning".

>> **INSPECTION END**

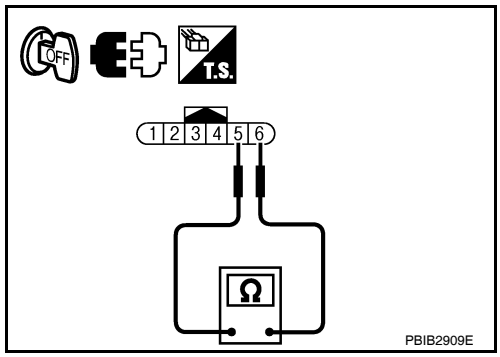
Component Inspection

INFOID:0000000004537460

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 5 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]



3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-572, "Throttle Valve Closed Position Learning".
5. Perform EC-572, "Idle Air Volume Learning".

Removal and Installation

INFOID:0000000004537461

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-141.

DTC P2118 THROTTLE CONTROL MOTOR

Component Description

INFOID:0000000004537462

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.

On Board Diagnosis Logic

INFOID:0000000004537463

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2118 2118	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	• Harness or connectors (Throttle control motor circuit is shorted.) • Electric throttle control actuator (Throttle control motor)

FAIL-SAFE MODE
When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

INFOID:0000000004537464

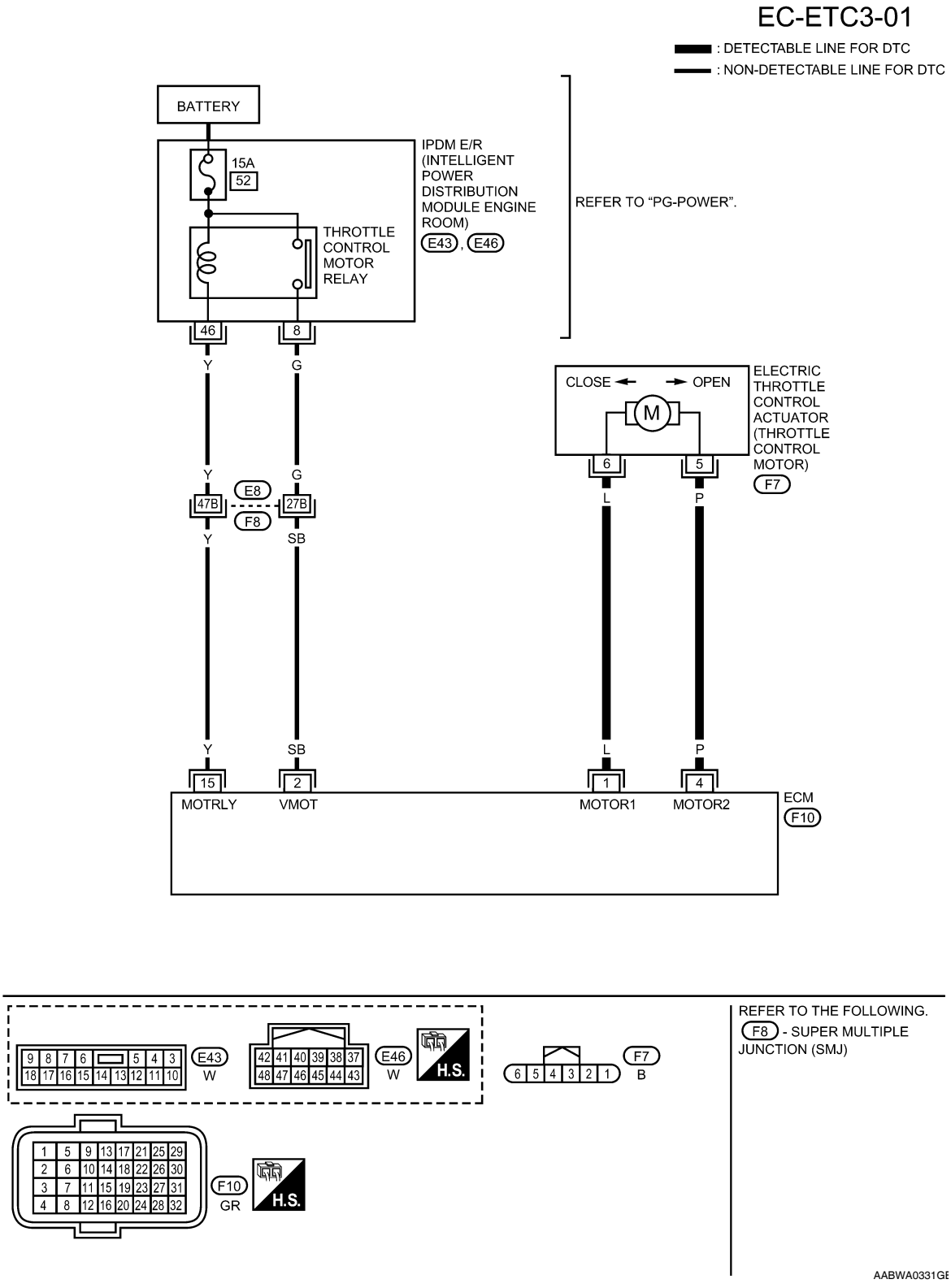
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.
4. If DTC is detected, go to EC-937, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537465

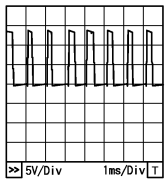
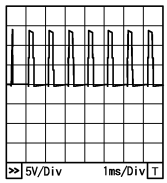
EC-ETC3-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L	Throttle control motor (Open)	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Approximately 3.2V  PBIA8150J
2	SB	Throttle control motor power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	P	Throttle control motor (Close)	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	Approximately 1.8V  PBIA8149J
15	Y	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

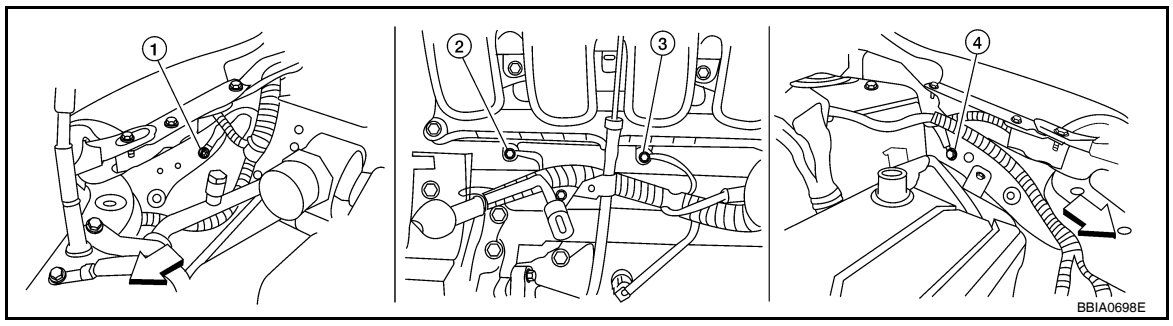
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004537466

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

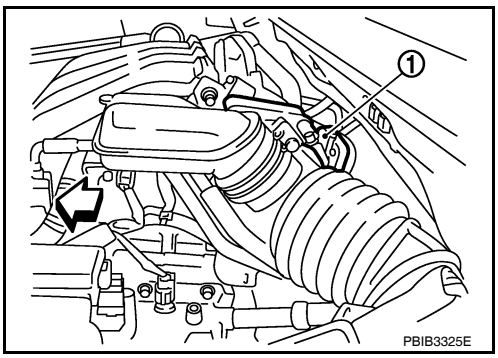
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Disconnect electric throttle control actuator (1) harness connector.



- : Vehicle front
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

Electric throttle control actuator terminal	ECM terminal	Continuity
5	1	Should not exist.
	4	Should exist.
6	1	Should exist.
	4	Should not exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THROTTLE CONTROL MOTOR

Refer to EC-938, "Component Inspection".

OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4.CHECK INTERMITTENT INCIDENT

Refer to EC-626.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-572, "Throttle Valve Closed Position Learning".
3. Perform EC-572, "Idle Air Volume Learning".

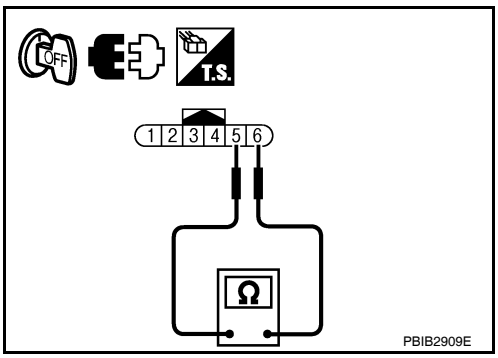
>> **INSPECTION END**

Component Inspection

INFOID:0000000004537467

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 5 and 6.



Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]

3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-572, "Throttle Valve Closed Position Learning".
5. Perform EC-572, "Idle Air Volume Learning".

Removal and Installation

INFOID:0000000004537468

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-141.

DTC P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

Component Description

INFOID:0000000004537469

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.

On Board Diagnosis Logic

INFOID:0000000004537470

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P2119 2119	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 detects the throttle valve is stuck open.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Malfunction A	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.
Malfunction B	ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
Malfunction C	While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position (A/T, CVT), neutral (M/T), and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

INFOID:0000000004537471

NOTE:
- **Perform PROCEDURE FOR MALFUNCTION A AND B first. If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION C.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A AND B

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to D position (A/T, CVT) or 1st position (M/T), and wait at least 3 seconds.
3. Set shift lever to P position (A/T, CVT) or Neutral position (M/T).
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 position (A/T, CVT) or 1st position (M/T), and wait at least 3 seconds.
7. Set shift lever to P position (A/T, CVT) or Neutral position (M/T).
8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
9. Check DTC.
10. If DTC is detected, go to EC-941, "Diagnosis Procedure".

PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to D position (A/T, CVT) or 1st position (M/T) and wait at least 3 seconds.

3. Set shift lever to N, P position (A/T, CVT) or Neutral (M/T) position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.
6. If DTC is detected, go to EC-941, "Diagnosis Procedure".

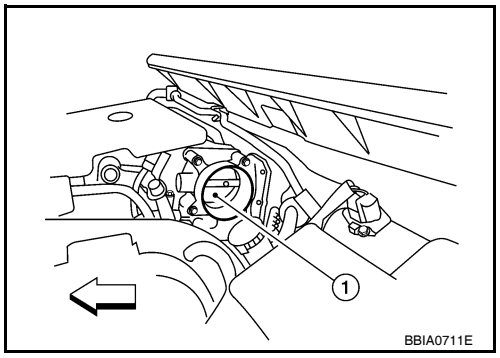
Diagnosis Procedure

INFOID:0000000004537472

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if a foreign matter is caught between the throttle valve (1) and the housing.

- : Vehicle front



OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-572, "Throttle Valve Closed Position Learning".
3. Perform EC-572, "Idle Air Volume Learning".

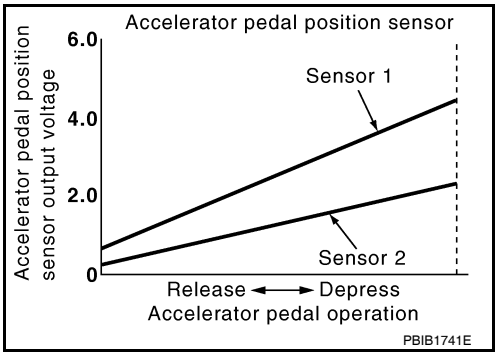
>> **INSPECTION END**

DTC P2122, P2123 APP SENSOR

Component Description

INFOID:0000000004537473

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.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537474

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2*	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

INFOID:0000000004537475

These self-diagnoses have the one trip detection logic.
NOTE:
If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-874.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122 2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	• Harness or connectors (APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1)
P2123 2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:0000000004537476

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

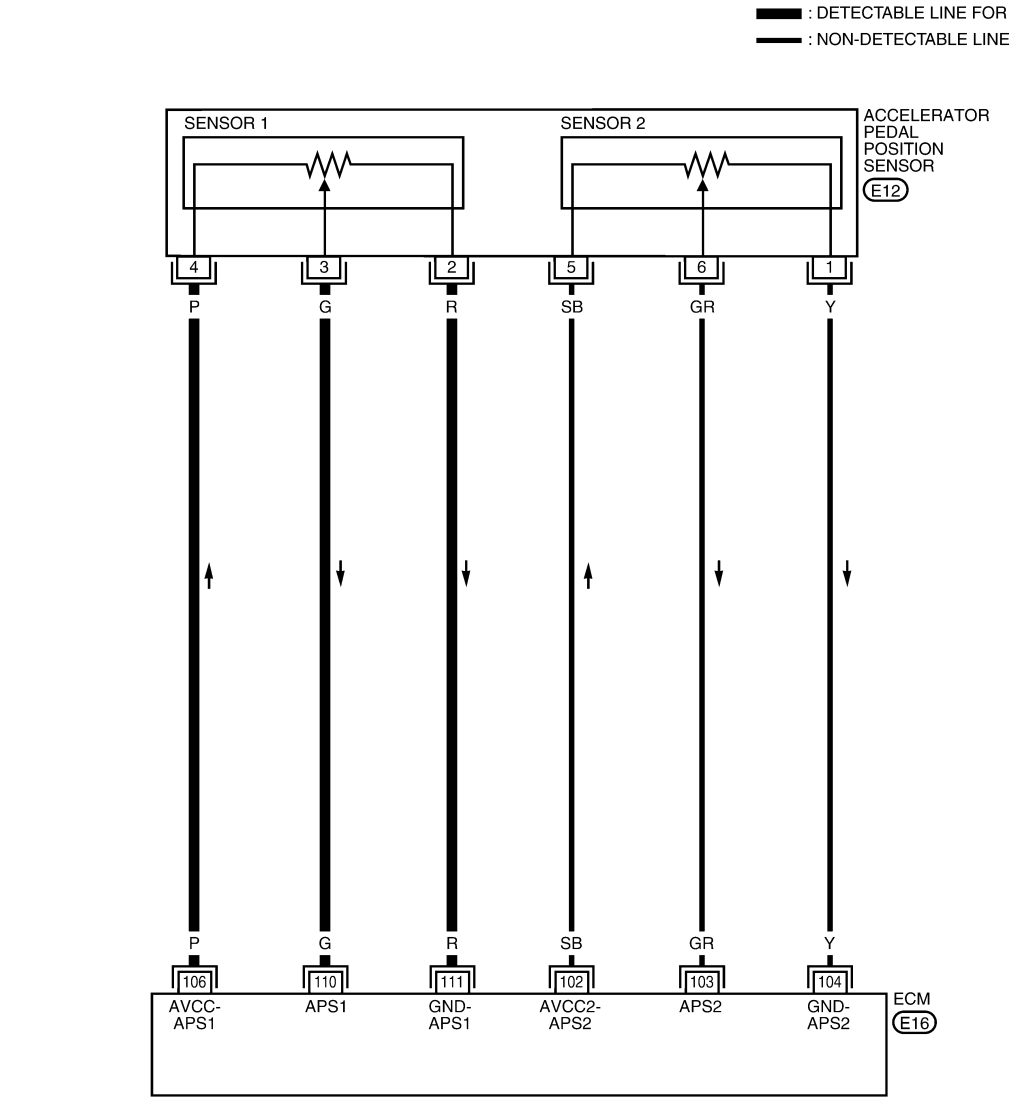
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

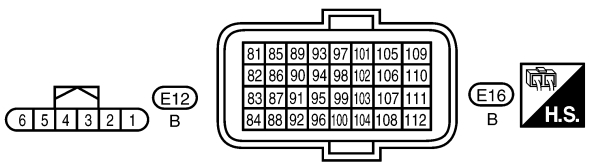
1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-944, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537477

EC-APPS1-01





BBWA2652E

Specification data are reference values and are measured between each terminal 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.

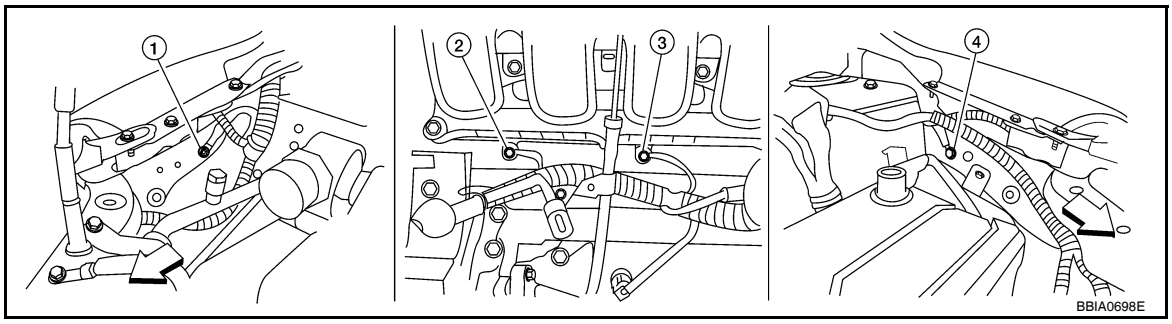
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	SB	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V
103	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4V
104	Y	Sensor ground (APP sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
106	P	Sensor power supply (APP sensor 1)	**[Ignition switch: ON]**	Approximately 5V
110	G	Accelerator pedal position sensor 1	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7V
111	R	Sensor ground (APP sensor 1)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:0000000004537478

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

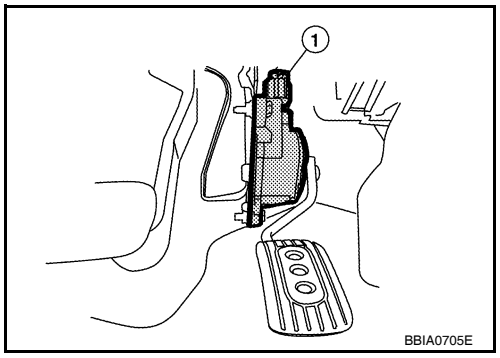
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

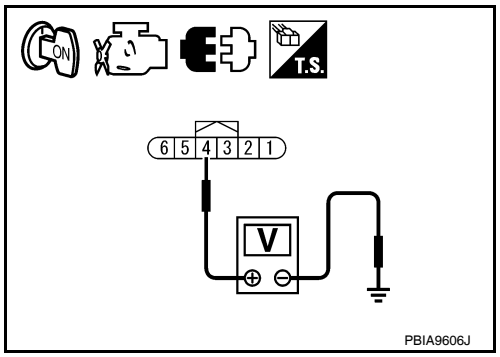
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 4 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 111 and APP sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 110 and APP sensor terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-946, "Component Inspection".

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.

2. Perform EC-572, "Accelerator Pedal Released Position Learning".
3. Perform EC-572, "Throttle Valve Closed Position Learning".
4. Perform EC-572, "Idle Air Volume Learning".

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

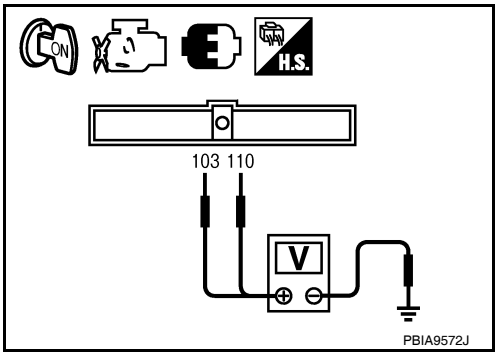
>> **INSPECTION END**

Component Inspection

INFOID:0000000004537479

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 110 (APP sensor 1 signal), 103 (APP sensor 2 signal) and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
110 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.9V
	Fully depressed	3.9 - 4.7V
103 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.6V
	Fully depressed	1.95 - 2.4V

4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-572, "Accelerator Pedal Released Position Learning".
6. Perform EC-572, "Throttle Valve Closed Position Learning".
7. Perform EC-572, "Idle Air Volume Learning".

Removal and Installation

INFOID:0000000004537480

ACCELERATOR PEDAL

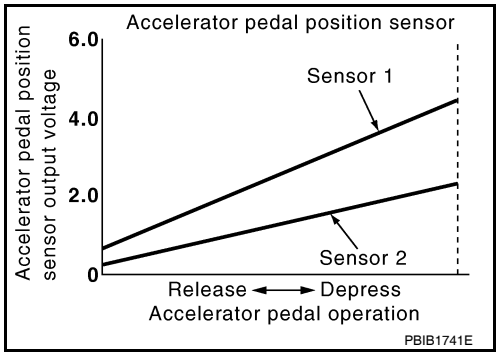
Refer to ACC-3.

DTC P2127, P2128 APP SENSOR

Component Description

INFOID:0000000004537481

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.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537482

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2*	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

INFOID:0000000004537483

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127 2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	• Harness or connectors (APP sensor 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Accelerator pedal position sensor (APP sensor 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor
P2128 2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:0000000004537484

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

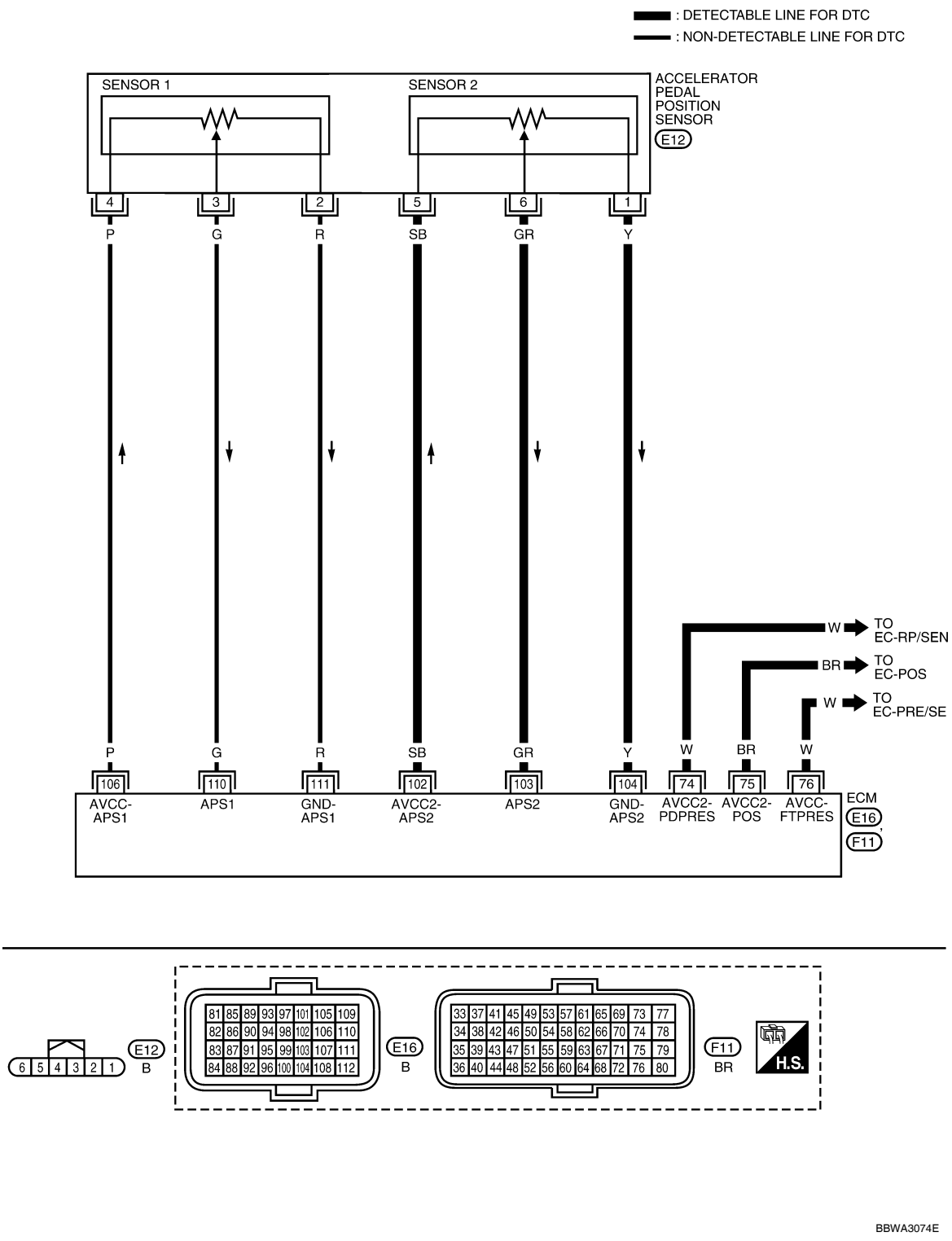
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-950, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537485

EC-APPS2-01



BBWA3074E

Specification data are reference values and are measured between each terminal 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.

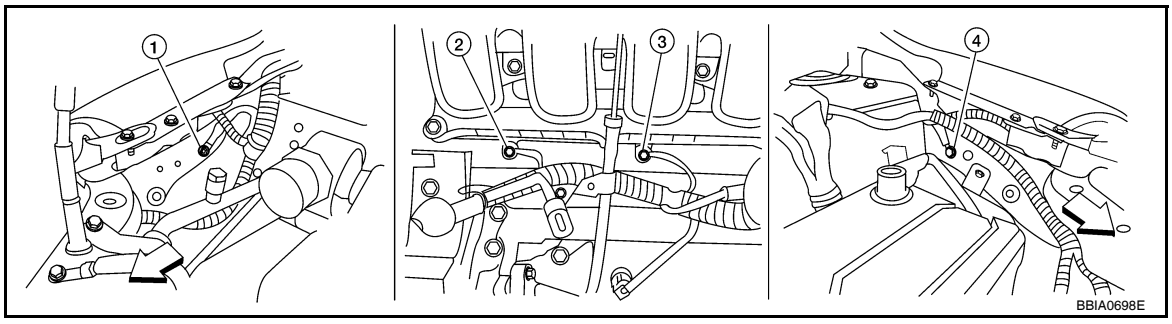
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	W	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
75	BR	Sensor power supply [Crankshaft position sensor (POS)]	**[Ignition switch: ON]**	Approximately 5V
76	W	EVAP control system pressure sensor power supply	**[Ignition switch: ON]**	Approximately 5V
102	SB	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V
103	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4V
104	Y	Sensor ground (APP sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
106	P	Sensor power supply (APP sensor 1)	**[Ignition switch: ON]**	Approximately 5V
110	G	Accelerator pedal position sensor 1	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7V
111	R	Sensor ground (APP sensor 1)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:0000000004537486

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

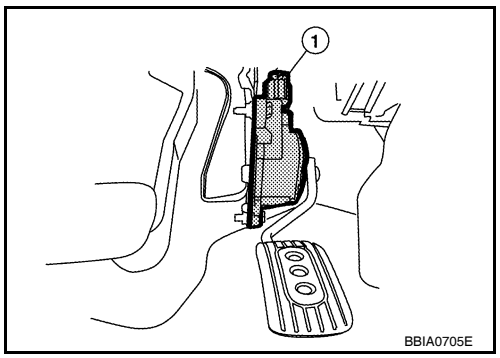
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

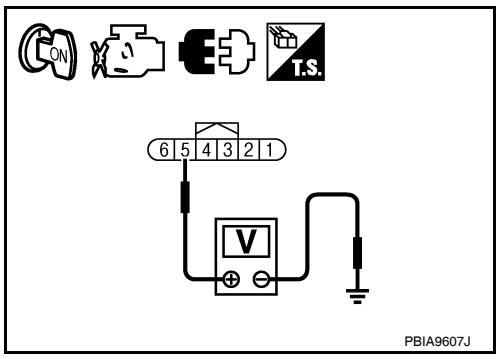
2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 5 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 6.
NG >> GO TO 3.

3. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 5 and ECM terminal 102. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COMPONENTS POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
74	Refrigerant pressure sensor terminal 3	EC-1006, "Wiring Diagram"
75	Crankshaft position sensor (POS) terminal 1	EC-776, "Wiring Diagram"
76	EVAP control system pressure sensor terminal 3	EC-834, "Wiring Diagram"
102	APP sensor terminal 5	EC-949, "Wiring Diagram"

OK or NG

OK >> GO TO 5.
NG >> 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-780, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-831, "Component Inspection".)

• Refrigerant pressure sensor (Refer to MTC-37.)

OK or NG

OK >> GO TO 10.
NG >> 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 harness continuity between ECM terminal 104 and APP sensor terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> 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 harness continuity between ECM terminal 103 and APP sensor terminal 6. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK APP SENSOR

Refer to EC-952, "Component Inspection".

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-572, "Accelerator Pedal Released Position Learning".
3. Perform EC-572, "Throttle Valve Closed Position Learning".
4. Perform EC-572, "Idle Air Volume Learning".

>> **INSPECTION END**

10.CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

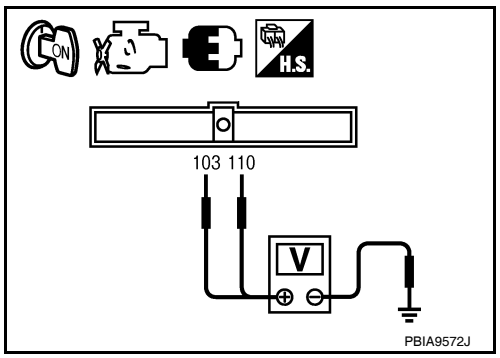
Component Inspection

INFOID:0000000004537487

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.

3. Check voltage between ECM terminals 110 (APP sensor 1 signal), 103 (APP sensor 2 signal) and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
110 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.9V
	Fully depressed	3.9 - 4.7V
103 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.6V
	Fully depressed	1.95 - 2.4V

4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-572, "Accelerator Pedal Released Position Learning".
6. Perform EC-572, "Throttle Valve Closed Position Learning".
7. Perform EC-572, "Idle Air Volume Learning".

Removal and Installation

INFOID:0000000004537488

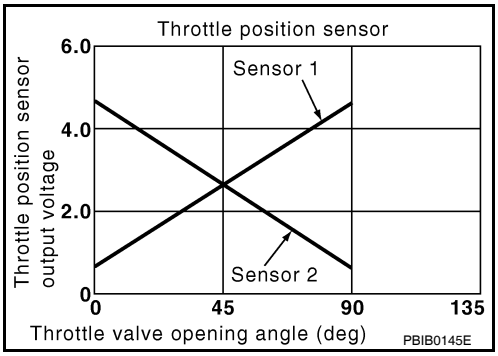
ACCELERATOR PEDAL
Refer to ACC-3.

DTC P2135 TP SENSOR

Component Description

INFOID:0000000004537489

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.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537490

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
TP SEN 1-B1 TP SEN 2-B1*	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T, CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

INFOID:0000000004537491

This self-diagnosis has the one trip detection logic.
NOTE:
If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.
Refer to EC-874.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135 2135	Throttle position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	• Harness or connector (TP sensor 1 and 2 circuit is open or short-ed.) • Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:0000000004537492

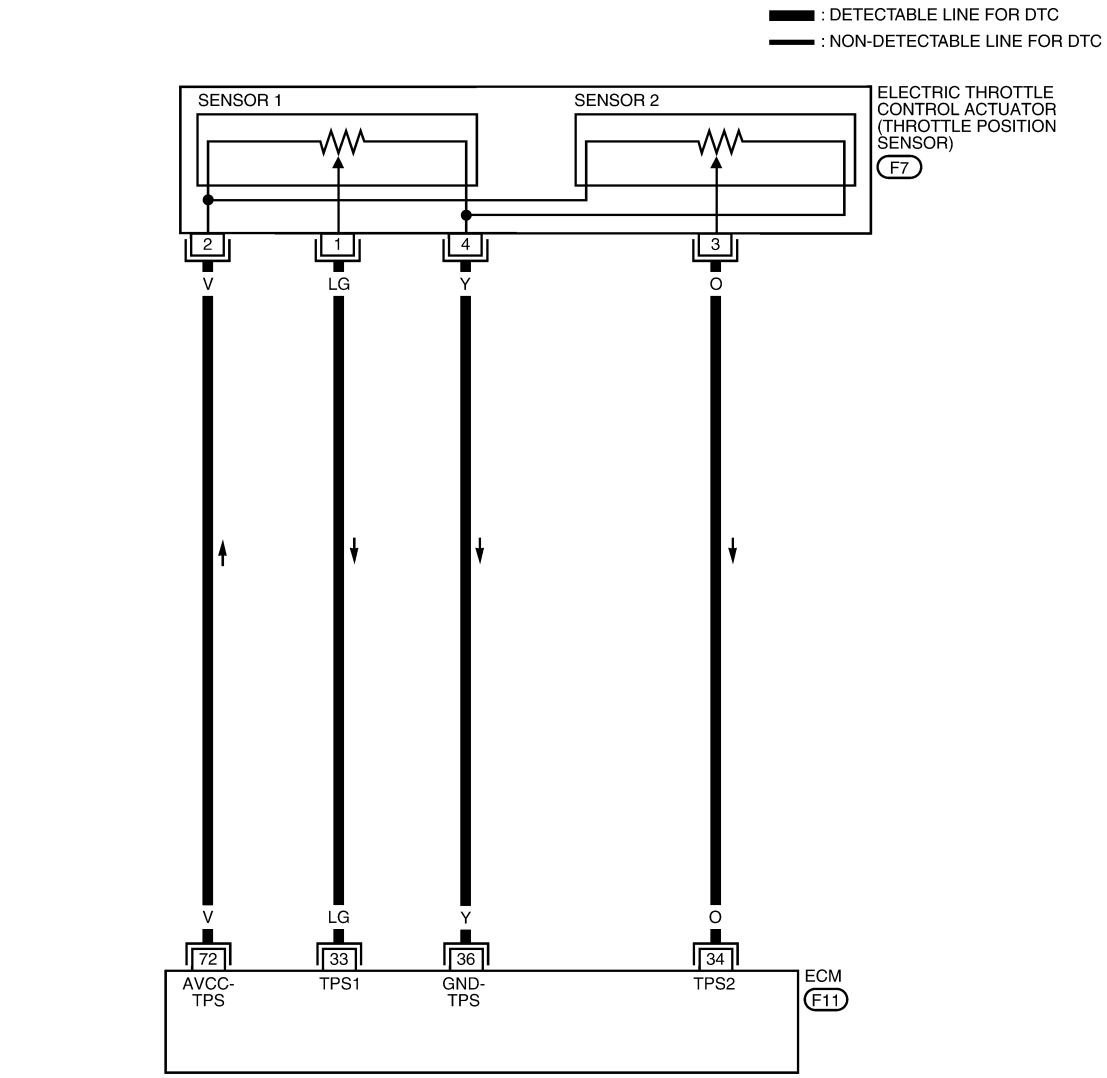
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

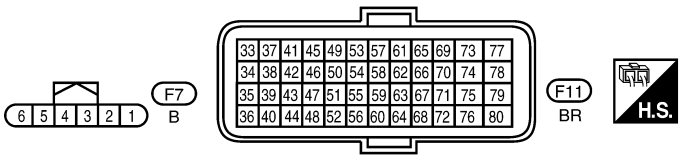
1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-956, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537493

EC-TPS3-01





BBWA2657E

Specification data are reference values and are measured between each terminal 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.

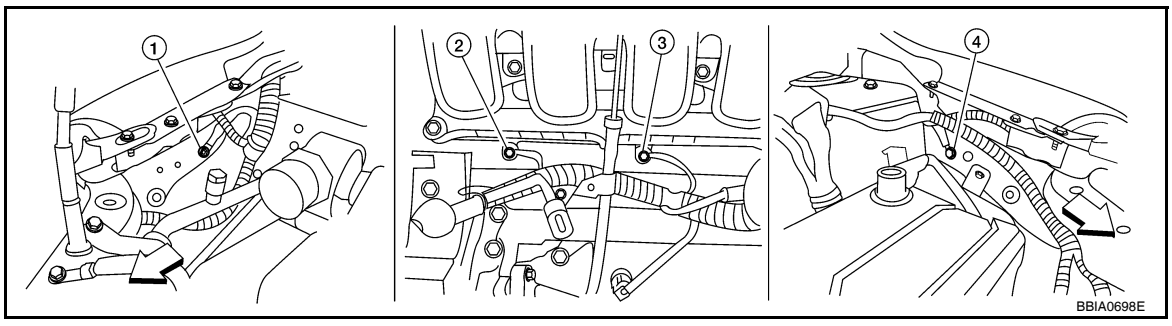
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	LG	Throttle position sensor 1	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
34	O	Throttle position sensor 2	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
36	Y	Sensor ground (Throttle position sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
72	V	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V

Diagnosis Procedure

INFOID:0000000004537494

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

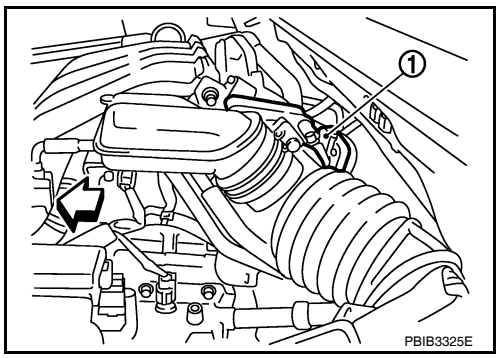
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator (1) harness connector.
- : Vehicle front
2. Turn ignition switch ON.

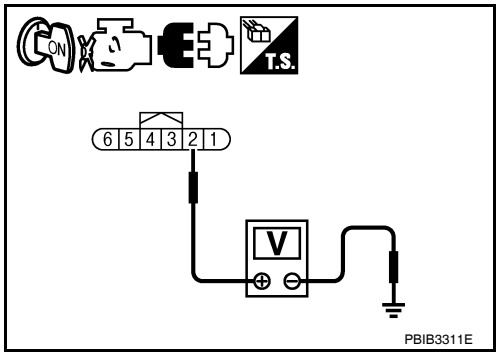


3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT-III or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 36. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following;
electric throttle control actuator terminal 1 and ECM terminal 33,
electric throttle control actuator terminal 3 and ECM terminal 34.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-958, "Component Inspection".

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-572, "Throttle Valve Closed Position Learning".

3. Perform EC-572, "Idle Air Volume Learning".

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

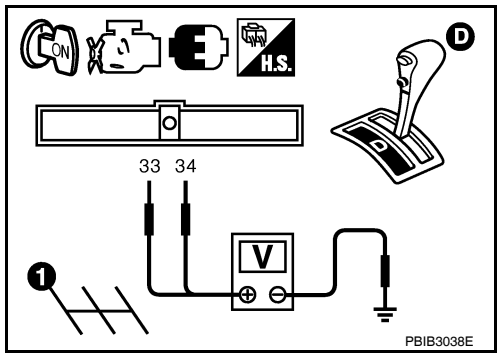
Component Inspection

INFOID:0000000004537495

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-572, "Throttle Valve Closed Position Learning".
3. Turn ignition switch ON.
4. Set shift lever to D position (A/T, CVT) or 1st position (M/T).
5. Check voltage between ECM terminals 33 (TP sensor 1 signal), 34 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
33 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
34 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-572, "Throttle Valve Closed Position Learning".
8. Perform EC-572, "Idle Air Volume Learning".

Removal and Installation

INFOID:0000000004537496

ELECTRIC THROTTLE CONTROL ACTUATOR

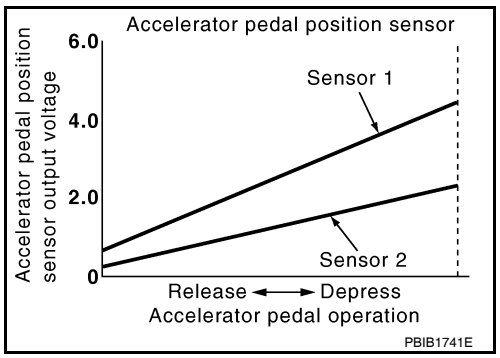
Refer to EM-141.

DTC P2138 APP SENSOR

Component Description

INFOID:0000000004537497

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.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537498

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2*	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

INFOID:0000000004537499

This self-diagnosis has the one trip detection logic.
NOTE:
If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.
Refer to EC-874.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138 2138	Accelerator pedal position sensor circuit range/ performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	• Harness or connector (APP sensor 1 and 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1 and 2) • Crankshaft position sensor (POS) • EVAP control system pressure sensor • Refrigerant pressure sensor

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:0000000004537500

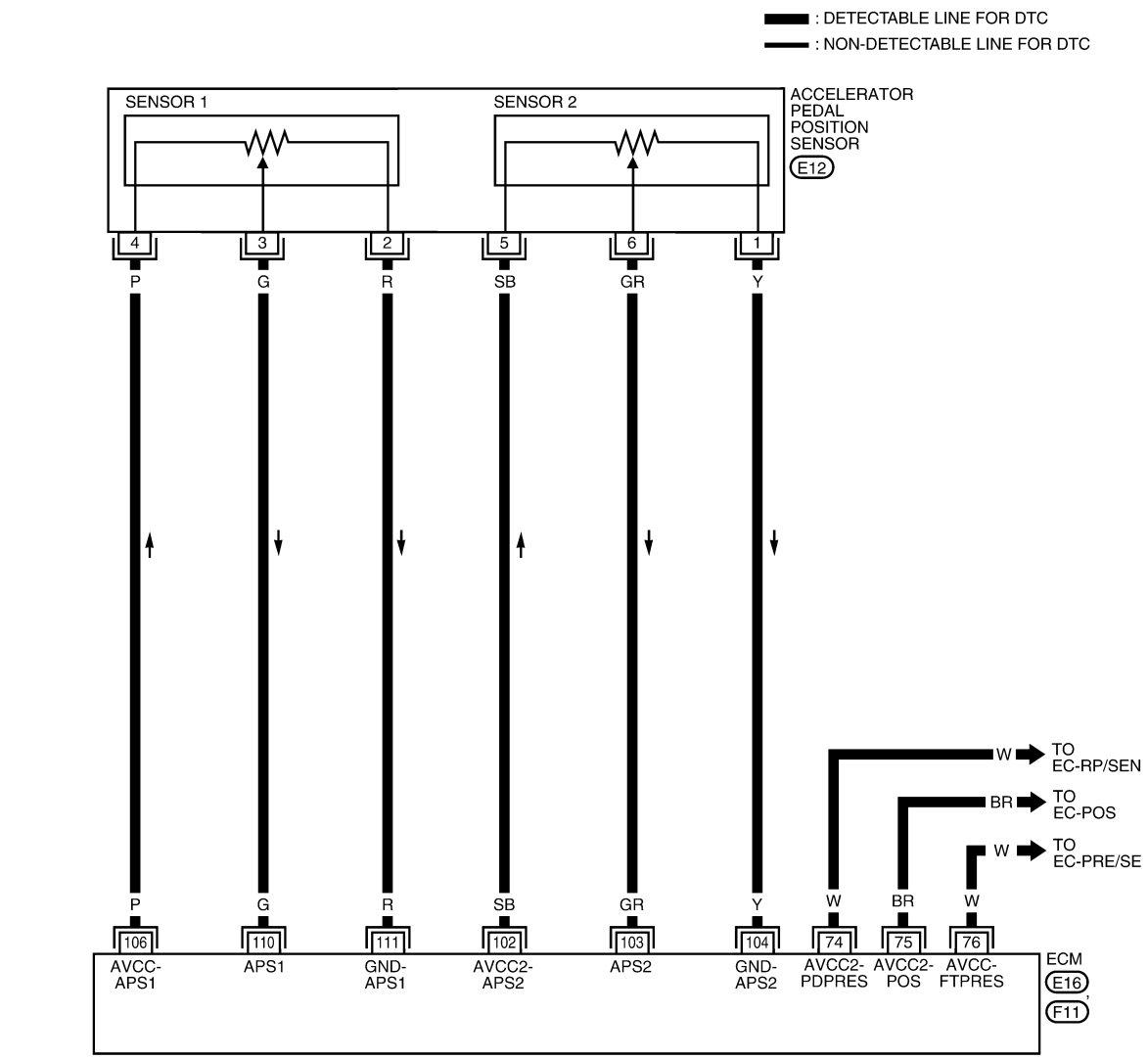
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

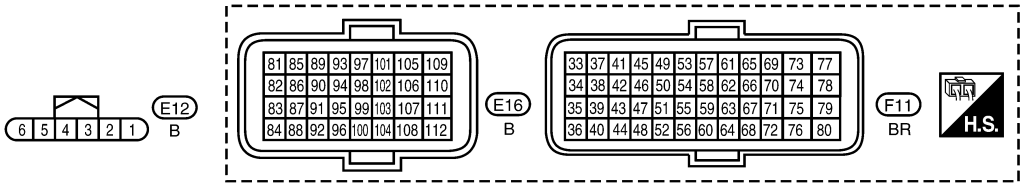
1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-962, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004537501

EC-APPS3-01





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Specification data are reference values and are measured between each terminal 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.

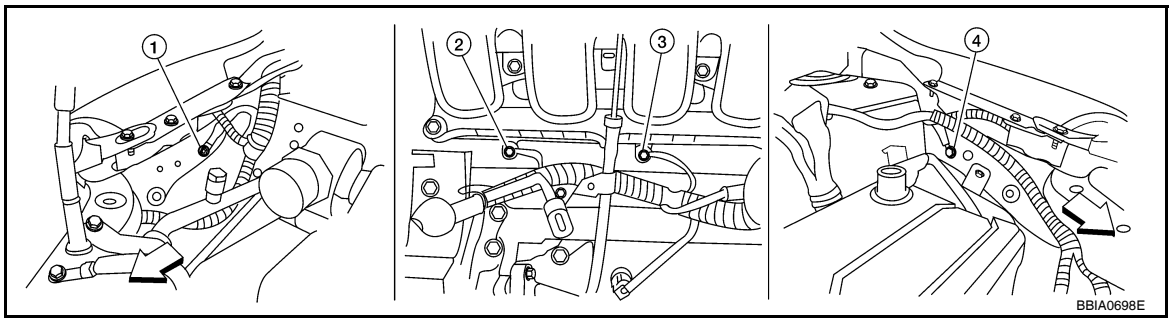
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	W	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
75	BR	Sensor power supply [Crankshaft position sensor (POS)]	**[Ignition switch: ON]**	Approximately 5V
76	W	EVAP control system pressure sensor power supply	**[Ignition switch: ON]**	Approximately 5V
102	SB	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V
103	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4V
104	Y	Sensor ground (APP sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
106	P	Sensor power supply (APP sensor 1)	**[Ignition switch: ON]**	Approximately 5V
110	G	Accelerator pedal position sensor 1	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7V
111	R	Sensor ground (APP sensor 1)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:0000000004537502

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-632, "Ground Inspection".



: Vehicle front

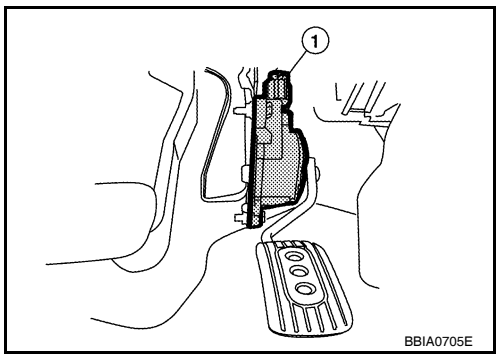
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

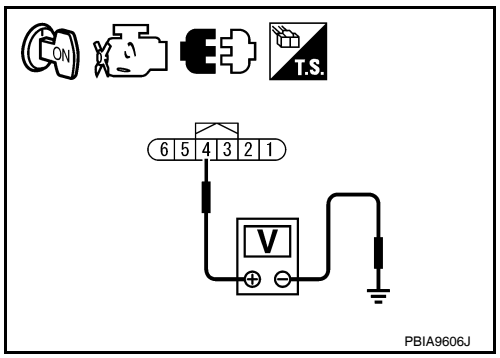
2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 4 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



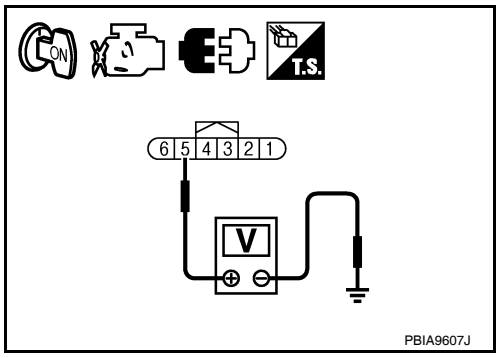
OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between APP sensor terminal 5 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 4.

4.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 5 and ECM terminal 102. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK COMPONENTS POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
74	Refrigerant pressure sensor terminal 3	EC-1006, "Wiring Diagram"
75	Crankshaft position sensor (POS) terminal 1	EC-776, "Wiring Diagram"
76	EVAP control system pressure sensor terminal 3	EC-834, "Wiring Diagram"
102	APP sensor terminal 5	EC-961, "Wiring Diagram"

OK or NG

OK >> GO TO 6.
NG >> 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-780, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-831, "Component Inspection".)
- Refrigerant pressure sensor (Refer to MTC-37.)

OK or NG

OK >> GO TO 11.
NG >> 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 harness continuity between the following;
   ECM terminal 111 and APP sensor terminal 2,
   ECM terminal 104 and APP sensor terminal 1.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following;
   ECM terminal 110 and APP sensor terminal 3,
   ECM terminal 103 and APP sensor terminal 6.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK APP SENSOR

Refer to EC-965, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-572, "Accelerator Pedal Released Position Learning".
3. Perform EC-572, "Throttle Valve Closed Position Learning".
4. Perform EC-572, "Idle Air Volume Learning".

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

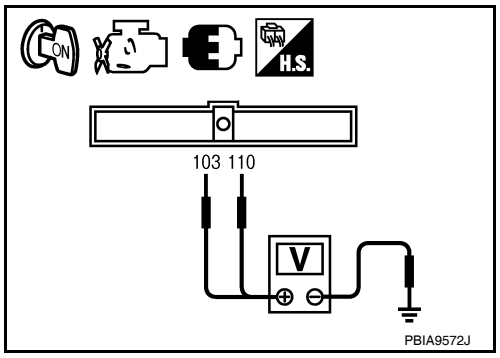
>> **INSPECTION END**

Component Inspection

INFOID:0000000004537503

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 110 (APP sensor 1 signal), 103 (APP sensor 2 signal) and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
110 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.9V
	Fully depressed	3.9 - 4.7V
103 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.6V
	Fully depressed	1.95 - 2.4V

4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-572, "Accelerator Pedal Released Position Learning".
6. Perform EC-572, "Throttle Valve Closed Position Learning".
7. Perform EC-572, "Idle Air Volume Learning".

Removal and Installation

INFOID:0000000004537504

ACCELERATOR PEDAL

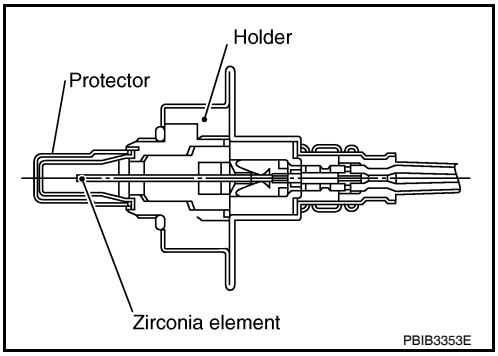
Refer to ACC-3.

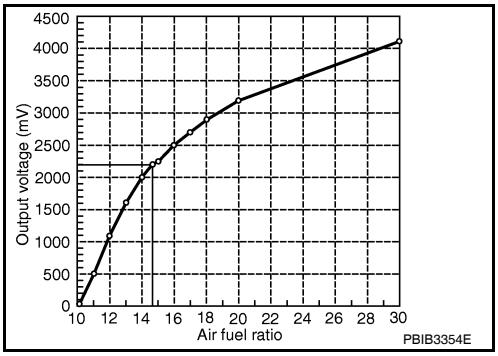
DTC P2A00 A/F SENSOR 1

Component Description

INFOID:0000000004537505

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 = 1, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide 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).





CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537506

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2V

On Board Diagnosis Logic

INFOID:0000000004537507

To judge the malfunction, the A/F signal computed by ECM from the A/F sensor 1 signal is monitored not to be shifted to LEAN side or RICH side.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P2A00 2A00	Air fuel ratio (A/F) sensor 1 circuit range/performance	• The output voltage computed by ECM from the A/F sensor 1 signal is shifted to the lean side for a specified period. • The A/F signal computed by ECM from the A/F sensor 1 signal is shifted to the rich side for a specified period.	• Air fuel ratio (A/F) sensor 1 • Air fuel ratio (A/F) sensor 1 heater • Fuel pressure • Fuel injector • Intake air leaks

DTC Confirmation Procedure

INFOID:0000000004537508

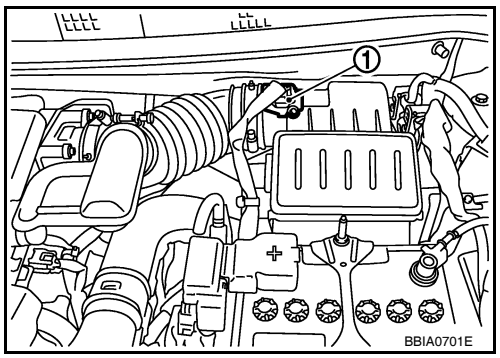
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.

3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
4. Clear the self-learning coefficient by touching “CLEAR”.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
7. Let engine idle for 1 minute.
8. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
9. Check 1st trip DTC.
10. If 1st trip DTC is detected, go to EC-969, "Diagnosis Procedure".

WITH GST

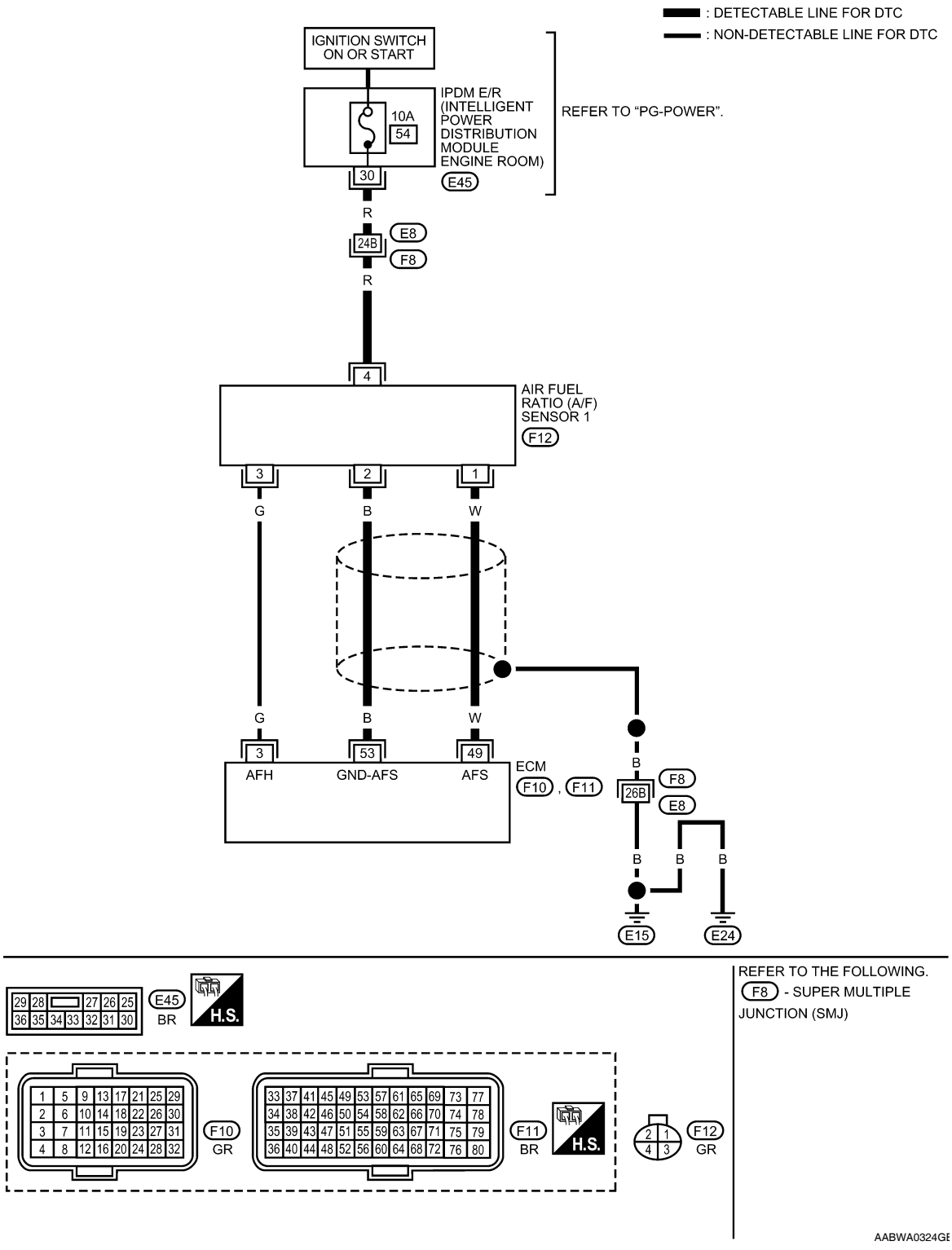
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector.
4. Start engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor (1) harness connector.
6. Select Service $03 with GST and make sure that DTC P0102 is detected.
7. Select Service $04 with GST and erase the DTC P0102.
8. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
9. Let engine idle for 1 minute.
10. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
11. Select Service $07 with GST.
    If 1st trip DTC is detected, go to EC-969, "Diagnosis Procedure".



Wiring Diagram

INFOID:0000000004560765

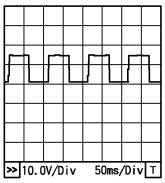
EC-A/F-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V  PBIA8148J
49	W	A/F sensor 1	**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	**[Ignition switch: ON]**	Approximately 2.2V

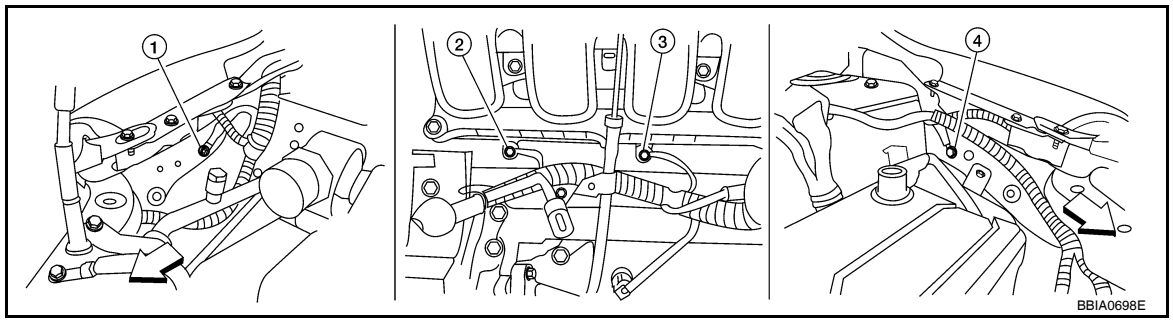
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004537510

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
Refer to EC-632, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1. Refer to EM-144, "Removal and Installation".

>> GO TO 3.

3.CHECK FOR INTAKE AIR LEAK

1. Start engine and run it at idle.
2. Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

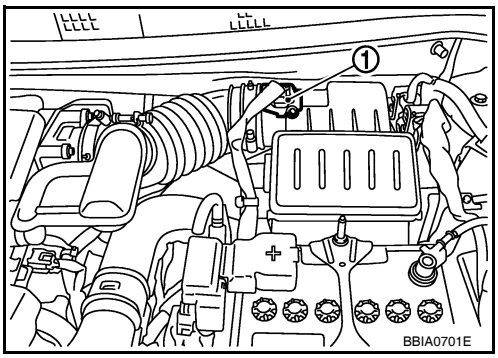
4. CLEAR THE SELF-LEARNING DATA

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 and P0172 detected?
   Is it difficult to start engine?

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor (1) 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. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to EC-542, "Emission-related Diagnostic Information".
8. Make sure DTC P0000 is displayed.
9. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 and P0172 detected?
   Is it difficult to start engine?



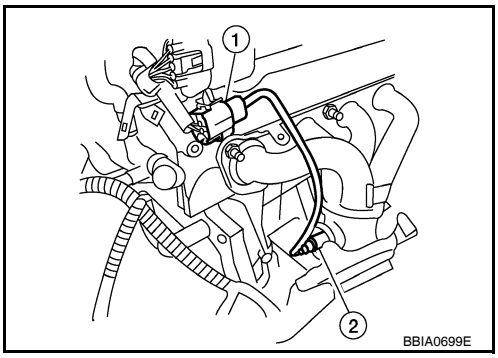
Yes or No

Yes >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-740 or EC-746.
No >> GO TO 5.

5. CHECK HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector (1).
- Air fuel ratio (A/F) sensor (2)
3. Check harness connector for water.

Water should no exist.



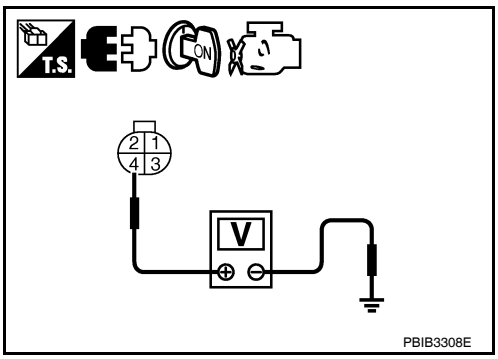
OK or NG

OK >> GO TO 6.
NG >> Repair or replace harness connector.

6. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8

• Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

4. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK A/F SENSOR 1 HEATER

Refer to EC-643, "Component Inspection".

OK or NG

OK >> GO TO 10.
NG >> GO TO 11.

10. CHECK INTERMITTENT INCIDENT

Perform EC-626.

OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

11. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (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 air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

>> GO TO 12.

12. CONFIRM A/F ADJUSTMENT DATA

1. Turn ignition switch ON.
2. Select “A/F ADJ-B1” in “DATA MONITOR” mode with CONSULT-III.
3. Make sure that “0.000” is displayed on CONSULT-III screen.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 13.

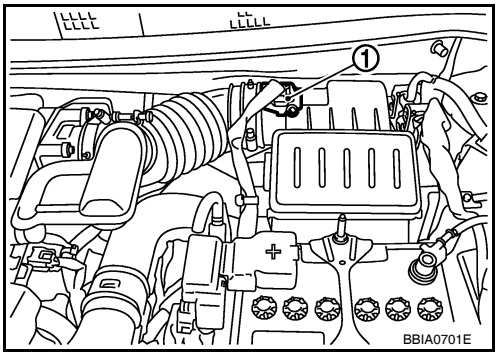
13. CLEAR THE SELF-LEARNGIN DATA

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching “CLEAR”.

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 (1) 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. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to EC-542, "Emission-related Diagnostic Information".
8. Make sure DTC P0000 is displayed.



>> GO TO 14.

14. CONFIRM A/F ADJUSTMENT DATA

1. Turn ignition switch OFF and then ON.
2. Select “A/F ADJ-B1” in “DATA MONITOR” mode with CONSULT-III.
3. Make sure that “0.000” is displayed on CONSULT-III screen.

>> **INSPECTION END**

Removal and Installation

INFOID:0000000004537511

AIR FUEL RATIO SENSOR

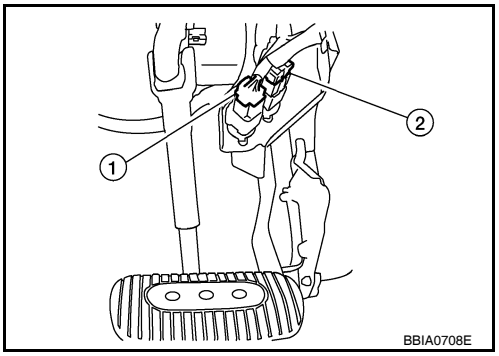
Refer to EM-144.

ASCD BRAKE SWITCH

Component Description

INFOID:0000000004537512

When depress on the brake pedal, ASCD brake switch (2) is turned OFF and stop lamp switch (1) is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal)
Refer to EC-524 for the ASCD function.



CONSULT-III Reference Value in Data Monitor Mode

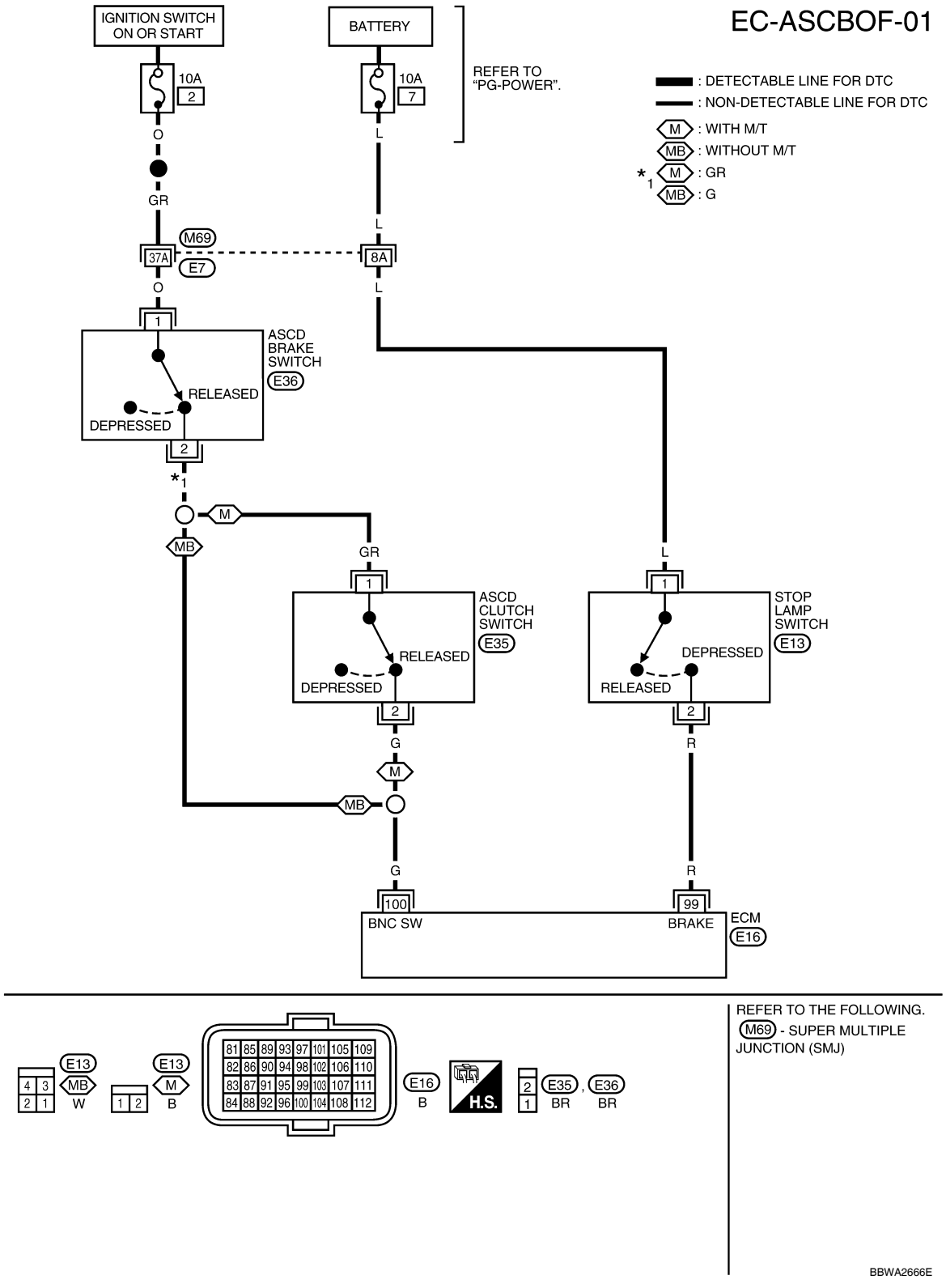
INFOID:0000000004537513

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1 (ASCD brake switch)	• Ignition switch: ON	• Brake pedal: Fully released (A/T, CVT) • Brake pedal and clutch pedal: Fully released (M/T)	ON
		• Brake pedal: Slightly depressed (A/T, CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	OFF
BRAKE SW2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

Wiring Diagram

INFOID:0000000004537514



Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
99	R	Stop lamp switch	**[Ignition switch: ON]** • Brake pedal: Fully released	Approximately 0V
			[Ignition switch: ON] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
100	G	ASCD brake switch	**[Ignition switch: ON]** • Brake pedal: Slightly depressed (A/T, CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	Approximately 0V
			[Ignition switch: ON] • Brake pedal: Fully released (A/T, CVT) • Brake pedal and clutch pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:0000000004537515

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.

M/T models

CONDITION	INDICATION
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON

A/T and CVT models

CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON

Without CONSULT-III

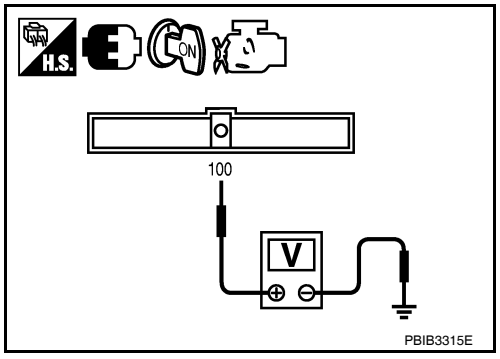
1. Turn ignition switch ON.
2. Check voltage between ECM terminal 100 and ground under the following conditions.

M/T models

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage

A/T and CVT models

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage



OK or NG

OK >> GO TO 2.
NG (M/T models) >>GO TO 3.
NG (A/T and CVT models) >>GO TO 4.

2.CHECK OVERALL FUNCTION-II

With CONSULT-III

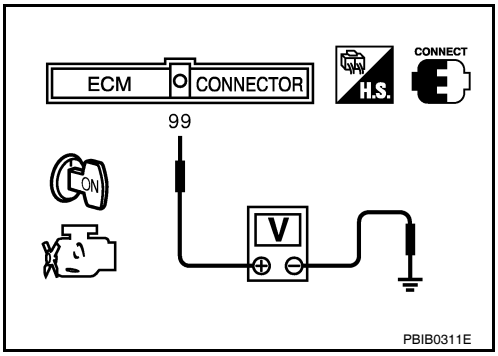
Check “BRAKE SW2” indication in “DATA MONITOR” mode.

CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON

Without CONSULT-III

Check voltage between ECM terminal 99 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

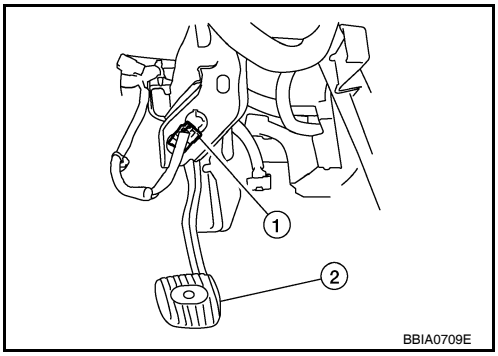


OK or NG

OK >> INSPECTION END.
NG >> GO TO 11.

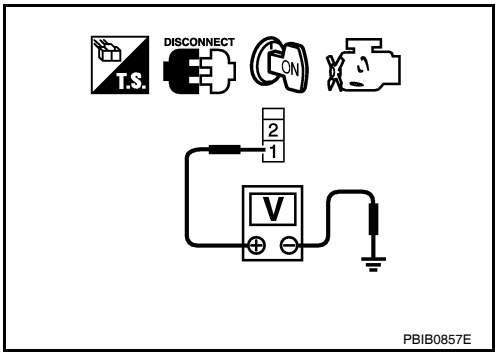
3. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch (1) harness connector.
- Clutch pedal (2)
3. Turn ignition switch ON.



4. Check voltage between ASCD clutch switch terminal 1 and ground under the following conditions with CONSULT-III or tester.

CONDITION	VOLTAGE
Brake pedal: Fully released	Battery voltage
Brake pedal: Slightly depressed	Approx. 0V



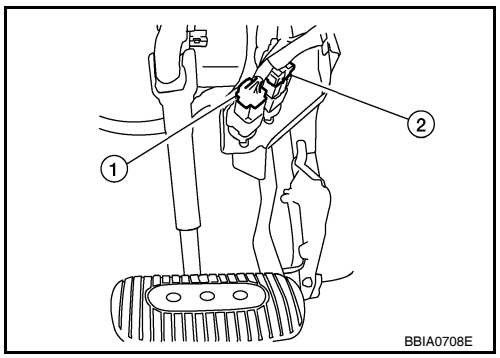
OK or NG

OK >> GO TO 9.
NG >> GO TO 4.

4. CHECK ASCD BRAKE SWITCH POWER SUPPLY

1. Turn ignition switch OFF.

2. Disconnect ASCD brake switch (2) harness connector.
- Stop lamp switch (1)
3. Turn ignition switch ON.

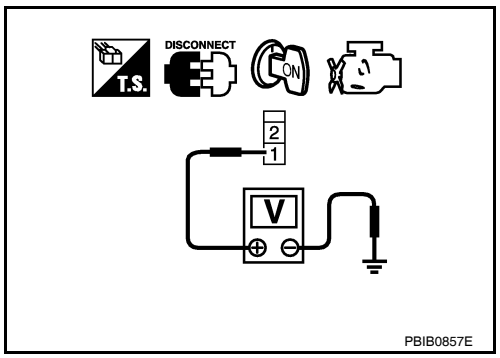


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK (M/T models) >>GO TO 6.
OK (A/T and CVT models) >>GO TO 7.
NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 100 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK ASCD BRAKE SWITCH

Refer to EC-914, "Component Inspection".

OK or NG

OK >> GO TO 15.
NG >> Replace ASCD brake switch.

9.CHECK ASCD CLUTCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 100 and ASCD clutch switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK ASCD CLUTCH SWITCH

Refer to EC-914, "Component Inspection"

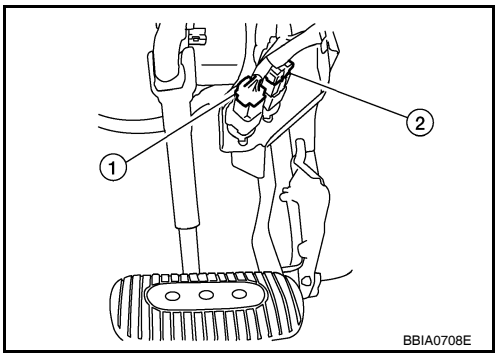
OK or NG

OK >> GO TO 15.
NG >> Replace ASCD clutch switch.

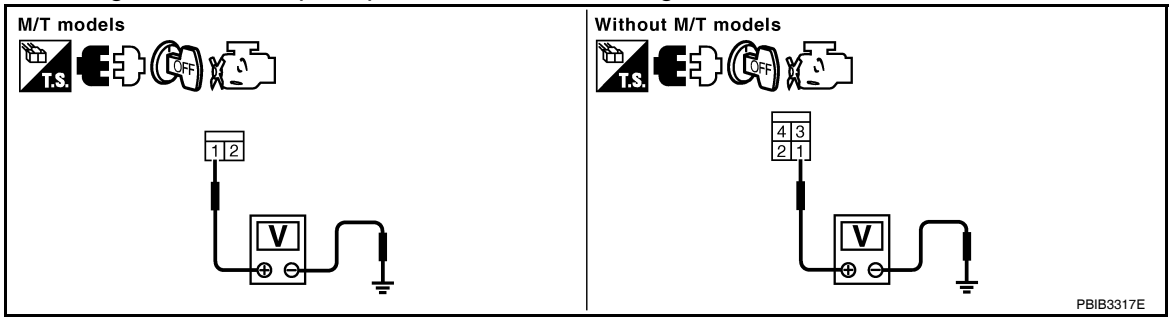
11.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch (1) harness connector.

- ASCD brake switch (2)



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- 10A fuse

- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 99 and stop lamp switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 14.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK STOP LAMP SWITCH

Refer to EC-914, "Component Inspection".

OK or NG

OK >> GO TO 15.
NG >> Replace stop lamp switch.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

Component Inspection

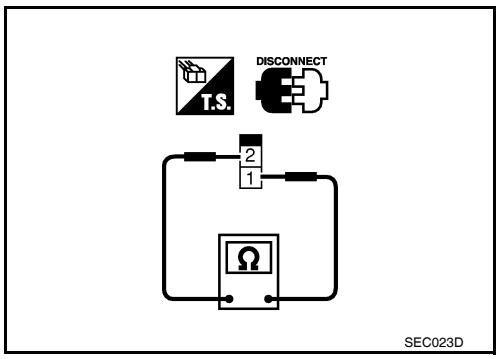
INFOID:0000000004537516

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released.	Should exist.
Brake pedal: Slightly depressed.	Should not exist.

If NG, adjust ASCD brake switch installation, refer to BR-6, and perform step 3 again.



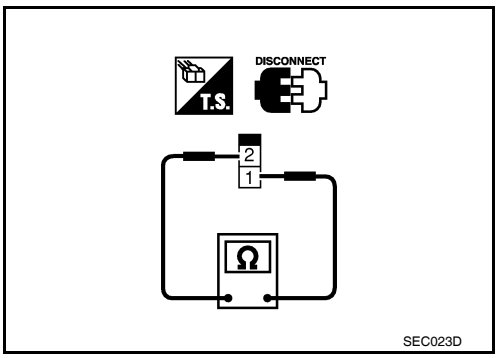
ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.

3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

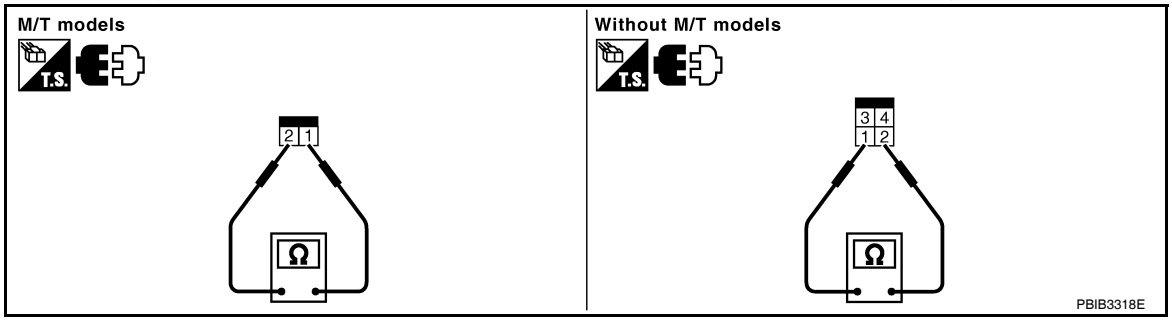
Condition	Continuity
Clutch pedal: Fully released.	Should exist.
Clutch pedal: Slightly depressed.	Should not exist.

If NG, adjust ASCD clutch switch installation, refer to CL-5, and perform step 3 again.



STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released.	Should not exist.
Brake pedal: Slightly depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to BR-6, and perform step 3 again.

ASCD INDICATOR

Component Description

INFOID:0000000004537517

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.
CRUISE indicator illuminates when MAIN switch on ASCD steering switch is turned ON to indicate that ASCD system is ready for operation.
SET indicator illuminates when following conditions are met.
- CRUISE indicator is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET indicator remains lit during ASCD control.
Refer to EC-524 for the ASCD function.

CONSULT-III Reference Value in Data Monitor Mode

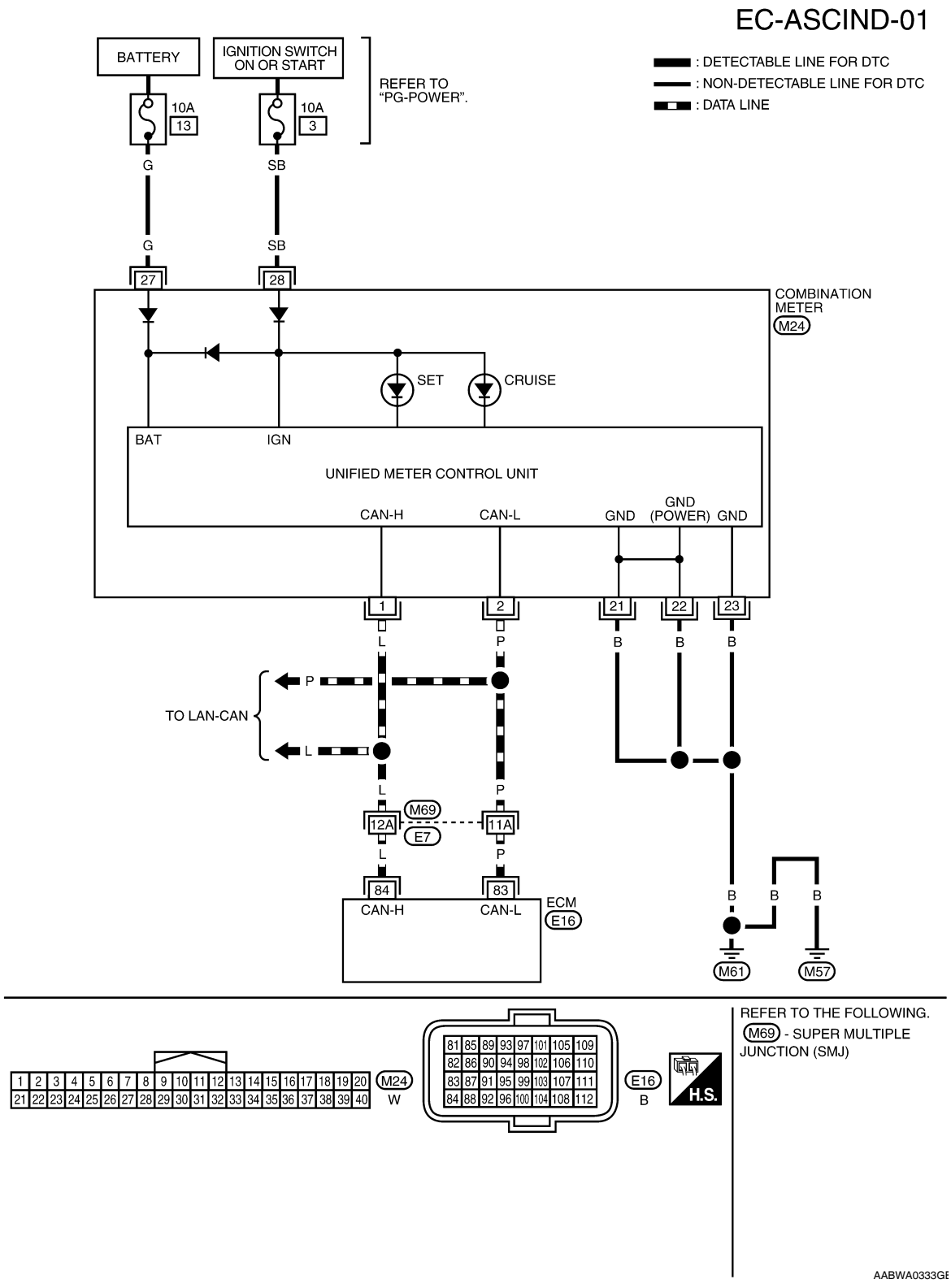
INFOID:0000000004537518

Specification data are reference value.

MONITOR ITEM	CONDITION		SPECIFICATION
CRUISE LAMP	• Ignition switch: ON	MAIN switch: Pressed at 1st time → 2nd	ON → OFF
SET LAMP	• MAIN switch: ON • Vehicle: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

Wiring Diagram

INFOID:0000000004537519



Diagnosis Procedure

INFOID:0000000004537520

1.CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	• Ignition switch: ON	MAIN switch: Pressed at 1st time → 2nd	ON → OFF
SET LAMP	• MAIN switch: ON • Vehicle: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2.CHECK DTC

Check that DTC U1000 or U1001 is not displayed.

Yes or No

Yes >> Perform trouble diagnoses for DTC U1000, U1001, refer to EC-633.
No >> GO TO 3.

3.CHECK COMBINATION METER OPERATION

Does combination meter operate normally?

Yes or No

Yes >> GO TO 4.
No >> Check combination meter circuit. Refer to DI-3.

4.CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

ELECTRICAL LOAD SIGNAL

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004537521

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd position.	ON
		Rear window defogger switch is OFF and lighting switch is OFF.	OFF
HEATER FAN SW	• Ignition switch: ON	Heater fan: Operating.	ON
		Heater fan: Not operating.	OFF

Diagnosis Procedure

INFOID:0000000004537522

1.CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCITION-I

1. Turn ignition switch ON.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-III under the following conditions.

Condition	LOAD SIGNAL
Lighting switch: ON at 2nd position	ON
Lighting switch: OFF	OFF

OK or NG

OK >> GO TO 2.
NG >> GO TO 4.

2.CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-III under the following conditions.

Condition	LOAD SIGNAL
Rear window defogger switch: ON	ON
Rear window defogger switch: OFF	OFF

OK or NG

OK >> GO TO 3.
NG >> GO TO 5.

3.CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

Check “HEATER FAN SW” in “DATA MONITOR” mode with CONSULT-III under the following conditions.

Condition	LOAD SIGNAL
Heater fan control switch: ON	ON
Heater fan control switch: OFF	OFF

OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 6.

4.CHECK HEADLAMP SYSTEM

Refer to LT-4 or LT-25.

>> **INSPECTION END**

5.CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to GW-51.

>> **INSPECTION END**

6. CHECK HEATER FAN CONTROL SYSTEM

Refer to MTC-22.

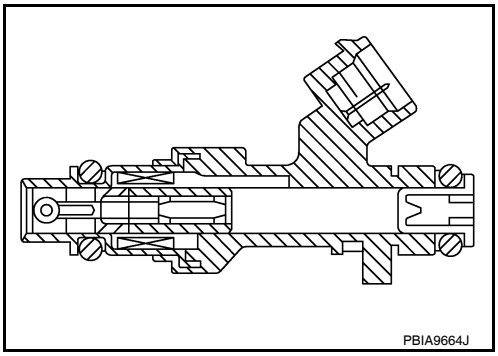
>> **INSPECTION END**

FUEL INJECTOR

Component Description

INFOID:0000000004537523

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.



CONSULT-III Reference Value in Data Monitor Mode

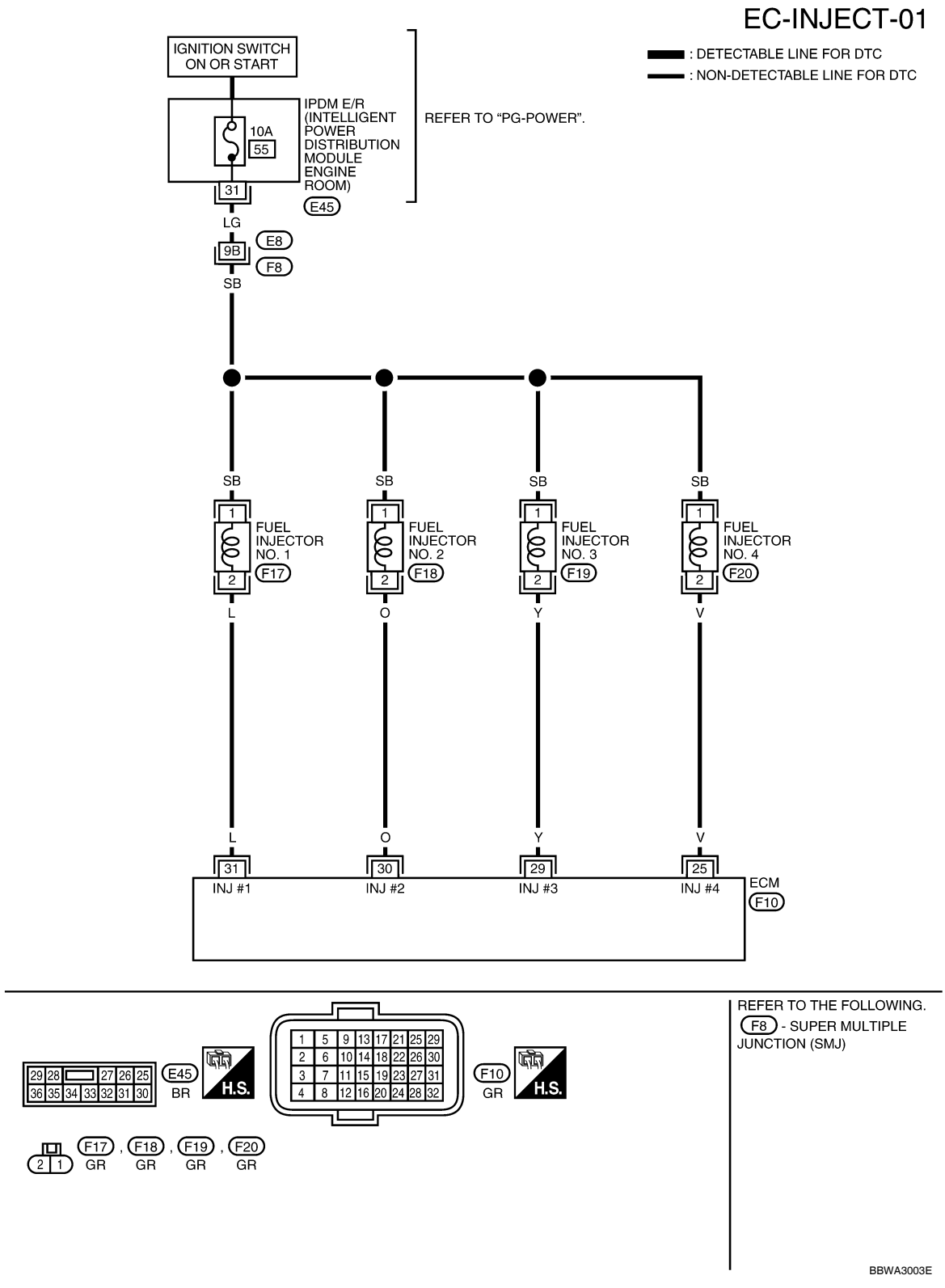
INFOID:0000000004537524

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
B/FUEL SCHDL	See EC-618.		
INJ PULSE-B1	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec

Wiring Diagram

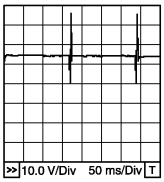
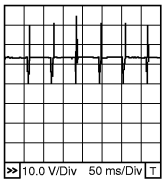
INFOID:0000000004537525



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25 29 30 31	V Y O L	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 2 Fuel injector No. 1	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)  PBIB0529E
			[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  PBIA4943J

: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004537526

1.INSPECTION START

Turn ignition switch to START.
Is any cylinder ignited?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2.CHECK OVERALL FUNCTION

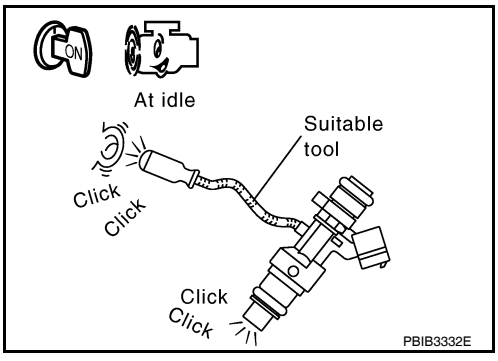
With CONSULT-III

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 noise should be heard.

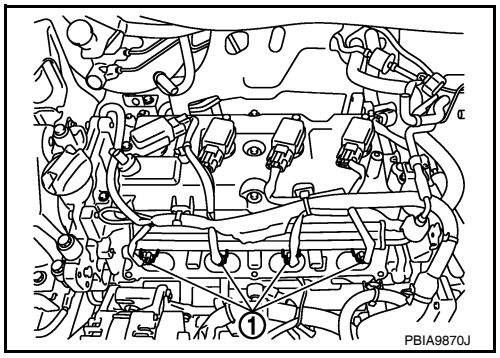


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 3.

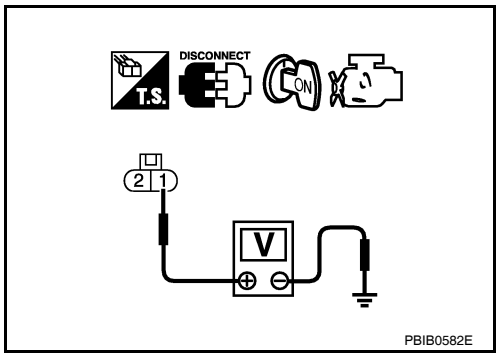
3. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector (1) harness connector.
3. Turn ignition switch ON.



4. Check voltage between fuel injector terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- IPDM E/R harness connector E45
- 10A fuse
- Harness for open or short between fuel injector and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between fuel injector terminal 2 and ECM terminals 25, 29, 30, 31. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK FUEL INJECTOR

Refer to EC-990, "Component Inspection".

OK or NG

OK >> GO TO 7.
NG >> Replace fuel injector.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> INSPECTION END

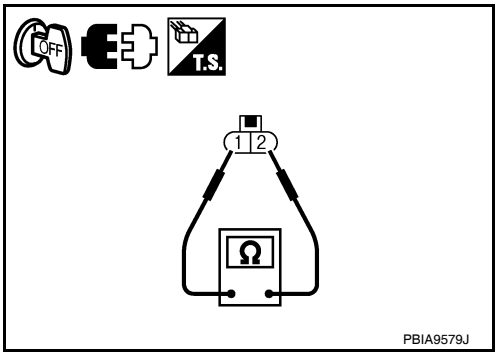
Component Inspection

INFOID:0000000004537527

FUEL INJECTOR

1. Disconnect fuel injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 11.1 - 14.5Ω [at 10 - 60°C (50 - 140°F)]



3. If NG, replace fuel injector.

Removal and Installation

INFOID:0000000004537528

FUEL INJECTOR

Refer to EM-156.

FUEL PUMP

Description

INFOID:0000000004537529

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay
Battery	Battery voltage*		

*: ECM determines the start signal status by the signals of engine speed and battery voltage.

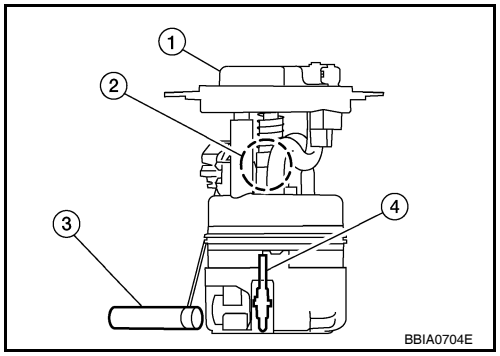
The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine startability. If the ECM receives a engine speed signal from the crankshaft position sensor (POS) and camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump 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
Engine: Stopped	Stops in 1.5 seconds
Except as shown above	Stops

COMPONENT DESCRIPTION

A turbine type design fuel pump is used in the fuel tank.

- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel level sensor (3)
- Fuel tank temperature sensor (4)



CONSULT-III Reference Value in Data Monitor Mode

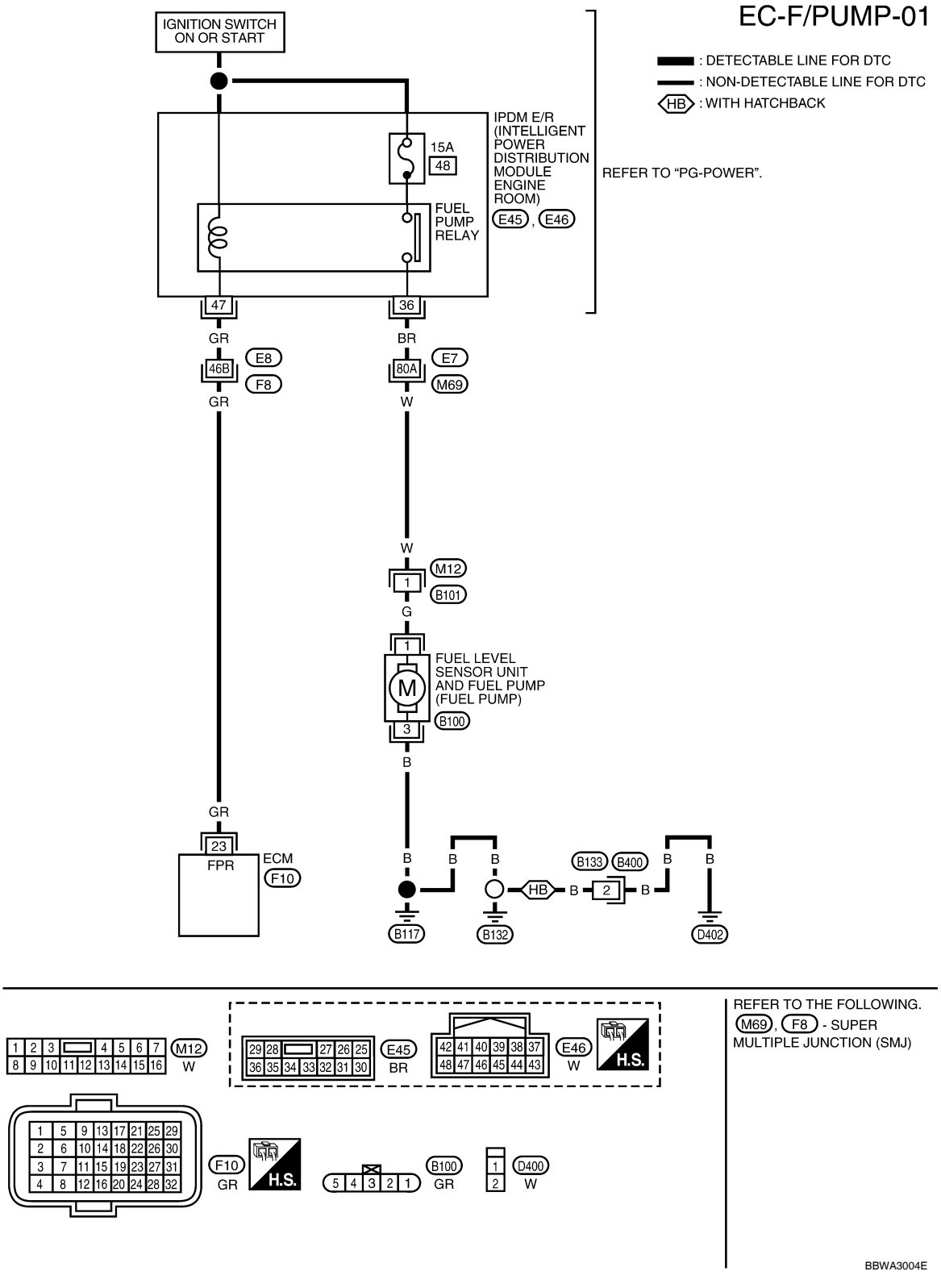
INFOID:0000000004537530

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	• For 1 second after turning ignition switch ON • Engine running or cranking	ON
	• Except above conditions	OFF

Wiring Diagram

INFOID:0000000004537531



Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	GR	Fuel pump relay	**[Ignition switch: ON]** • For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.0V
			[Ignition switch: ON] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)

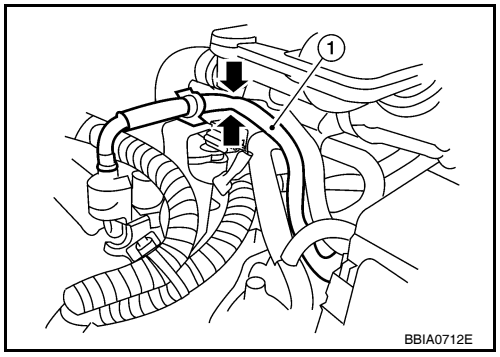
Diagnosis Procedure

INFOID:0000000004537532

1.CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose (1) with two fingers.

- Illustration shows the view with intake air duct removed.



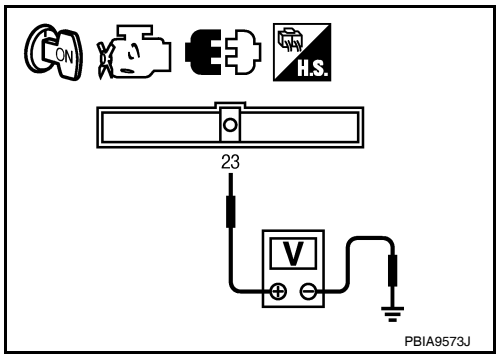
Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check voltage between ECM terminal 23 and ground with CONSULT-III or tester.



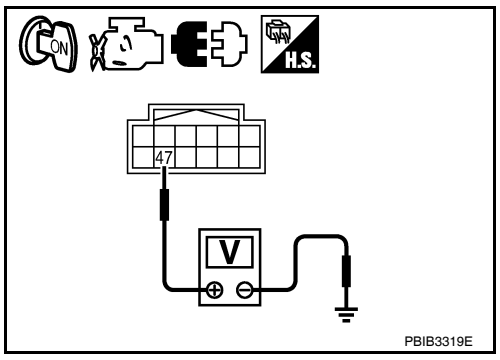
Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 3.

3.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E46.
3. Turn ignition switch ON.
4. Check voltage between IPDM E/R terminal 47 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 11.

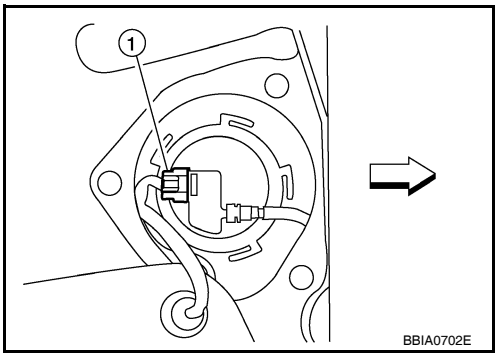
4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between IPDM E/R and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

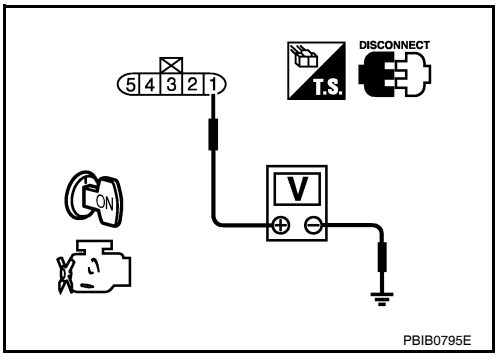
5.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect “fuel level sensor unit and fuel pump” harness connector (1).
- Illustration shows the view with inspection hole cover removed.
4. Turn ignition switch ON.



5. Check voltage between “fuel level sensor unit and fuel pump” terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage should exist for 1 second after ignition switch is turned ON.



OK or NG

OK >> GO TO 9.
NG >> GO TO 6.

6.CHECK 15A FUSE

1. Turn ignition switch OFF.
2. Disconnect 15A fuse.
3. Check 15A fuse.

OK or NG

OK >> GO TO 7.
NG >> Replace fuse.

7.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

1. Disconnect IPDM E/R harness connector E45.
2. Check harness continuity between IPDM E/R terminal 36 and “fuel level sensor unit and fuel pump” terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- Harness connectors M12, B101

• Harness for open or short between IPDM E/R and “fuel level sensor unit and fuel pump”

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK FUEL PUMP GROUND CIRCUIT

1. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 3 and ground. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair or replace harness or connectors.

10. CHECK FUEL PUMP

Refer to EC-995, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> Replace fuel pump.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

OK or NG

OK >> Replace IPDM E/R. Refer to PG-27, "Removal and Installation of IPDM E/R".
NG >> Repair or replace harness or connectors.

Component Inspection

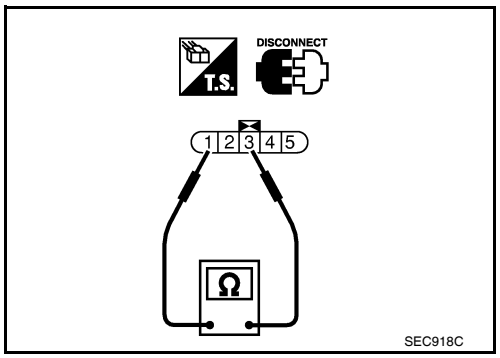
INFOID:0000000004537533

FUEL PUMP

1. Disconnect “fuel level sensor unit and fuel pump” harness connector.
2. Check resistance between “fuel level sensor unit and fuel pump” terminals 1 and 3.

Resistance: Approximately 0.2 - 5.0Ω [at 25°C (77°F)]

3. If NG, replace “fuel level sensor unit and fuel pump”.



Removal and Installation

INFOID:0000000004537534

FUEL PUMP

Refer to FL-5.

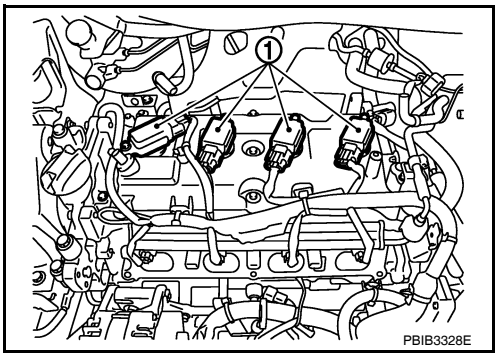
IGNITION SIGNAL

Component Description

INFOID:0000000004537535

IGNITION COIL & POWER TRANSISTOR

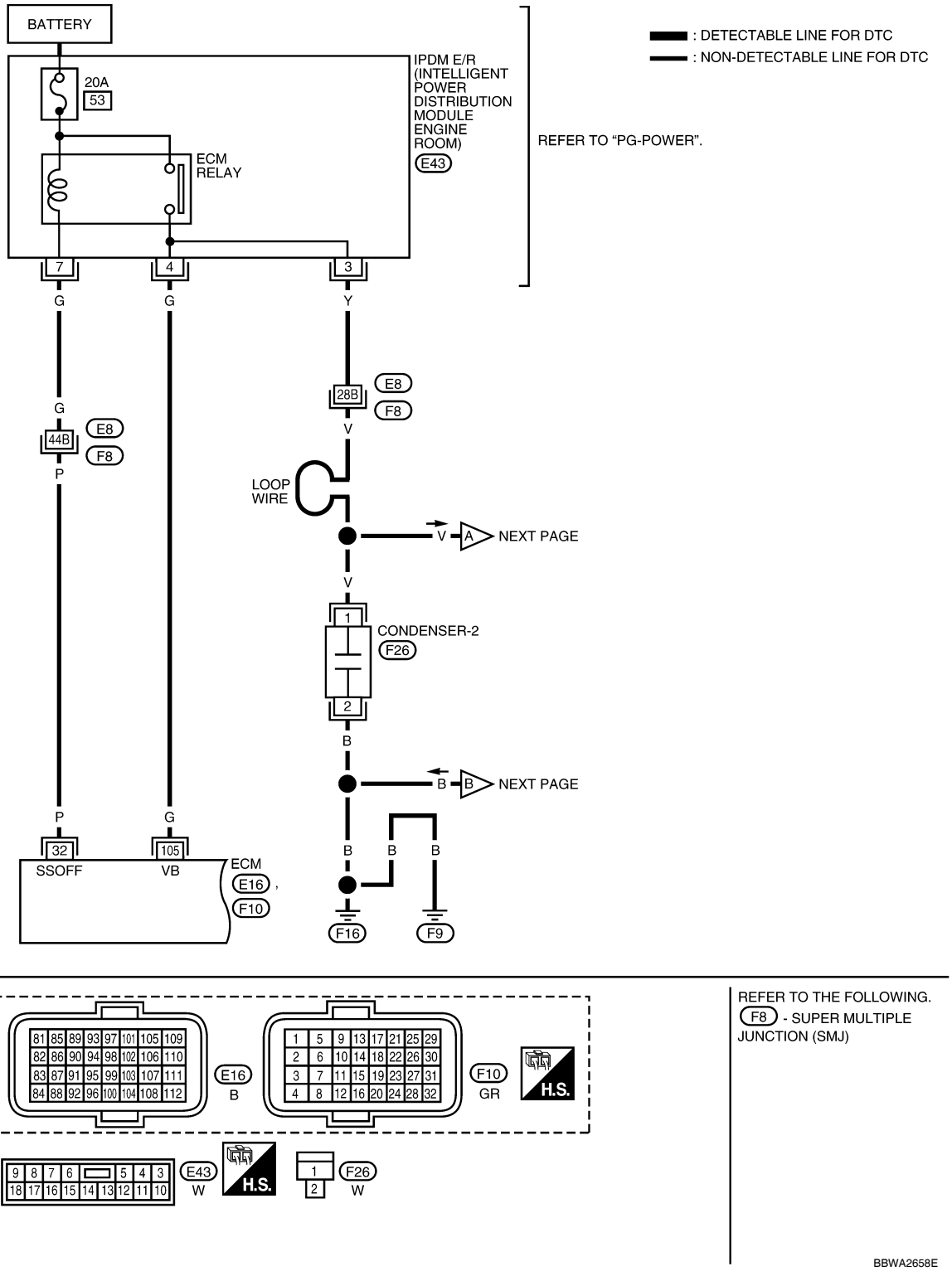
The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil (1) primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.



Wiring Diagram

INFOID:0000000004537536

EC-IGNSYS-01



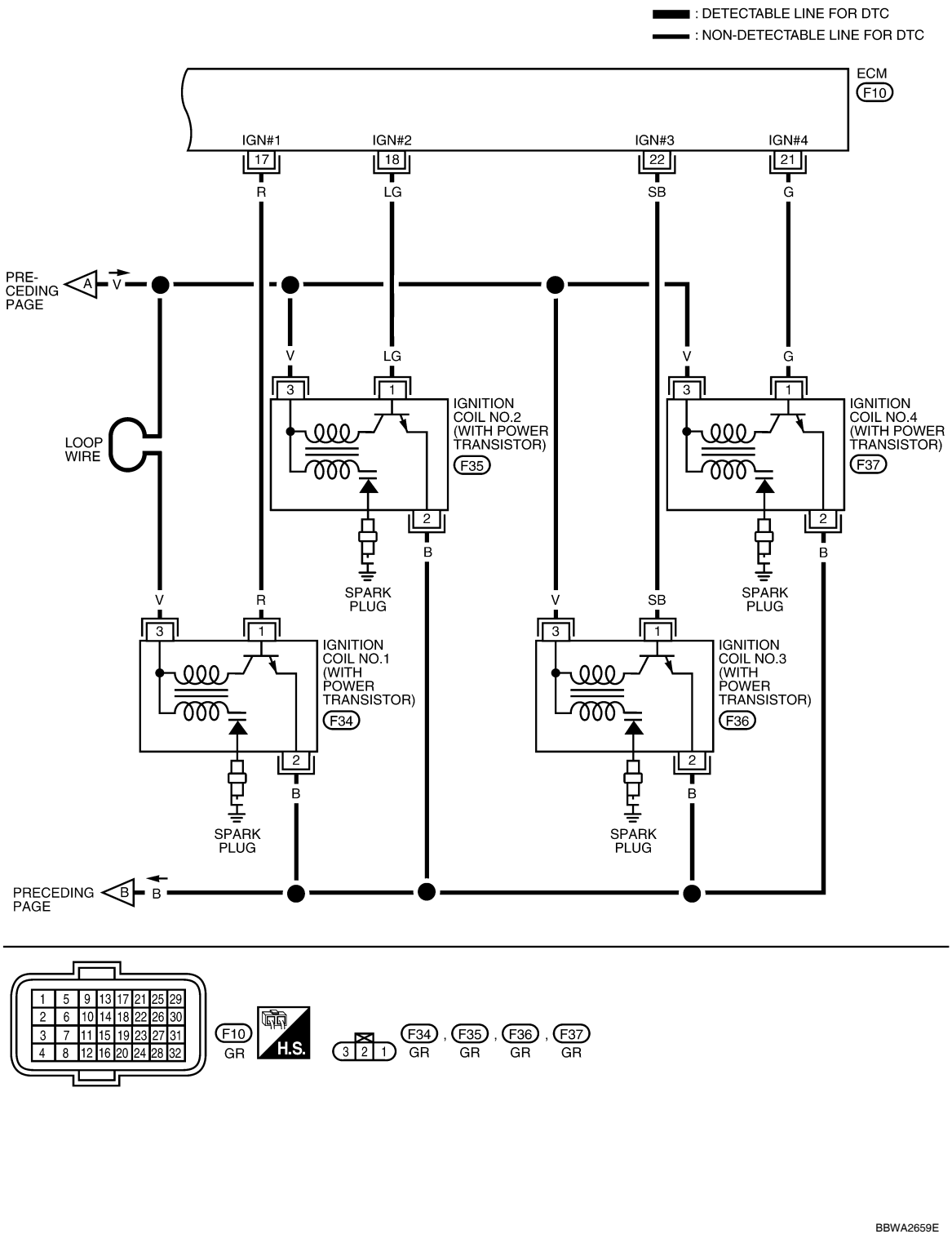
Specification data are reference values and are measured between each terminal and ground.

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For 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)
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

EC-IGNSYS-02

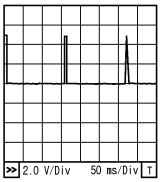
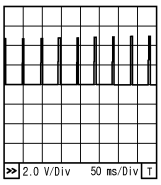


BBWA2659E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
17 18 21 22	R LG G SB	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 4 Ignition signal No. 3	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.3V  PBIA9265J
			[Engine is running] • **Warm-up condition** • Engine speed: 2,500 rpm	0.2 - 0.5V  PBIA9266J

: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004537537

1.CHECK ENGINE START

Turn ignition switch OFF, and restart engine.
Is engine running?

Yes or No

Yes (With CONSULT-III)>>GO TO 2.
Yes (Without CONSULT-III)>>GO TO 3.
No >> GO TO 4.

2.CHECK OVERALL FUNCTION

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.

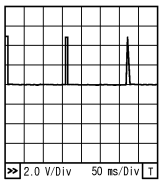
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 10.

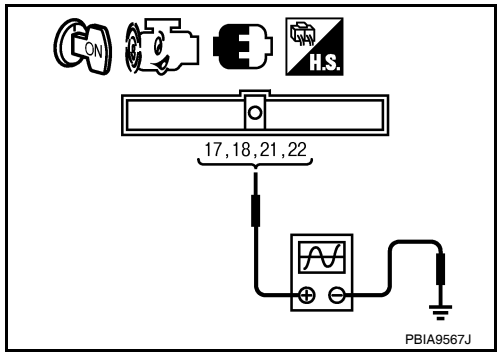
3.CHECK OVERALL FUNCTION

Without CONSULT-III

1. Let engine idle.
2. Read the voltage signal between ECM terminals 17, 18, 21, 22 and ground with an oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown below.
   NOTE:
   The pulse cycle changes depending on rpm at idle.



PBIA9265J



PBIA9567J

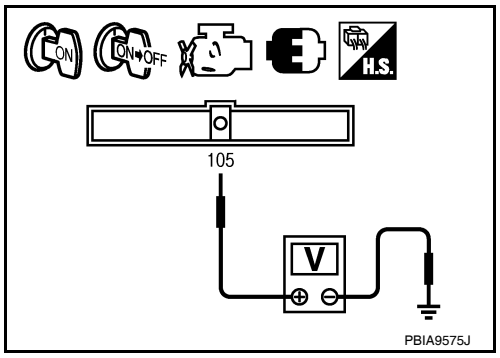
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 10.

4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
2. Check voltage between ECM terminal 105 and ground with CONSULT-III or tester.

Voltage: Battery voltage

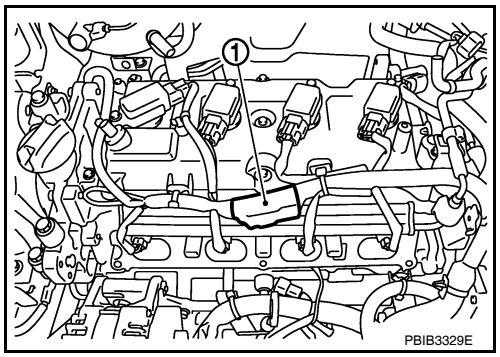


OK or NG

OK >> GO TO 5.
NG >> Go to EC-627.

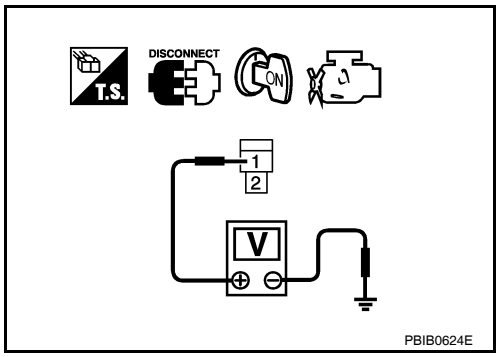
5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser-2 (1) harness connector.
3. Turn ignition switch ON.



4. Check voltage between condenser-2 terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 8.
NG >> GO TO 6.

6. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E43.
3. Check harness continuity between IPDM E/R terminal 3 and condenser-2 terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> Go to EC-627.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8

• Harness for open or short between IPDM E/R and condenser-2

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK CONDENSER-2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between condenser-2 terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK CONDENSER-2

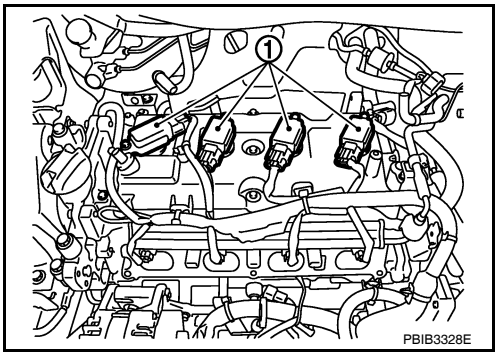
Refer to EC-1003, "Component Inspection"

OK or NG

OK >> GO TO 10.
NG >> Replace condenser-2.

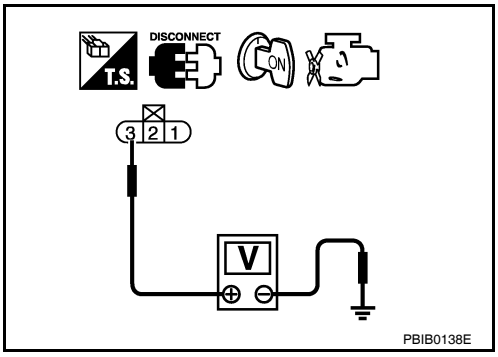
10. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect ignition coil (1) harness connector.
4. Turn ignition switch ON.



5. Check voltage between ignition coil terminal 3 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.
• Harness connector F8
• Harness for open or short between ignition coil and harness connector F8

>> Repair or replace harness or connectors.

12. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Check harness continuity between ignition coil terminal 2 and ground.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 13.
NG >> Repair open circuit or short to power in harness or connectors.

13. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 17, 18, 21, 22 and ignition coil terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 14.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-1003, "Component Inspection".

OK or NG

OK >> GO TO 15.
NG >> Replace ignition coil with power transistor.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

>> **INSPECTION END**

Component Inspection

INFOID:0000000004537538

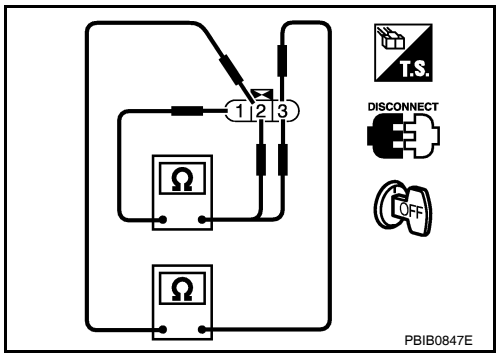
IGNITION COIL WITH POWER TRANSISTOR

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

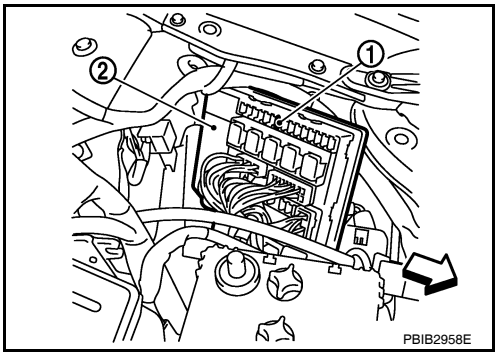
1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 and 2	Except 0 or ∞
1 and 3	Except 0
2 and 3	

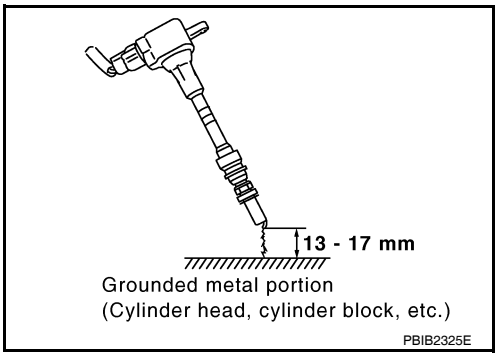


4. If NG, replace ignition coil with power transistor.
If OK, go to next step.
5. Turn ignition switch OFF.
6. Reconnect all harness connectors disconnected.

7. Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.



- : Vehicle front
8. Start engine.
9. After engine stalls, crank it two or three times to release all fuel pressure.
10. Turn ignition switch OFF.
11. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
12. Remove ignition coil and spark plug of the cylinder to be checked.
13. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
14. Connect spark plug and harness connector to ignition coil.
15. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
16. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

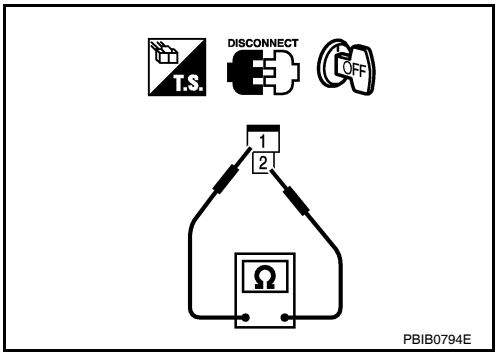
CAUTION:
- **Do not approach to the spark plug and the ignition coil within 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm is taken.**

NOTE:
When the gap is less than 13 mm, the spark might be generated even if the coil is malfunctioning.

17. If NG, replace ignition coil with power transistor.

CONDENSER-2

1. Turn ignition switch OFF.
2. Disconnect condenser-2 harness connector.
3. Check resistance between condenser-2 terminals 1 and 2.



Resistance: Above 1 MΩ [at 25°C (77°F)]

4. If NG, replace condenser-2.

Removal and Installation

INFOID:0000000004537539

IGNITION COIL WITH POWER TRANSISTOR

Refer to EM-153.

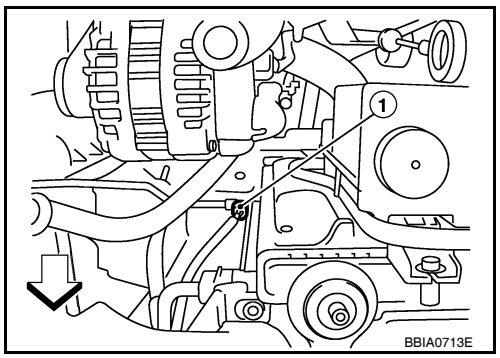
REFRIGERANT PRESSURE SENSOR

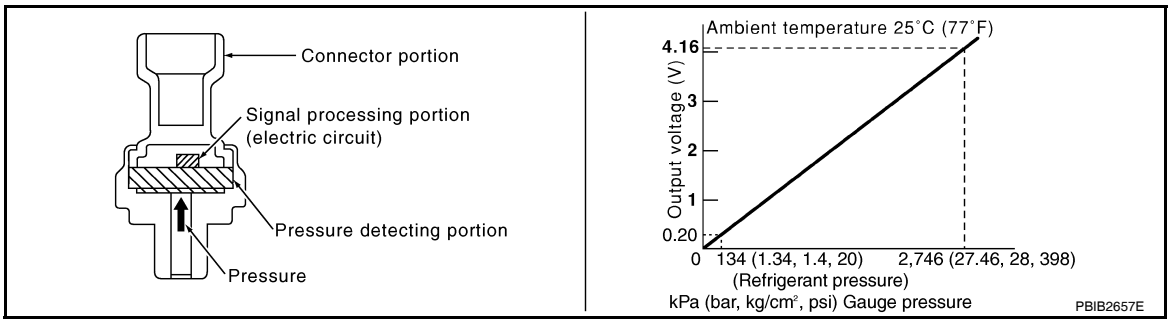
Component Description

INFOID:0000000004537540

The refrigerant pressure sensor (1) is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.

• : Vehicle front

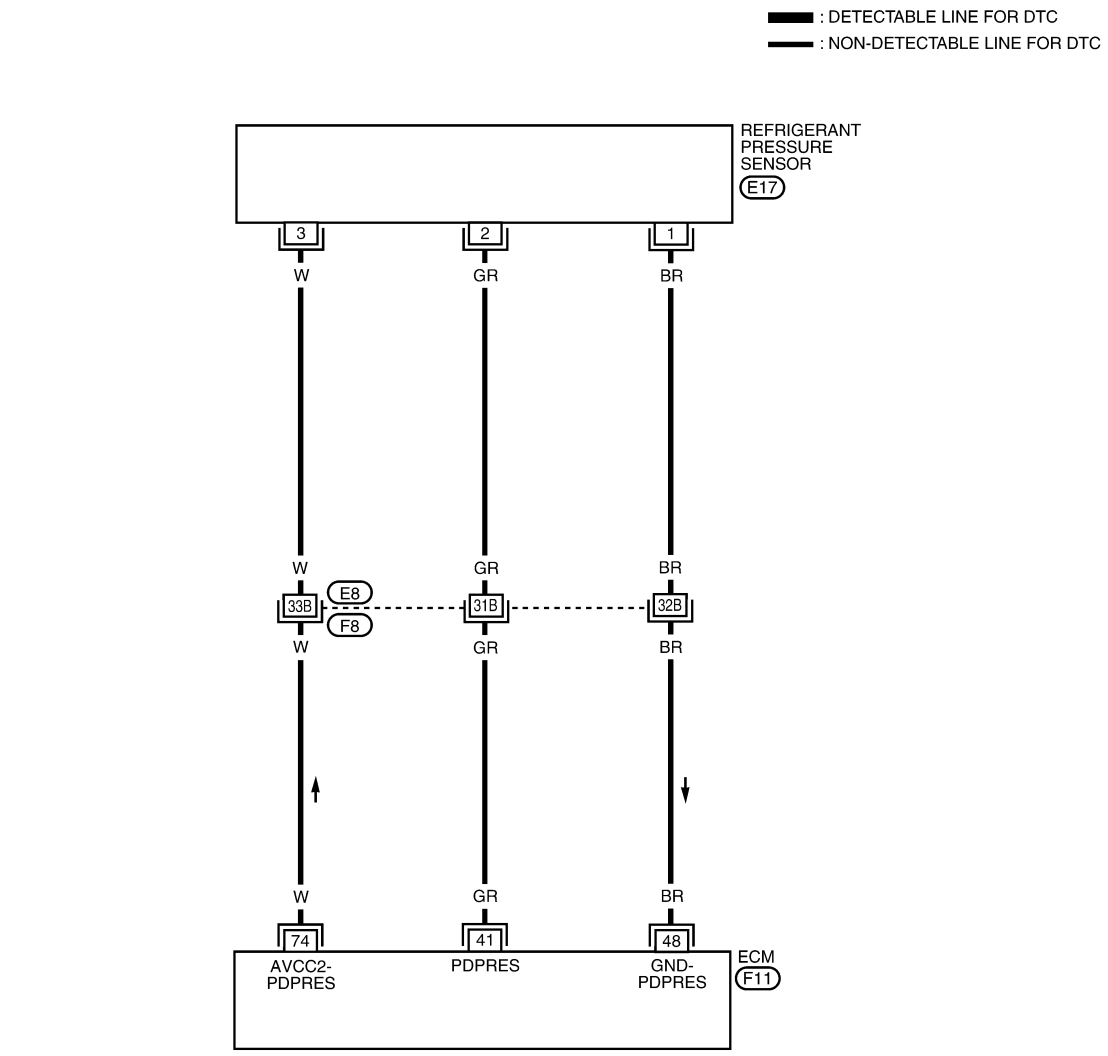


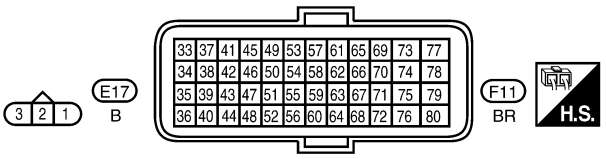


Wiring Diagram

INFOID:0000000004537541

EC-RP/SEN-01





REFER TO THE FOLLOWING.
F8 - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2662E

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
41	GR	Refrigerant pressure sensor	**[Engine is running]** • **Warm-up condition** • Both A/C switch and blower fan switch: ON (Compressor operates)	1.0 - 4.0V
48	BR	Sensor ground (Refrigerant pressure sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
74	W	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V

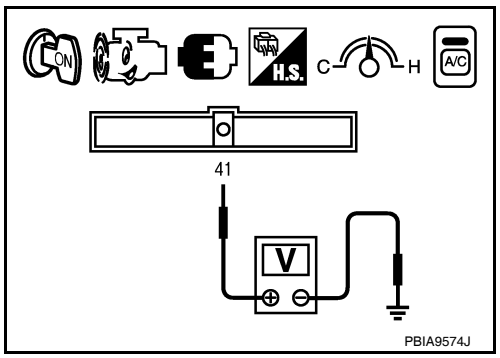
Diagnosis Procedure

INFOID:0000000004537542

1.CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower fan switch ON.
3. Check voltage between ECM terminal 41 and ground with CONSULT-III or tester.

Voltage: 1.0 - 4.0V

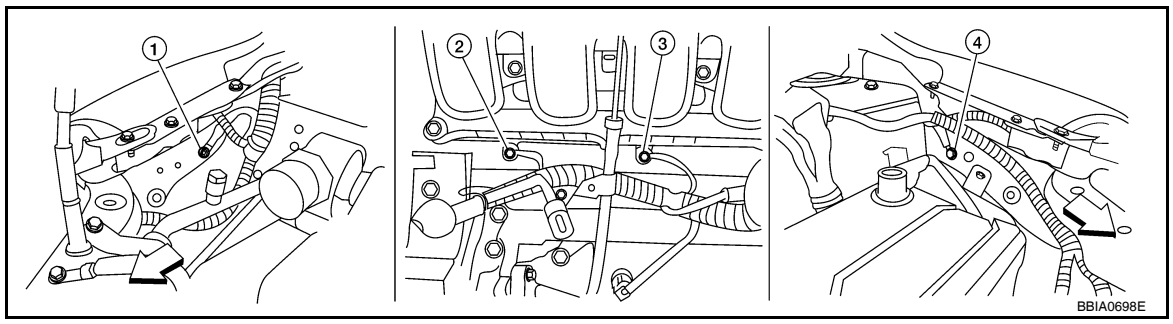


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2.CHECK GROUND CONNECTIONS

1. Turn A/C switch and blower fan switch OFF.
2. Stop engine and turn ignition switch OFF.
3. Loosen and retighten ground screw on the body.
Refer to EC-632, "Ground Inspection".



: Vehicle front

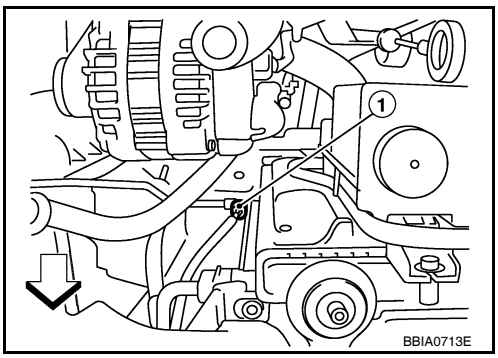
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

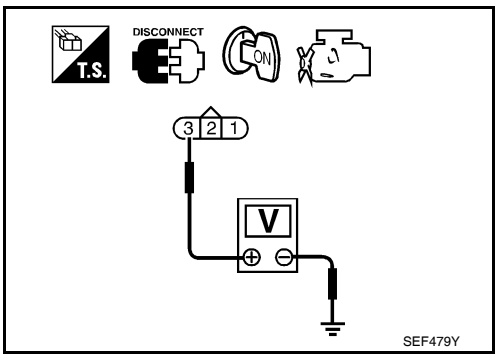
3.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor (1) harness connector.
- : Vehicle front
2. Turn ignition switch ON.



3. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between refrigerant pressure sensor terminal 1 and ECM terminal 48. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between refrigerant pressure sensor terminal 2 and ECM terminal 41. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-626.

OK or NG

OK >> Replace refrigerant pressure sensor.
NG >> Repair or replace.

Removal and Installation

INFOID:0000000004537543

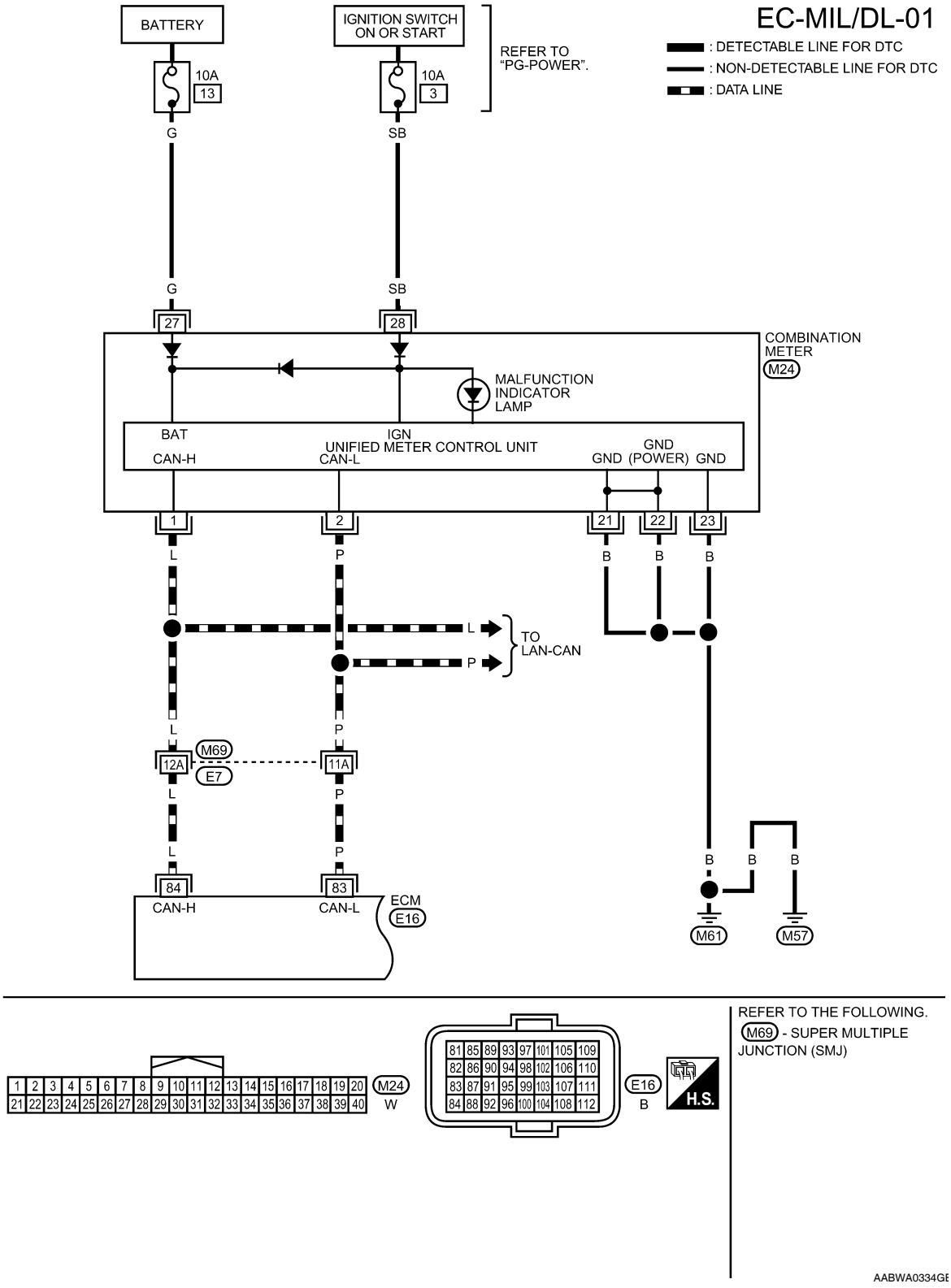
REFRIGERANT PRESSURE SENSOR

Refer to MTC-83, "Removal and Installation of Refrigerant Pressure Sensor".

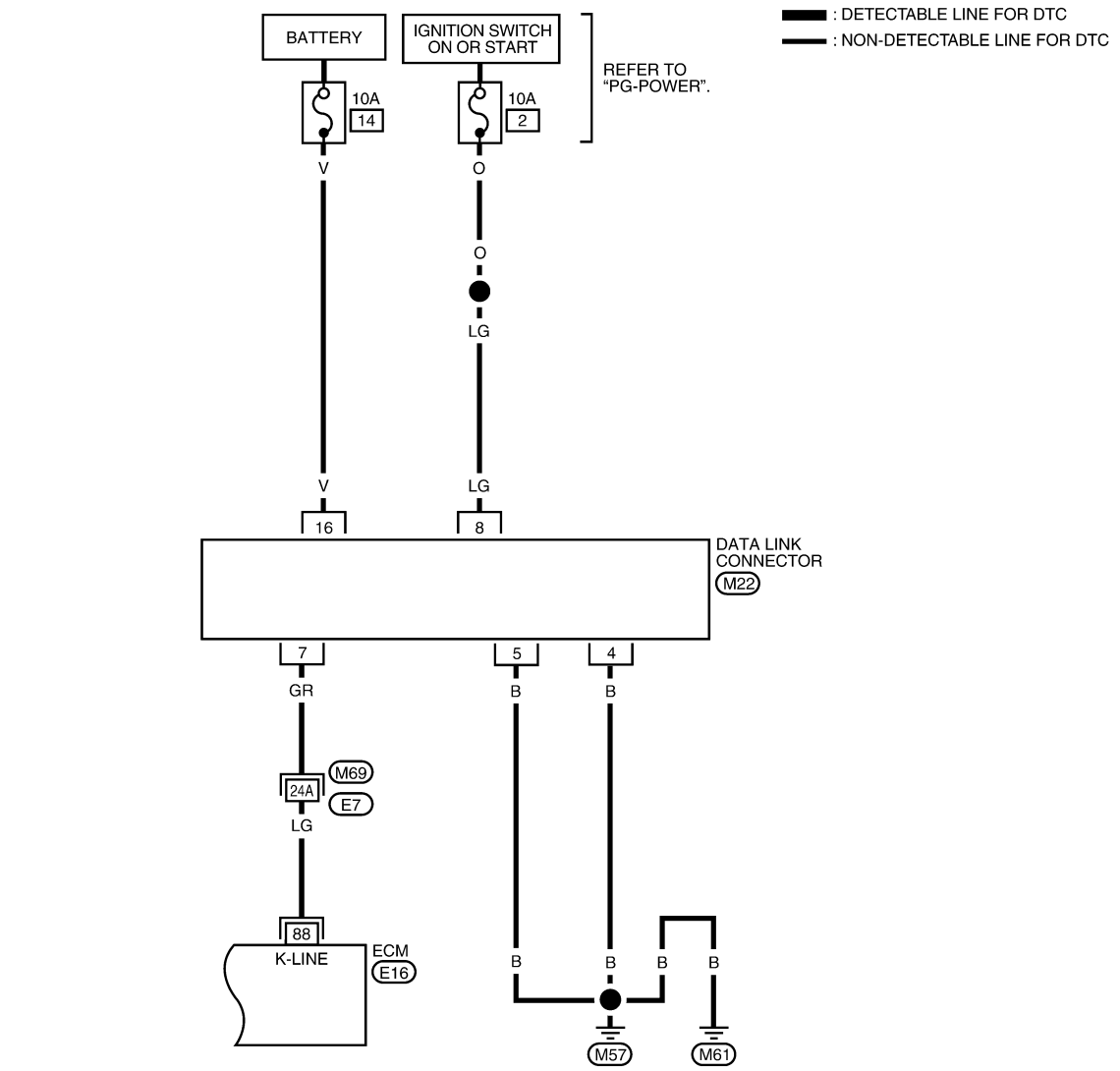
MIL AND DATA LINK CONNECTOR

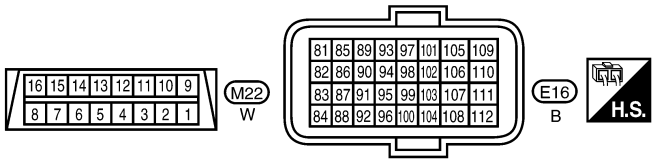
Wiring Diagram

INFOID:0000000004537544



EC-MIL/DL-02





REFER TO THE FOLLOWING.
M69 - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2998E

SERVICE DATA AND SPECIFICATIONS (SDS)

Fuel Pressure

INFOID:0000000004537545

Fuel pressure at idle	Approximately 350 kPa (3.57 kg/cm^2, 51 psi)

Idle Speed and Ignition Timing

INFOID:0000000004537546

Target idle speed	A/T	No load* (in P or N position)	700 ± 50 rpm
	CVT	No load* (In P or N position)	
	M/T	No load* (in Neutral position)	
Air conditioner: ON	A/T	In P or N position	850 rpm or more
	CVT	In P or N position	
	M/T	In Neutral position	
Ignition timing	A/T	In P or N position	13 ± 5° BTDC
	CVT	In P or N position	
	M/T	In Neutral position	

*: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

INFOID:0000000004537547

	Calculated load value% (Using CONSULT-III or GST)
At idle	10 - 35
At 2,500 rpm	10 - 35

Mass Air Flow Sensor

INFOID:0000000004537548

Supply voltage	Battery voltage (11 - 14V)
Output voltage at idle	1.0 - 1.3*V
Mass air flow (Using CONSULT-III or GST)	1.0 - 4.0 g·m/sec at idle* 2.0 - 10.0 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.

Intake Air Temperature Sensor

INFOID:0000000004537549

Temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

Engine Coolant Temperature Sensor

INFOID:0000000004537550

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Air Fuel Ratio (A/F) Sensor 1 Heater

INFOID:0000000004537551

Resistance [at 25°C (77°F)]	1.8 - 2.44Ω

Heated Oxygen sensor 2 Heater

INFOID:0000000004537552

Resistance [at 25°C (77°F)]	3.4 - 4.4Ω

Crankshaft Position Sensor (POS)

INFOID:0000000004537553

Refer to EC-780, "Component Inspection".

Camshaft Position Sensor (PHASE)

INFOID:0000000004537554

Refer to EC-785, "Component Inspection".

Throttle Control Motor

INFOID:0000000004537555

Resistance [at 25°C (77°F)]	Approximately 1 - 15Ω

Fuel Injector

INFOID:0000000004537556

Resistance [at 10 - 60°C (50 - 140°F)]	11.4 - 14.5Ω

Fuel Pump

INFOID:0000000004537557

Resistance [at 25°C (77°F)]	Approximately 0.2 - 5.0Ω

SERVICE INFOMATION

APPLICATION NOTICE

How to Check Vehicle Type

INFOID:0000000004538071

Check the vehicle serial number to confirm the service information in EC section.

Vehicle serial number	Service information
Up to serial 386333	MR TYPE 1
From serial 386334	MR TYPE 2

INDEX FOR DTC

U0101-U1001

INFOID:0000000004499897

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
U0101	0101*4	LOST COMM (TCM)	EC-1145
U0140	0140*4	LOST COMM (BCM)	EC-1147
U1001	1001*4	CAN COMM CIRCUIT	EC-1149

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*4: The troubleshooting for this DTC needs CONSULT-III.

P0011-P0075

INFOID:0000000004806544

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0011	0011	INT/V TIM CONT-B1	EC-1151
P0031	0031	A/F SEN1 HTR (B1)	EC-1155
P0032	0032	A/F SEN1 HTR (B1)	EC-1155
P0037	0037	HO2S2 HTR (B1)	EC-1160
P0038	0038	HO2S2 HTR (B1)	EC-1160
P0075	0075	INT/V TIM V/CIR-B1	EC-1165

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0101-P0128

INFOID:0000000004806556

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0101	0101	MAF SEN/CIRCUIT-B1	EC-1170
P0102	0102	MAF SEN/CIRCUIT-B1	EC-1178
P0103	0103	MAF SEN/CIRCUIT-B1	EC-1178
P0112	0112	IAT SEN/CIRCUIT-B1	EC-1185
P0113	0113	IAT SEN/CIRCUIT-B1	EC-1185
P0116	0116	ECT SEN/CIRC	EC-1189
P0117	0117	ECT SEN/CIRC	EC-1189
P0118	0118	ECT SEN/CIRC	EC-1189
P0122	0122	TP SEN 2/CIRC-B1	EC-1197
P0123	0123	TP SEN 2/CIRC-B1	EC-1197
P0125	0125	ECT SENSOR	EC-1202

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0127	0127	IAT SENSOR-B1	EC-1205
P0128	0128	THERMSTAT FNCTN	EC-1208

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0130-P0183

INFOID:0000000004806554

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0130	0130	A/F SENSOR1 (B1)	EC-1210
P0131	0131	A/F SENSOR1 (B1)	EC-1216
P0132	0132	A/F SENSOR1 (B1)	EC-1222
P0133	0133	A/F SENSOR1 (B1)	EC-1228
P0137	0137	HO2S2 (B1)	EC-1235
P0138	0138	HO2S2 (B1)	EC-1242
P0139	0139	HO2S2 (B1)	EC-1251
P0171	0171	FUEL SYS-LEAN-B1	EC-1258
P0172	0172	FUEL SYS-RICH-B1	EC-1264
P0181	0181	FTT SENSOR	EC-1270
P0182	0182	FTT SEN/CIRCUIT	EC-1274
P0183	0183	FTT SEN/CIRCUIT	EC-1274

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0222-P0420

INFOID:0000000004806555

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0222	0222	TP SEN 1/CIRC-B1	EC-1278
P0223	0223	TP SEN 1/CIRC-B1	EC-1278
P0300	0300	MULTI CYL MISFIRE	EC-1283
P0301	0301	CYL 1 MISFIRE	EC-1283
P0302	0302	CYL 2 MISFIRE	EC-1283
P0303	0303	CYL 3 MISFIRE	EC-1283
P0304	0304	CYL 4 MISFIRE	EC-1283
P0327	0327	KNOCK SEN/CIRC-B1	EC-1289
P0328	0328	KNOCK SEN/CIRC-B1	EC-1289
P0335	0335	CKP SEN/CIRCUIT	EC-1293
P0340	0340	CMP SEN/CIRC-B1	EC-1299
P0420	0420	TW CATALYST SYS-B1	EC-1305

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0441-P0463

INFOID:0000000004806553

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0441	0441	EVAP PURG FLOW/MON	EC-1310
P0442	0442	EVAP SMALL LEAK	EC-1315
P0443	0443	PURG VOLUME CONT/V	EC-1322
P0444	0444	PURG VOLUME CONT/V	EC-1330
P0445	0445	PURG VOLUME CONT/V	EC-1330
P0447	0447	VENT CONTROL VALVE	EC-1336
P0448	0448	VENT CONTROL VALVE	EC-1342
P0451	0451	EVAP SYS PRES SEN	EC-1348
P0452	0452	EVAP SYS PRES SEN	EC-1351
P0453	0453	EVAP SYS PRES SEN	EC-1358
P0455	0455	EVAP GROSS LEAK	EC-1366
P0456	0456	EVAP VERY SML LEAK	EC-1373
P0460	0460	FUEL LEV SEN SLOSH	EC-1381
P0461	0461	FUEL LEVEL SENSOR	EC-1383
P0462	0462	FUEL LEVL SEN/CIRC	EC-1385
P0463	0463	FUEL LEVL SEN/CIRC	EC-1385

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0500-P0643

INFOID:0000000004806552

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0500	0500	VEH SPEED SEN/CIRC	EC-1387
P0506	0506	ISC SYSTEM	EC-1389
P0507	0507	ISC SYSTEM	EC-1391
P0605	0605	ECM	EC-1393
P0607	0607	ECM	EC-1395
P0643	0643	SENSOR POWER/CIRC	EC-1396

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0705-P0734

INFOID:0000000004806551

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0705	0705	PNP SW/CIRC	AT-91 (A/T) CVT-244 (CVT)
P0710	0710	ATF TEMP SEN/CIRC*4	AT-96 (A/T) CVT-249 (CVT)
P0715	0715	INPUT SPD SEN/CIRC	CVT-254
P0720	0720	VEH SPD SEN/CIR AT	AT-101 (A/T) CVT-258 (CVT)
P0725	0725	ENGINE SPEED SIG	AT-106
P0731	0731	A/T 1ST GR FNCTN*4	AT-110
P0732	0732	A/T 2ND GR FNCTN*4	AT-113
P0733	0733	A/T 3RD GR FNCTN*4	AT-116
P0734	0734	A/T 4TH GR FNCTN*4	AT-119

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*3: When erasing this DTC, always use CONSULT-III or GST.

P0740-P0840

INFOID:0000000004806550

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0740	0740	TCC SOLENOID/CIRC	AT-124 (A/T) CVT-266 (CVT)
P0744	0744	A/T TCC S/V FNCTN	AT-129 (A/T) CVT-271 (CVT)
P0745	0745	L/PRESS SOL/CIRC	AT-134 (A/T) CVT-273 (CVT)
P0746	0746	PRS CNT SOL/A FCTN	CVT-278
P0750	0750	SFT SOL A/CIRC	AT-139
P0755	0755	SFT SOL B/CIRC	AT-144
P0776	0776	PRS CNT SOL/B FCTN	CVT-280
P0778	0778	PRS CNT SOL/B CIRC	CVT-282
P0840	0840	TR PRS SENS/A CIRC	CVT-287

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P0850-P1572

INFOID:0000000004806549

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P0850	0850	P-N POS SW/CIRCUIT	EC-1401
P1148	1148	CLOSED LOOP-B1	EC-1407
P1217	1217	ENG OVER TEMP	EC-1408
P1225	1225	CTP LEARNING-B1	EC-1417
P1226	1226	CTP LEARNING-B1	EC-1419
P1421	1421	COLD START CONTROL	EC-1421
P1564	1564	ASCD SW	EC-1423
P1572	1572	ASCD BRAKE SW	EC-1429
P1574	1574	ASCD VHL SPD SEN	EC-1438

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P1610-P1615

INFOID:0000000004806548

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P1610	1610	LOCK MODE	BL-259
P1611	1611	ID DISCORD,IMMU-ECM	BL-259
P1612	1612	CHAIN OF ECM-IMMU	BL-259
P1614	1614	CHAIN OF IMMU-KEY	BL-259
P1615	1615	DIFFERENCE OF KEY	BL-259

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P1715-P1805

INFOID:0000000004806547

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P1715	1715	IN PULY SPEED	EC-1440 (A/T) EC-1441 (CVT)
P1740	1740	LU-SLCT SOL/CIRC	CVT-306
P1760	1760	O/R CLTCH SOL/CIRC	AT-149
P1777	1777	STEP MOTR CIRC	CVT-311
P1778	1778	STEP MOTR FNC	CVT-315
P1805	1805	BRAKE SW/CIRCUIT	EC-1443

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

P2100-P2A00

INFOID:0000000004806546

DTC*1		Items (CONSULT-III screen terms)	Reference
CONSULT-III GST*2	ECM*3		
P2100	2100	ETC MOT PWR-B1	EC-1447
P2101	2101	ETC FNCTN/CIRC-B1	EC-1451
P2103	2103	ETC MOT PWR	EC-1447
P2118	2118	ETC MOT-B1	EC-1457
P2119	2119	ETC ACTR-B1	EC-1462
P2122	2122	APP SEN 1/CIRC	EC-1464
P2123	2123	APP SEN 1/CIRC	EC-1464
P2127	2127	APP SEN 2/CIRC	EC-1469
P2128	2128	APP SEN 2/CIRC	EC-1469
P2135	2135	TP SENSOR-B1	EC-1476
P2138	2138	APP SENSOR	EC-1481
P2A00	2A00	A/F SENSOR1 (B1)	EC-1488

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000004499899

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the “SUPPLEMENTAL RESTRAINT SYSTEM” and “SEAT BELTS” of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the “SUPPLEMENTAL RESTRAINT SYSTEM”.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

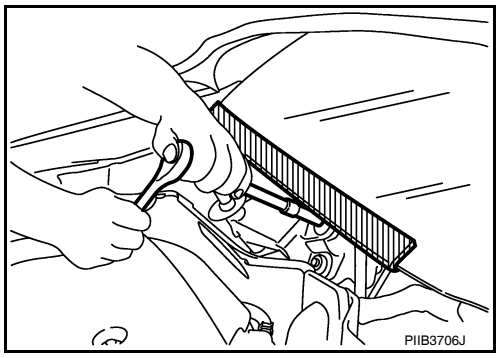
WARNING:

- **When working near the Airbag Diagnosis Sensor Unit or other Airbag System sensors with the ignition ON or engine running, DO NOT use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery, and wait at least 3 minutes before performing any service.**

Precaution for Procedure without Cowl Top Cover

INFOID:0000000004499900

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc.



On Board Diagnosis (OBD) System of Engine and A/T, CVT

INFOID:0000000004499901

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:

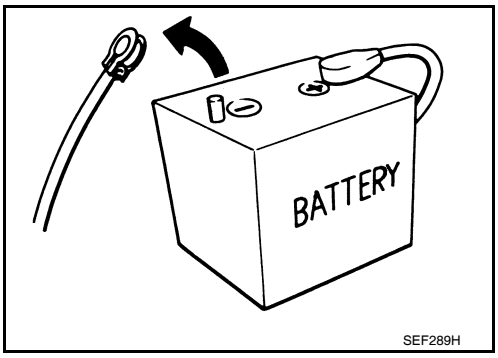
- **Be sure to turn the ignition switch OFF and disconnect the battery ground cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A 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-64.**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.**

- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

Precaution

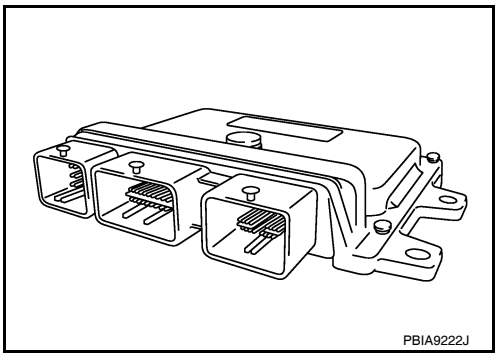
INFOID:0000000004499902

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect negative battery cable.**



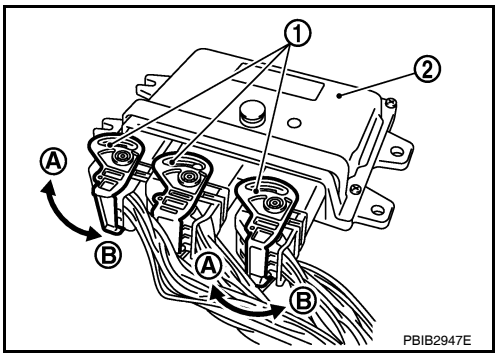
- **Do not disassemble ECM.**
- **If battery cable is disconnected, the memory will return to the initial ECM values.**
  The ECM will now start to self-control at its initial values. Engine operation can vary slightly in this case. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- **If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.**

- **Diagnostic trouble codes**
- **1st trip diagnostic trouble codes**
- **Freeze frame data**
- **1st trip freeze frame data**
- **System readiness test (SRT) codes**
- **Test values**

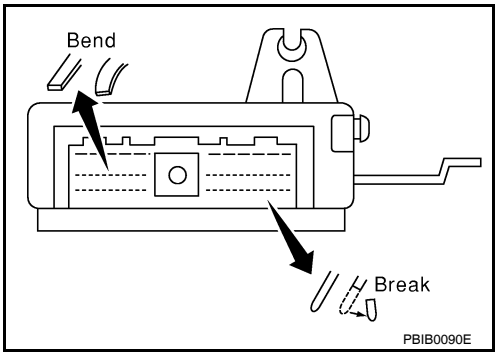


- **When connecting ECM harness connector, fasten (B) it securely with a lever (1) as far as it will go as shown in the figure.**

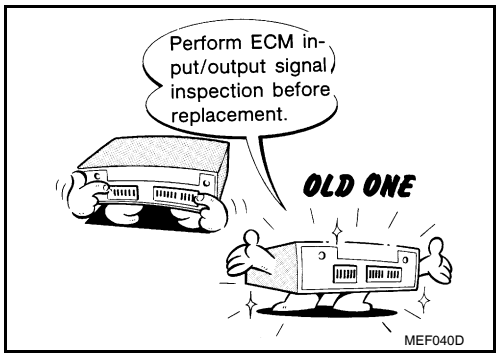
- **ECM (2)**
- **Loosen (A)**



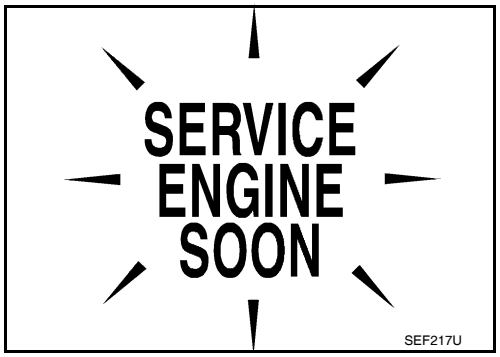
- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can 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.**



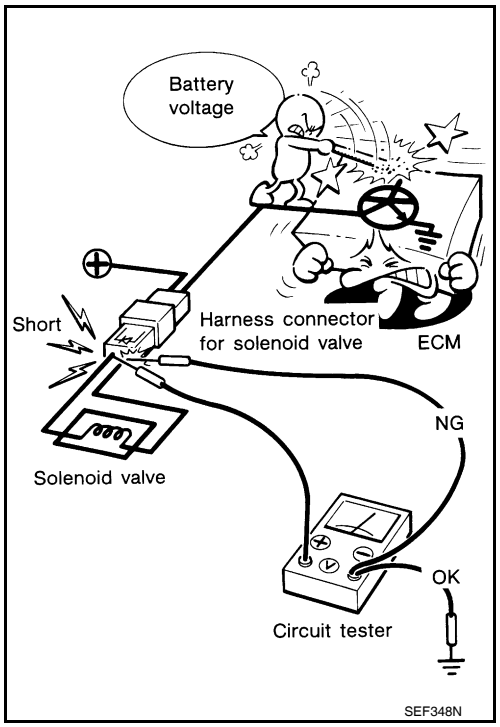
- **Keep engine control system parts and harness dry.**
- **Before replacing ECM, perform "ECM Terminals and Reference Value" inspection and make sure ECM functions properly. Refer to EC-1109, "ECM Terminal and Reference Value".**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **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).**



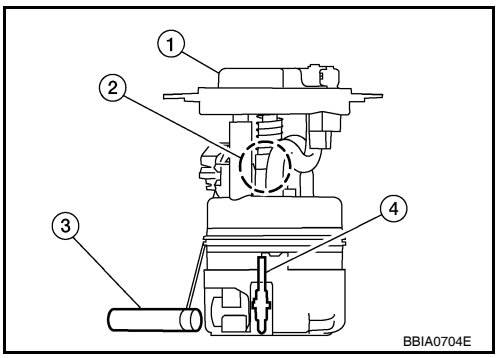
- **After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Overall Function Check.**
  The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Overall Function Check should be a good result if the repair is completed.



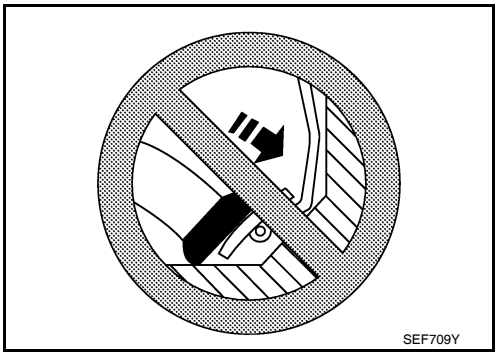
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**



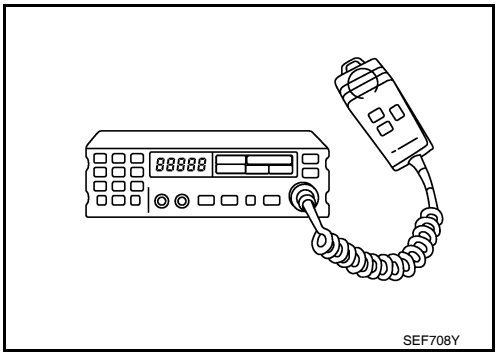
- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**
  - **Fuel level sensor unit and fuel pump (1)**
  - **Fuel pressure regulator (2)**
  - **Fuel level sensor (3)**
  - **Fuel tank temperature sensor (4)**



- **Do not depress accelerator pedal when starting.**
- **Immediately after starting, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**



- **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 radio can be kept smaller.**
  - **Be sure to ground the radio to vehicle body.**

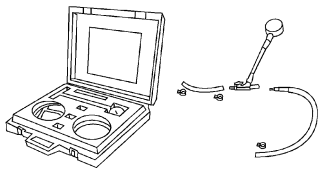
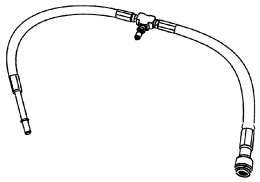
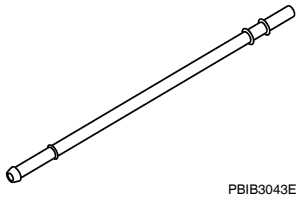


PREPARATION

Special Service Tool

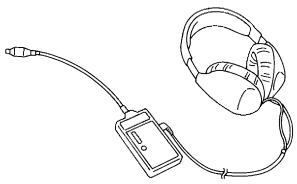
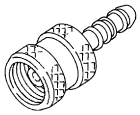
INFOID:0000000004499903

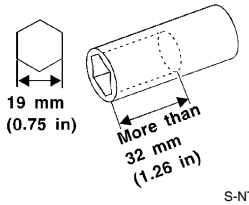
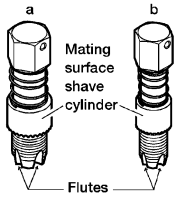
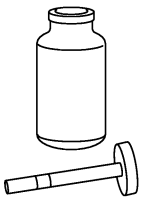
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
(J-44321) Fuel pressure gauge Kit  LEC642	Checking fuel pressure
(J-44321-6) Fuel pressure adapter  LBIA0376E	Connecting fuel pressure gauge to quick connector type fuel lines.
KV10118400 Fuel tube adapter  PBIB3043E	Measuring fuel pressure

Commercial Service Tool

INFOID:0000000004499904

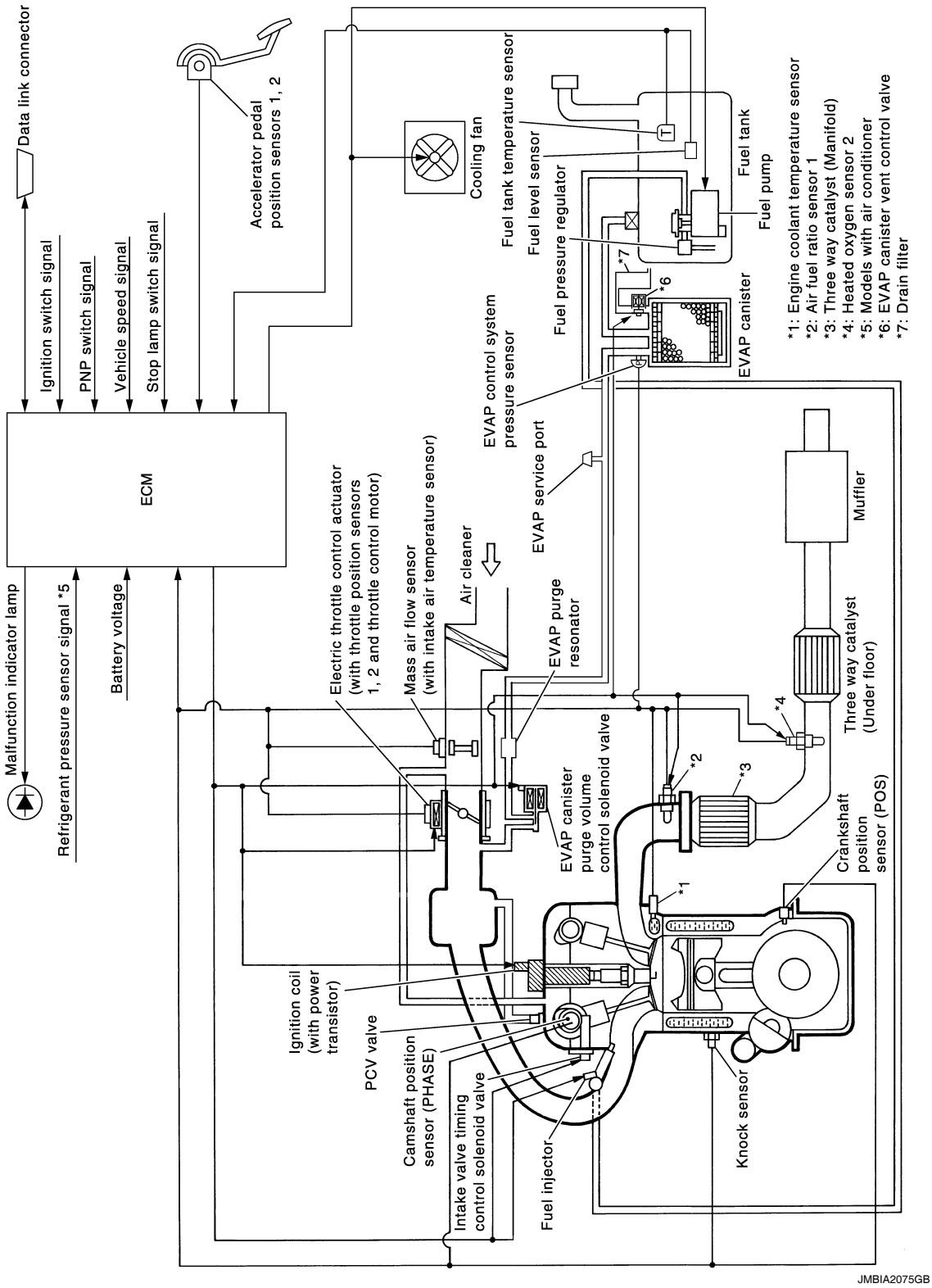
Tool number (Kent-Moore No.) Tool name	Description
Leak detector i.e.: (J-41416)  S-NT703	Locating the EVAP leak
EVAP service port adapter i.e.: (J-41413-OBD)  S-NT704	Applying positive pressure through EVAP service port

Tool number (Kent-Moore No.) Tool name	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
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)  AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor** **b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor**
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)  S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

ENGINE CONTROL SYSTEM

Schematic

INFOID:0000000004499905



Multiport Fuel Injection (MFI) System

INFOID:0000000004499906

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		
Engine coolant temperature sensor	Engine coolant temperature		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage*3		
Knock sensor	Engine knocking condition		
EPS control unit	Power steering operation*2		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		
Air conditioner switch	Air conditioner operation*2		
ABS actuator and electric unit (control unit)	Vehicle speed*2		
Combination meter			

*1: This sensor is not used to control the engine system under normal conditions.

*2: This signal is sent to the ECM through CAN communication line.

*3: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from the crankshaft position sensor (POS), camshaft position sensor (PHASE) and the mass air flow sensor.

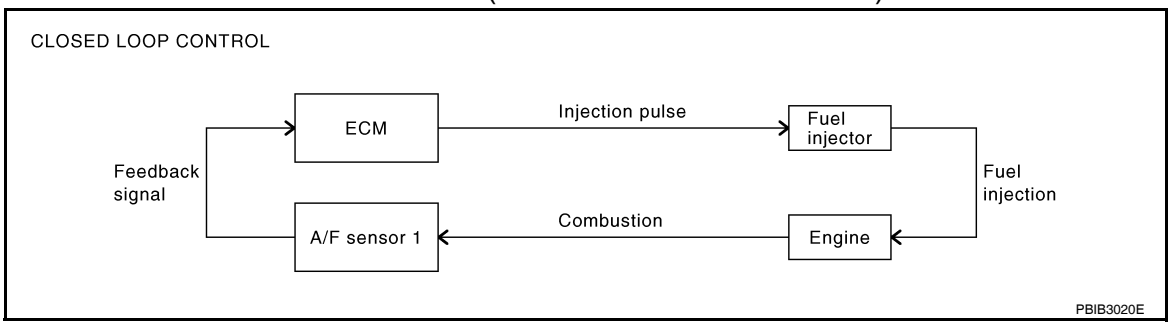
VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

<Fuel increase>
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (A/T and 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 drivability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses air fuel ratio (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 air fuel ratio (A/F) sensor 1, refer to EC-1210. 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 air fuel ratio (A/F) sensor 1 shift, the air/fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

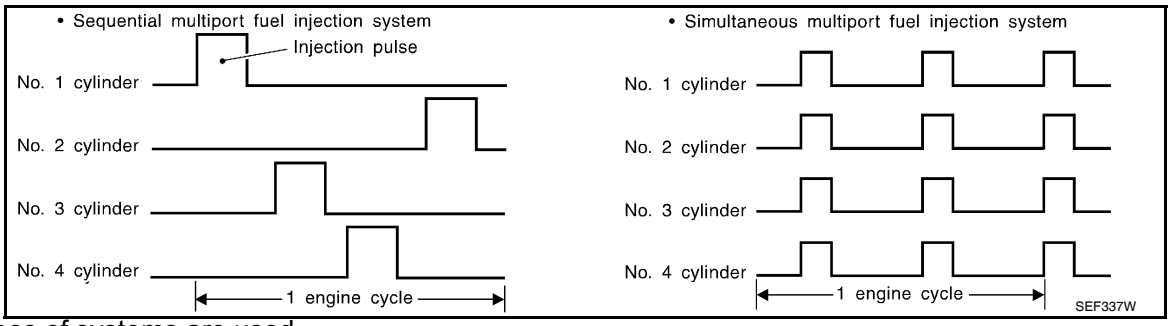
Open Loop Control

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 air fuel ratio (A/F) sensor 1 or its circuit
- Insufficient activation of air fuel ratio (A/F) sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (A/T and CVT models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from air fuel ratio (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 air fuel ratio (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 fuel 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.

Electronic Ignition (EI) System

INFOID:0000000004499907

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2 Piston position	Ignition timing control	Power transistor
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*2		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
ABS actuator and electric unit (control unit)	Vehicle speed*1		
Combination meter			

*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.

Fuel Cut Control (at No Load and High Engine Speed)

INFOID:0000000004499908

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Park/neutral position (PNP) switch	Neutral position	Fuel cut control	Fuel injector
Accelerator pedal position sensor	Accelerator pedal position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
ABS actuator and electric unit (control unit)	Vehicle speed*		
Combination meter			

*: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

If the engine speed is above 2,400 rpm under no load [for example, the shift lever position is P or N (A/T, CVT), Neutral (M/T) and engine speed is over 2,400 rpm] fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.
Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

NOTE:
This function is different from deceleration control listed under EC-1027, "Multiport Fuel Injection (MFI) System".

AIR CONDITIONING CUT CONTROL

Input/Output Signal Chart

INFOID:0000000004499909

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner ON signal*1	Air conditioner cut control	Air conditioner relay
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*2		
Refrigerant pressure sensor	Refrigerant pressure		
EPS control unit	Power steering operation*1		
ABS actuator and electric unit (control unit)	Vehicle speed*1		
Combination meter			

*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

INFOID:0000000004499910

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.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

System Description

INFOID:0000000004499911

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	Electric throttle control actuator
Stop lamp switch	Brake pedal operation		
ASCD clutch switch (M/T models)	Clutch pedal operation		
ASCD steering switch	ASCD steering switch operation		
Park/neutral position (PNP) switch	Gear position		
ABS actuator and electric unit (control unit)	Vehicle speed*		
Combination meter			
TCM	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 144 km/h (89 MPH).
ECM controls throttle angle of electric throttle control actuator to regulate engine speed.
Operation status of ASCD is indicated by CRUISE indicator and SET indicator in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.
NOTE:
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press MAIN switch. (The CRUISE indicator in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH), press SET/COAST switch. (Then SET indicator in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is depressed 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 two 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 the neutral position (M/T models)
- Selector lever is changed to N, P, R position (A/T and CVT models)
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.
- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.
  When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ACCELERATE switch.
- Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

If MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

When the SET/COAST switch is depressed 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 depressed after cancel operation other than depressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released.
- Clutch pedal is released (M/T models)
- Selector lever is in other than P and N positions (A/T and CVT models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (89 MPH)

Component Description

INFOID:0000000004499912

ASCD STEERING SWITCH

Refer to EC-1423.

ASCD BRAKE SWITCH

Refer to EC-1429 and EC-1495.

ASCD CLUTCH SWITCH

Refer to EC-1429 and EC-1495.

STOP LAMP SWITCH

Refer to EC-1429, EC-1443and EC-1495.

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EC-1447, EC-1451, EC-1457and EC-1462.

ASCD INDICATOR

Refer to EC-1503.

CAN COMMUNICATION

System Description

INFOID:0000000004499913

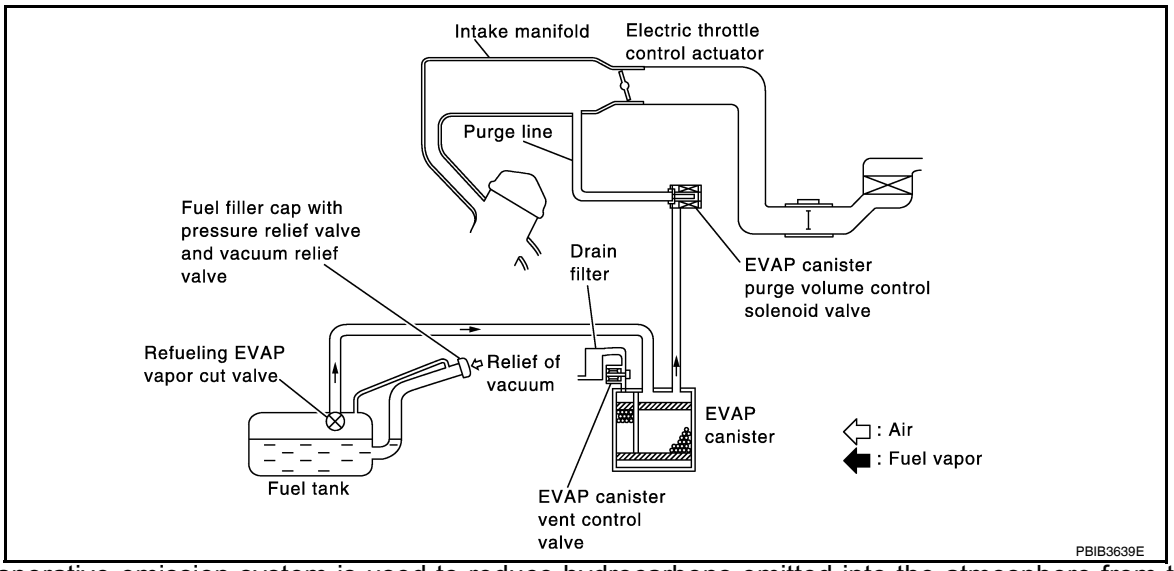
CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information 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-26, "CAN Communication Signal Chart", about CAN communication for detail.

EVAPORATIVE EMISSION SYSTEM

Description

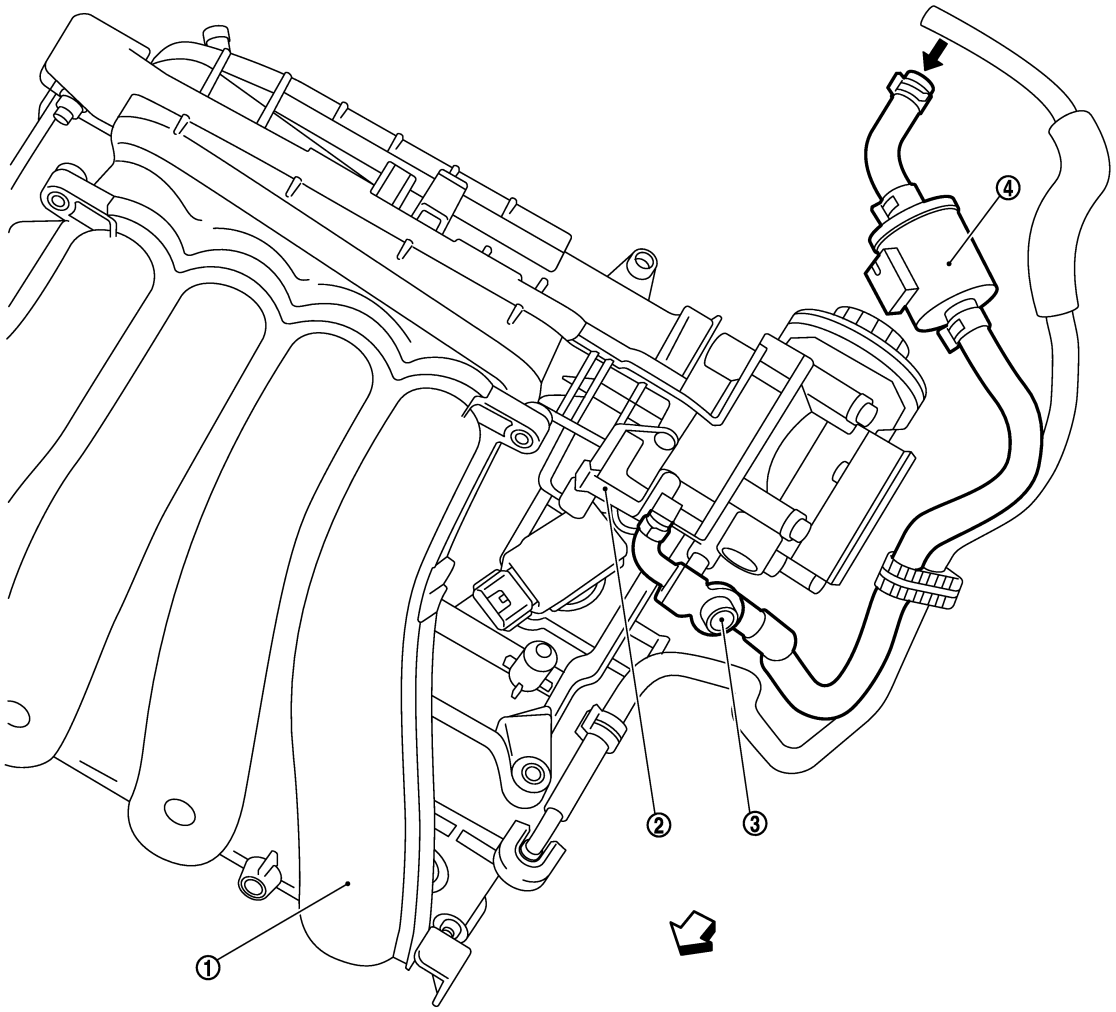
INFOID:0000000004499914

SYSTEM DESCRIPTION



The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating.

EVAPORATIVE EMISSION LINE DRAWING

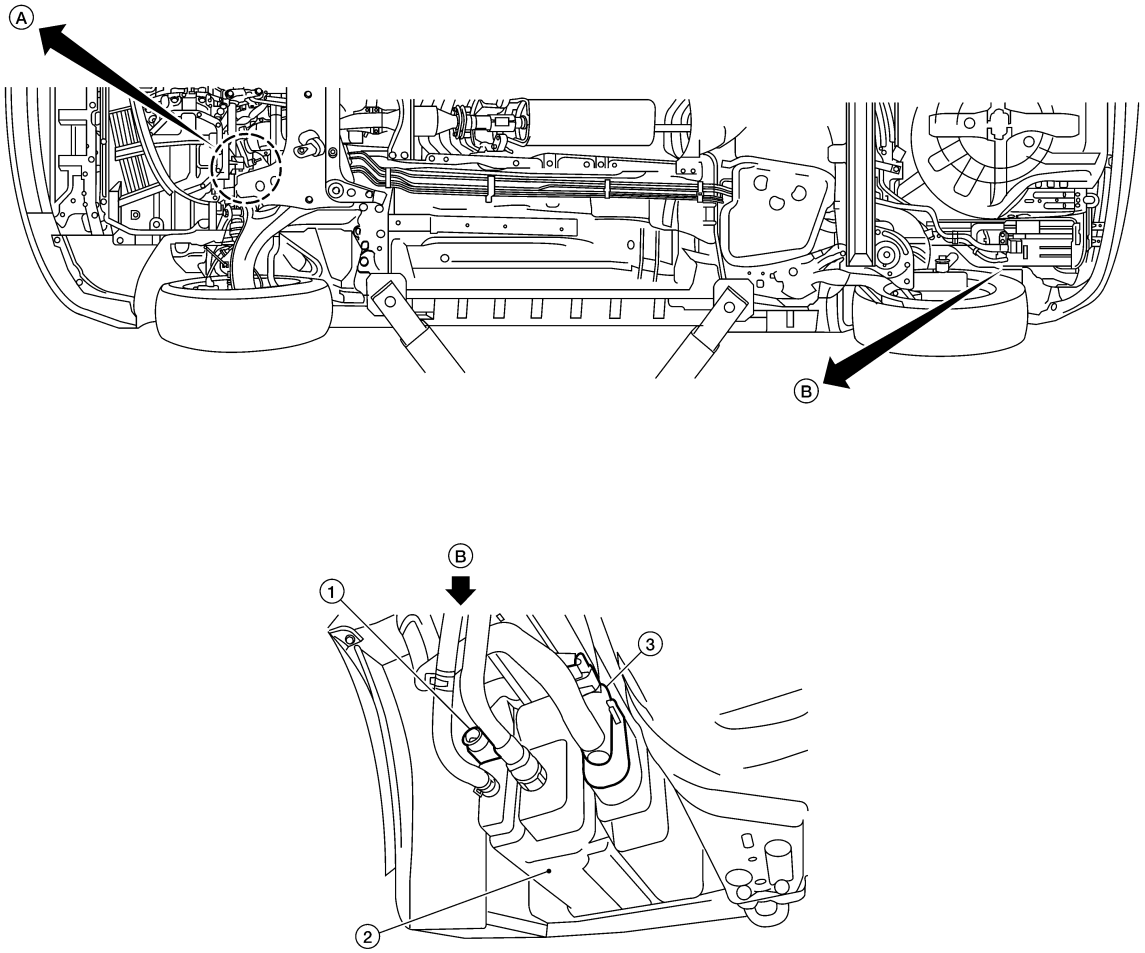


PBIB3330E

: Vehicle front
: From next figure

1. Intake manifold collector
2. EVAP canister purge volume control solenoid valve
3. EVAP service port
4. EVAP purge resonator

NOTE: Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.



BBIA0692E

(A): To previous figure

1. EVAP control system pressure sensor 2. EVAP canister 3. EVAP canister vent control valve

NOTE: Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

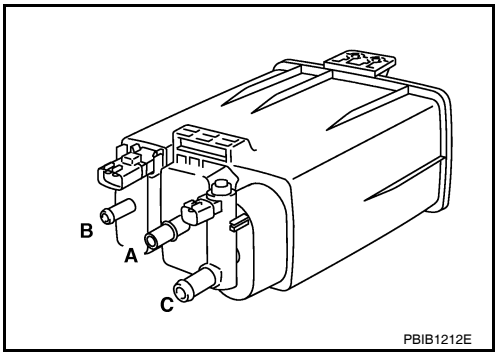
Component Inspection

INFOID:0000000004499915

EVAP CANISTER

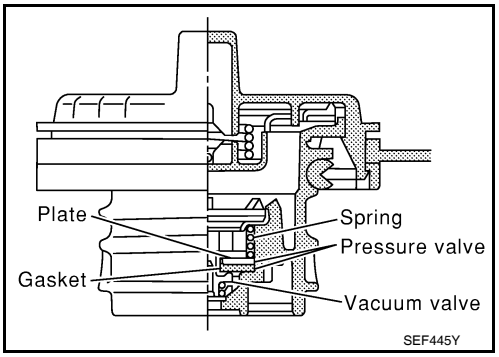
Check EVAP canister as follows:

1. Block port **B**.
2. Blow air into port **A**and check that it flows freely out of port **C**.
3. Release blocked port **B**.
4. Apply vacuum pressure to port **B**and check that vacuum pressure exists at the ports **A** and **C**.
5. Block port **A** and **B**.
6. Apply pressure to port **C**and check that there is no leakage.



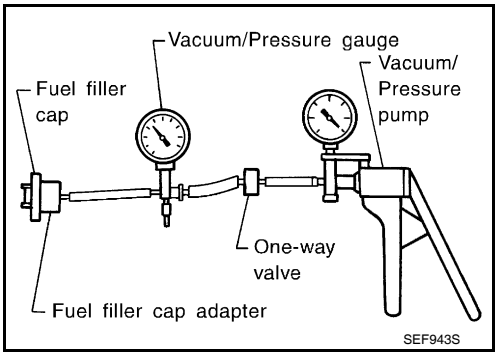
FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

1. Wipe clean valve housing.



2. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa
(0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)
Vacuum: –6.0 to –3.4 kPa
(–0.061 to –0.035 kg/cm^2, –0.87 to –0.48 psi)



3. If out of specification, replace fuel filler cap as an assembly.

CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1329, "Component Inspection".

FUEL TANK TEMPERATURE SENSOR

Refer to EC-1273, "Component Inspection".

EVAP CANISTER VENT CONTROL VALVE

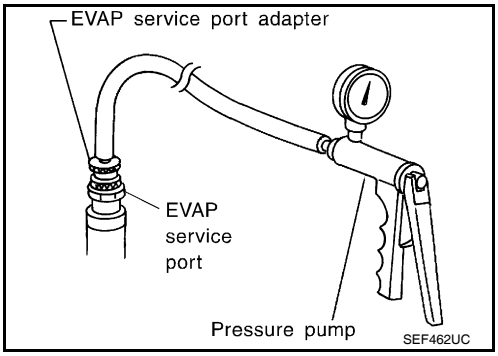
Refer to EC-1340, "Component Inspection".

EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1350, "Component Inspection".

EVAP SERVICE PORT

Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leak.

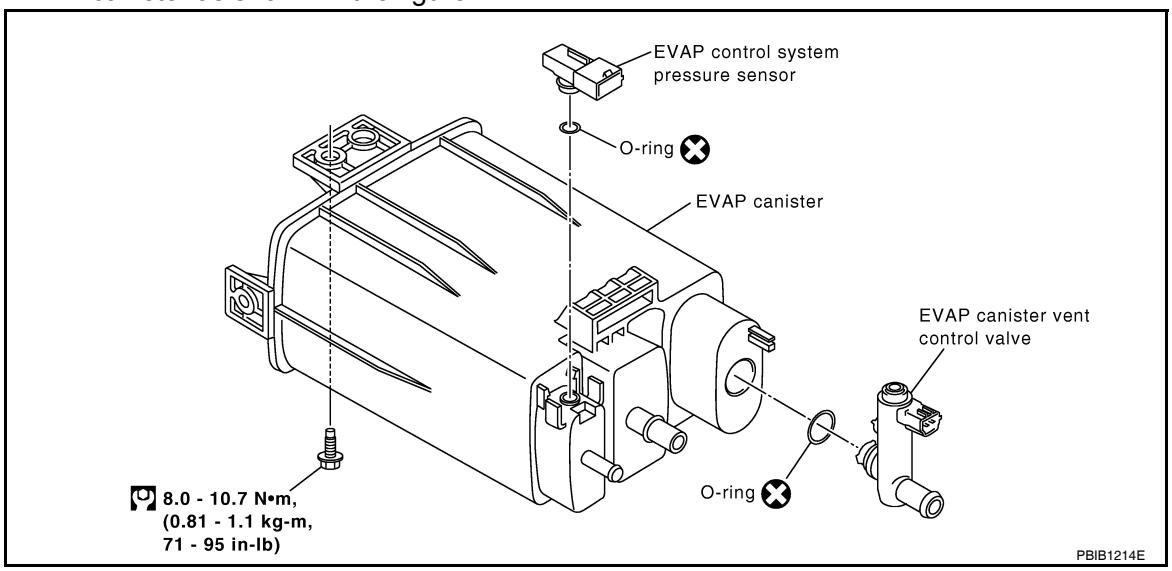


Removal and Installation

INFOID:0000000004499916

EVAP CANISTER

Tighten EVAP canister as shown in the figure.

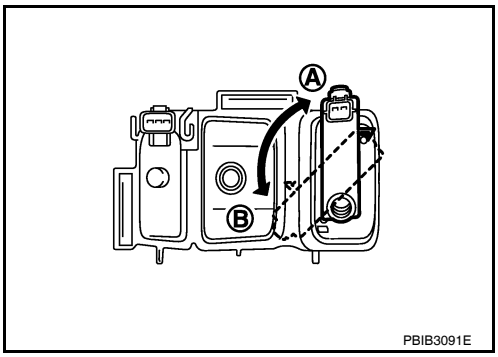


EVAP CANISTER VENT CONTROL VALVE

1. Turn EVAP canister vent control valve counterclockwise.
- Lock (A)
- Unlock (B)

2. Remove the EVAP canister vent control valve.

Always replace O-ring with a new one.



How to Detect Fuel Vapor Leakage

INFOID:0000000004499917

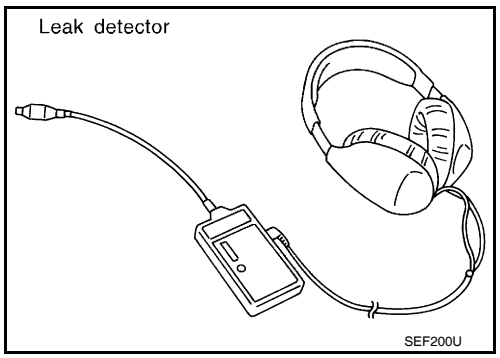
CAUTION:
- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in EVAP system.**

NOTE:
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

WITH CONSULT-III

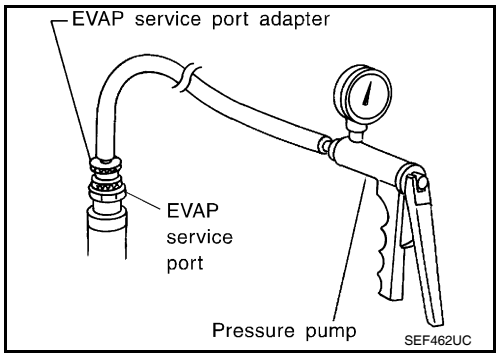
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump and hose to the EVAP service port adapter.

3. Turn ignition switch ON.
4. Select the “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-III.
5. Touch “START”. A bar graph (Pressure indicating display) will appear on the screen.
6. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7. Remove EVAP service port adapter and hose with pressure pump.
8. Locate the leak using a leak detector. Refer to EC-1036, "Description".

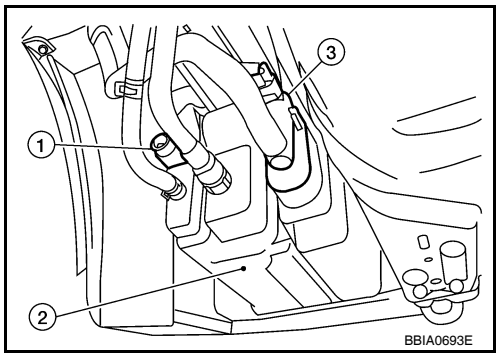


WITHOUT CONSULT-III

1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump with pressure gauge to the EVAP service port adapter.



3. Apply battery voltage to the terminal of EVAP canister vent control valve (3) to make a closed EVAP system.
   - EVAP control system pressure sensor (1)
   - EVAP canister (2)

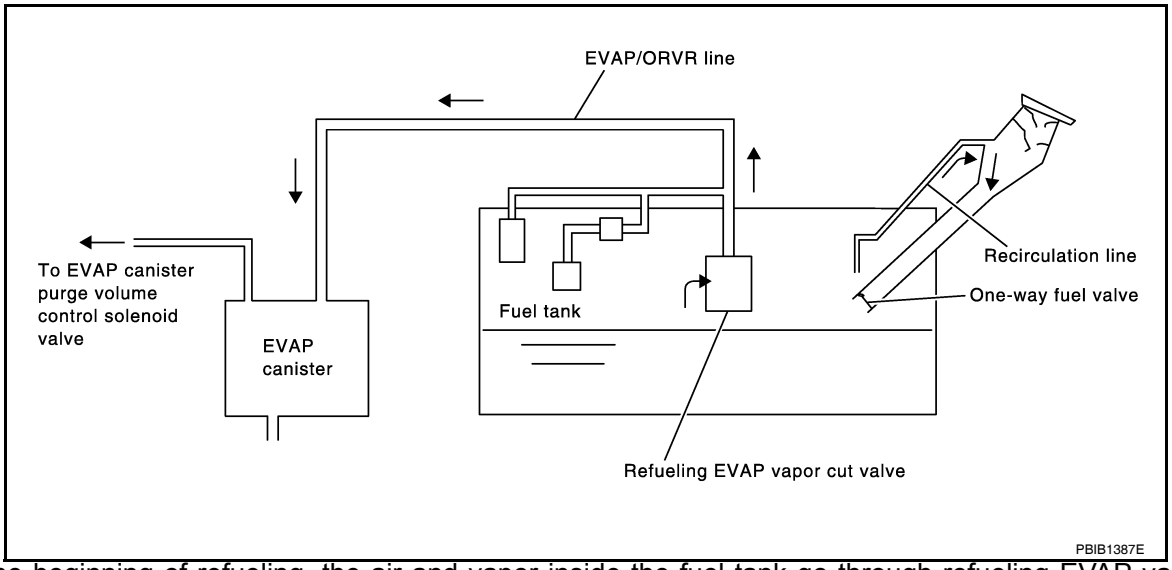


4. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2, 0.2 to 0.4 psi).
5. Remove EVAP service port adapter and hose with pressure pump.
6. Locate the leak using a leak detector. Refer to EC-1036, "Description".

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

System Description

INFOID:0000000004499918



From the beginning of refueling, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve and EVAP/ORVR line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.
When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

WARNING:
When conducting inspections below, be sure to observe the following:
- **Put a "CAUTION: FLAMMABLE" sign in workshop.**
- **Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.**
- **Be sure to furnish the workshop with a CO_2 fire extinguisher.**

CAUTION:
- **Before removing fuel line parts, carry out the following procedures:**
- **Put drained fuel in an explosion-proof container and put lid on securely.**
- **Release fuel pressure from fuel line. Refer to EC-1086, "Fuel Pressure Check".**
- **Disconnect negative battery cable.**
- **Always replace O-ring when the fuel gauge retainer is removed.**
- **Do not kink or twist hose and tube when they are installed.**
- **Do not tighten hose and clamps excessively to avoid damaging hoses.**
- **After installation, run engine and check for fuel leaks at connection.**
- **Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.**

Diagnosis Procedure

INFOID:0000000004499919

SYMPTOM: FUEL ODOR FROM EVAP CANISTER IS STRONG.

1. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
   The weight should be less than 1.9 kg (4.2 lb).

OK or NG

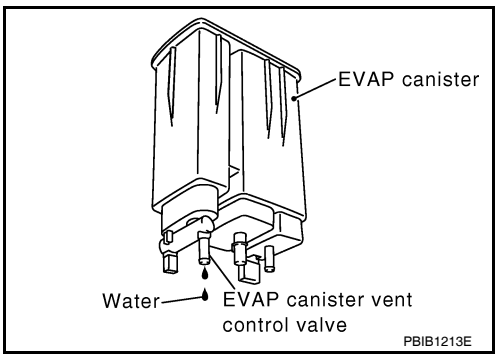
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 3.
No >> GO TO 6.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

4. CHECK DRAIN FILTER

Refer to EC-1045, "Component Inspection".

OK or NG

OK >> GO TO 5.
NG >> Replace drain filter.

5. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

6. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-1045, "Component Inspection".

OK or NG

OK >> **INSPECTION END**
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

SYMPTOM: CANNOT REFUEL/FUEL ODOR FROM THE FUEL FILLER OPENING IS STRONG WHILE REFUELING.

1. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
   The weight should be less than 1.9 kg (4.2 lb).

OK or NG

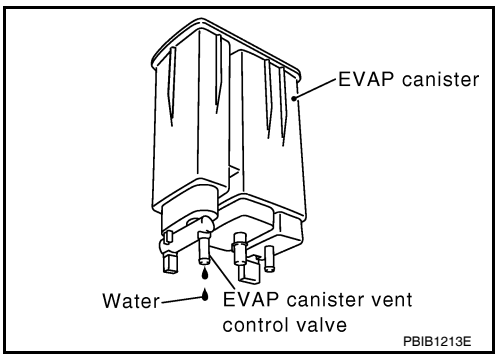
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 3.
No >> GO TO 5.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

4. CHECK DRAIN FILTER

Refer to EC-1045, "Component Inspection".

OK or NG

OK >> GO TO 5.
NG >> Replace drain filter.

5. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

6. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling EVAP vapor cut valve for clogging, kink, looseness and improper connection.

OK or NG

OK >> GO TO 7.
NG >> Repair or replace hoses and tubes.

7. CHECK FILLER NECK TUBE

Check recirculation line for clogging, dents and cracks.

OK or NG

OK >> GO TO 8.
NG >> Replace filler neck tube.

8. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-1045, "Component Inspection".

OK or NG

OK >> GO TO 9.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

9. CHECK FUEL FILLER TUBE

Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.

OK or NG

OK >> GO TO 10.
NG >> Replace fuel filler tube.

10. CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

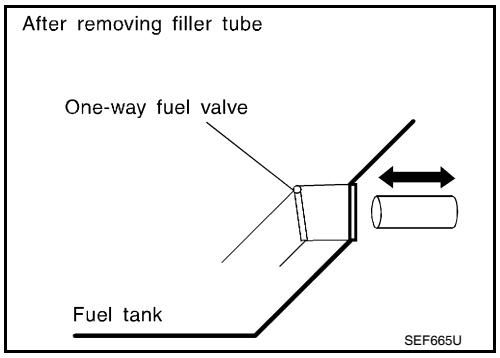
OK or NG

OK >> GO TO 11.

NG >> Repair or replace one-way fuel valve with fuel tank.

11. CHECK ONE-WAY FUEL VALVE-II

1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as follows.
   When a stick is inserted, the valve should open, when removing stick it should close.
   Do not drop any material into the tank.



OK or NG

OK >> **INSPECTION END**
NG >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.

Component Inspection

INFOID:0000000004499920

REFUELING EVAP VAPOR CUT VALVE

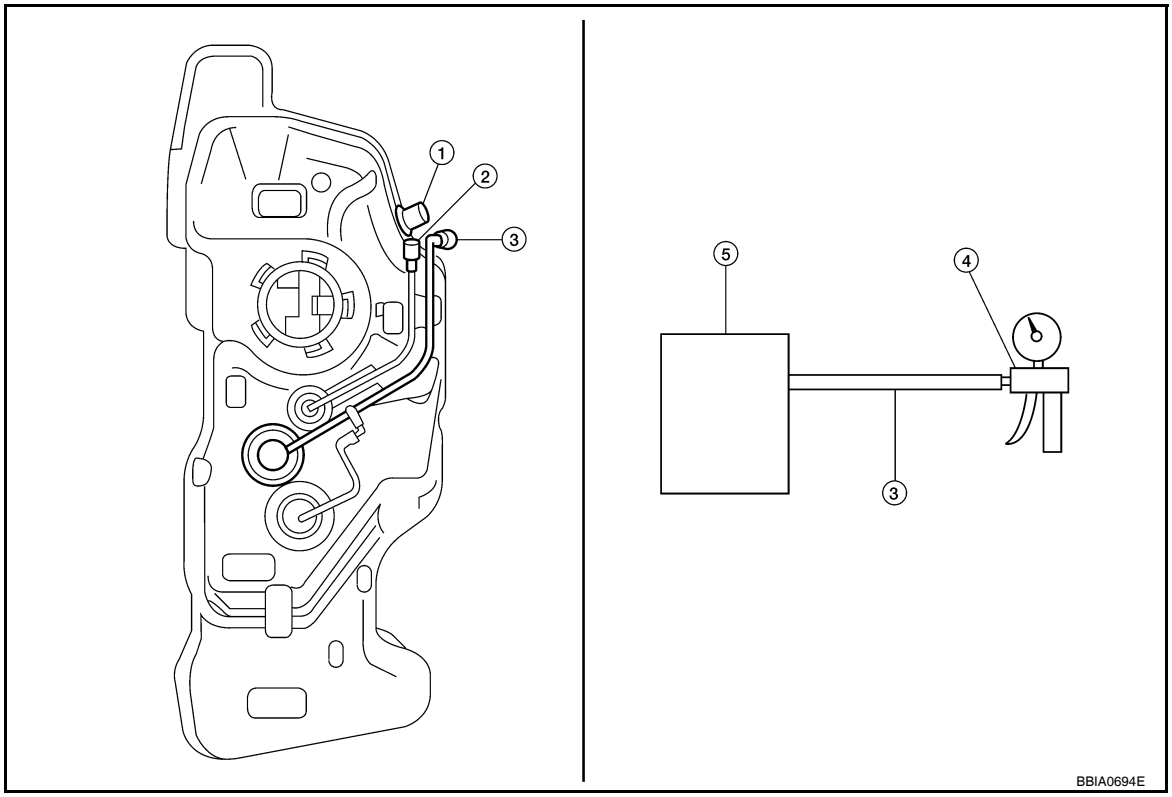
With CONSULT-III

1. Remove fuel tank. Refer to FL-9.
2. Drain fuel from the tank as follows:

a. Remove fuel feed hose located on the fuel gauge retainer.
b. Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
c. Drain fuel using “FUEL PUMP RELAY” in “ACTIVE TEST” mode with CONSULT-III.

3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
   Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
4. Check refueling EVAP vapor cut valve for being stuck to open as follows.

a. Connect vacuum pump to hose end.
b. Remove fuel gauge retainer with fuel gauge unit.
   Always replace O-ring with new one.
c. Put fuel tank upside down.
d. Apply vacuum pressure to hose end [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



1. Filler tube
2. Recirculation line
3. EVAP/ORVR line
4. Vacuum/pressure handy pump
5. Fuel tank

Without CONSULT-III

1. Remove fuel tank. Refer to FL-9.
2. Drain fuel from the tank as follows:

a. Remove fuel gauge retainer.

b. Drain fuel from the tank using a handy pump into a fuel container.

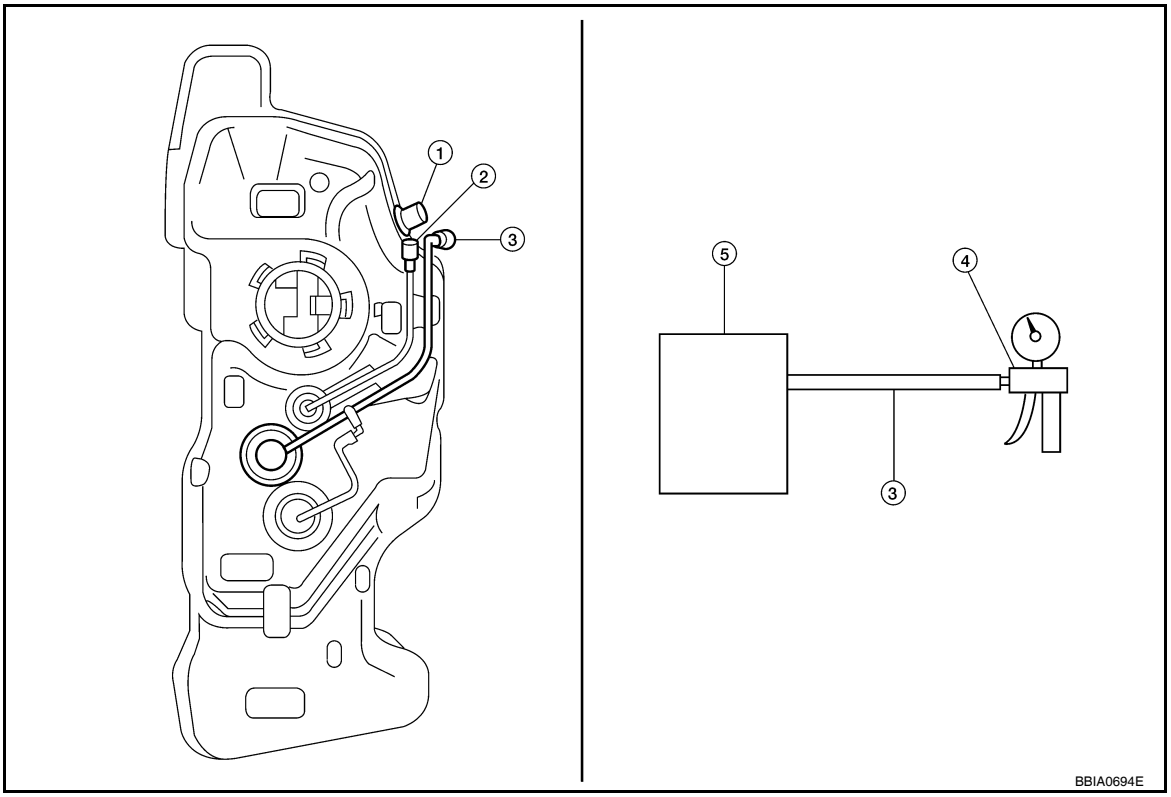
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
   Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
4. Check refueling EVAP vapor cut valve for being stuck to open as follows.

a. Connect vacuum pump to hose end.

b. Remove fuel gauge retainer with fuel gauge unit.
   Always replace O-ring with new one.

c. Put fuel tank upside down.

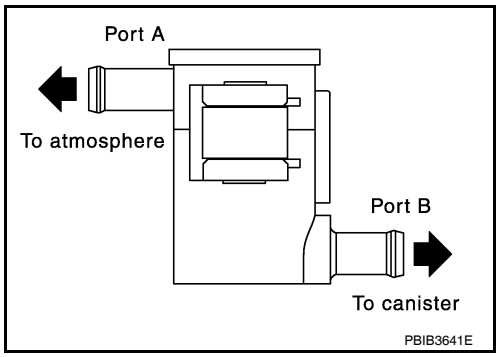
d. Apply vacuum pressure to hose end [−13.3 kPa (−100 mmHg, −3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



1. Filler tube
2. Recirculation line
3. EVAP/ORVR line
4. Vacuum/pressure handy pump
5. Fuel tank

DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.
7. If NG, replace drain filter.

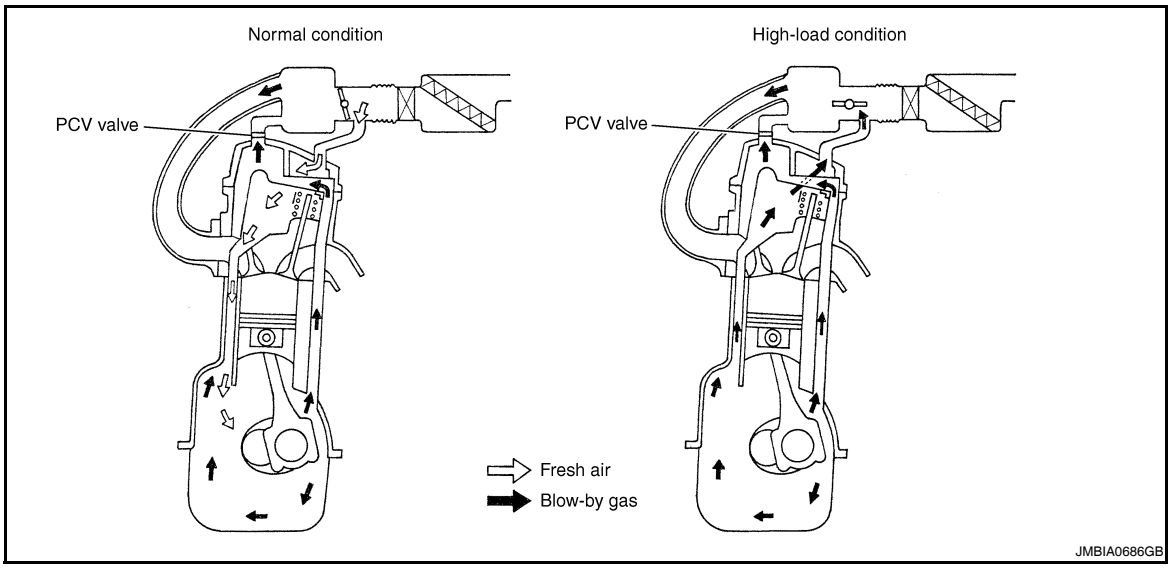


POSITIVE CRANKCASE VENTILATION

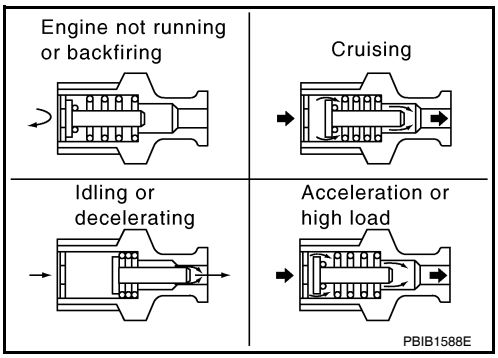
Description

INFOID:0000000004499921

SYSTEM DESCRIPTION



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.

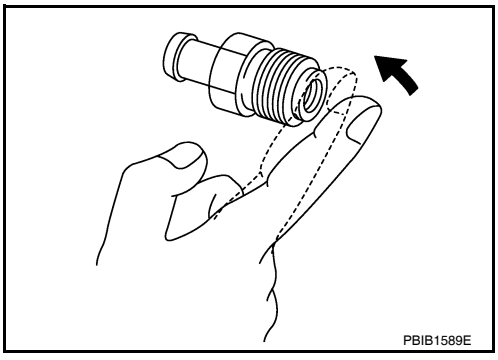


Component Inspection

INFOID:0000000004499922

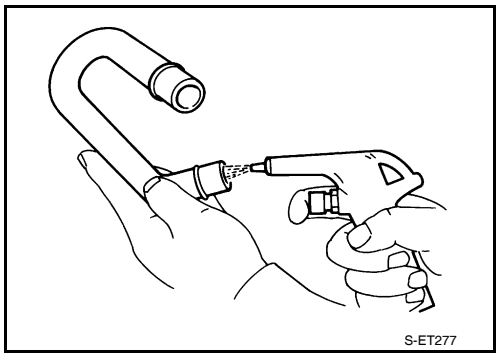
PCV (POSITIVE CRANKCASE VENTILATION) VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.



PCV VALVE VENTILATION HOSE

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM-NATS)

Description

INFOID:0000000004499923

- **If the security indicator illuminates with the ignition switch ON or DTC P1610 - P1615 is displayed in "SELF DIAGNOSTIC RESULT" mode, perform the trouble diagnosis for corresponding to the detected DTC. Refer to EC-1015, "U0101-U1001".**
- **Check that no DTC is displayed in "SELF DIAGNOSIS RESULT" mode of "BCM" before erasing the detected DTC in "ENGINE" mode with CONSULT-III.**
- **When replacing ECM, refer to EC-1083, "Procedure After Replacing ECM".**

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Introduction

INFOID:0000000004499924

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	Diagnostic service
Diagnostic Trouble Code (DTC)	Service $03 of SAE J1979
Freeze Frame data	Service $02 of SAE J1979
System Readiness Test (SRT) code	Service $01 of SAE J1979
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Service $07 of SAE J1979
1st Trip Freeze Frame data	
Test values and Test limits	Service $06 of SAE J1979
Calibration ID	Service $09 of SAE J1979

The above information can be checked using procedures listed in the table below.

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	SRT status	Test value
CONSULT-III	×	×	×	×	×	×	—
GST	×	×	×	—	×	×	×
ECM	×	×*	—	—	—	×	—

*: 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-1094, "Fail-Safe Chart".)

Two Trip Detection Logic

INFOID:0000000004499925

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. Specific on board diagnostic items will cause the ECM to light up 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	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to EC-1052, "Emission-related Diagnostic Information".)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by MIL lighting up when there is malfunction on engine control system.

Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.
The fail-safe function also operates when above diagnoses except MIL circuit are detected, and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Emission-related Diagnostic Information

INFOID:0000000004499926

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

×: Applicable —: Not applicable

Items (CONSULT-III screen terms)	DTC*1		SRT code	Trip	MIL lighting up	Reference
	CONSULT-III GST*2	ECM*3				
LOST COMM (TCM)	U0101	0101*4	—	1	×	EC-1145
LOST COMM (BCM)	U0140	0140*4	—	1	×	EC-1147
CAN COMM CIRCUIT	U1001	1001*4	—	2	—	EC-1149
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—	—	**Flashing***5	EC-1069
INT/V TIM CONT-B1	P0011	0011	—	2	×	EC-1151
A/F SEN1 HTR (B1)	P0031	0031	—	2	×	EC-1155
A/F SEN1 HTR (B1)	P0032	0032	—	2	×	EC-1155
HO2S2 HTR (B1)	P0037	0037	—	2	×	EC-1160
HO2S2 HTR (B1)	P0038	0038	—	2	×	EC-1160
INT/V TIM V/CIR-B1	P0075	0075	—	2	×	EC-1165
MAF SEN/CIRCUIT-B1	P0101	0101	—	2	×	EC-1170
MAF SEN/CIRCUIT-B1	P0102	0102	—	1	×	EC-1178
MAF SEN/CIRCUIT-B1	P0103	0103	—	1	×	EC-1178
IAT SEN/CIRCUIT-B1	P0112	0112	—	2	×	EC-1185
IAT SEN/CIRCUIT-B1	P0113	0113	—	2	×	EC-1185
ECT SEN/CIRC	P0116	0116	—	2	×	EC-1189
ECT SEN/CIRC	P0117	0117	—	1	×	EC-1192
ECT SEN/CIRC	P0118	0118	—	1	×	EC-1192
TP SEN 2/CIRC-B1	P0122	0122	—	1	×	EC-1197
TP SEN 2/CIRC-B1	P0123	0123	—	1	×	EC-1197
ECT SENSOR	P0125	0125	—	2	×	EC-1202
IAT SENSOR-B1	P0127	0127	—	2	×	EC-1205
THERMSTAT FNCTN	P0128	0128	—	2	×	EC-1208
A/F SENSOR1 (B1)	P0130	0130	—	2	×	EC-1210
A/F SENSOR1 (B1)	P0131	0131	—	2	×	EC-1216
A/F SENSOR1 (B1)	P0132	0132	—	2	×	EC-1222
A/F SENSOR1 (B1)	P0133	0133	×	2	×	EC-1228
HO2S2 (B1)	P0137	0137	×	2	×	EC-1235
HO2S2 (B1)	P0138	0138	×	2	×	EC-1242
HO2S2 (B1)	P0139	0139	×	2	×	EC-1251
FUEL SYS-LEAN-B1	P0171	0171	—	2	×	EC-1258

Items (CONSULT-III screen terms)	DTC*1		SRT code	Trip	MIL lighting up	Reference
	CONSULT-III GST*2	ECM*3				
FUEL SYS-RICH-B1	P0172	0172	—	2	×	EC-1264
FTT SENSOR	P0181	0181	—	2	×	EC-1270
FTT SEN/CIRCUIT	P0182	0182	—	2	×	EC-1274
FTT SEN/CIRCUIT	P0183	0183	—	2	×	EC-1274
TP SEN 1/CIRC-B1	P0222	0222	—	1	×	EC-1278
TP SEN 1/CIRC-B1	P0223	0223	—	1	×	EC-1278
MULTI CYL MISFIRE	P0300	0300	—	2	×	EC-1283
CYL 1 MISFIRE	P0301	0301	—	2	×	EC-1283
CYL 2 MISFIRE	P0302	0302	—	2	×	EC-1283
CYL 3 MISFIRE	P0303	0303	—	2	×	EC-1283
CYL 4 MISFIRE	P0304	0304	—	2	×	EC-1283
KNOCK SEN/CIRC-B1	P0327	0327	—	2	—	EC-1289
KNOCK SEN/CIRC-B1	P0328	0328	—	2	—	EC-1289
CKP SEN/CIRCUIT	P0335	0335	—	2	×	EC-1293
CMP SEN/CIRC-B1	P0340	0340	—	2	×	EC-1299
TW CATALYST SYS-B1	P0420	0420	×	2	×	EC-1305
EVAP PURG FLOW/MON	P0441	0441	×	2	×	EC-1310
EVAP SMALL LEAK	P0442	0442	×	2	×	EC-1315
PURG VOLUME CONT/V	P0443	0443	—	2	×	EC-1322
PURG VOLUME CONT/V	P0444	0444	—	2	×	EC-1330
PURG VOLUME CONT/V	P0445	0445	—	2	×	EC-1330
VENT CONTROL VALVE	P0447	0447	—	2	×	EC-1336
VENT CONTROL VALVE	P0448	0448	—	2	×	EC-1342
EVAP SYS PRES SEN	P0451	0451	—	2	×	EC-1348
EVAP SYS PRES SEN	P0452	0452	—	2	×	EC-1351
EVAP SYS PRES SEN	P0453	0453	—	2	×	EC-1358
EVAP GROSS LEAK	P0455	0455	—	2	×	EC-1366
EVAP VERY SML LEAK	P0456	0456	×*6	2	×	EC-1373
FUEL LEV SEN SLOSH	P0460	0460	—	2	×	EC-1381
FUEL LEVEL SENSOR	P0461	0461	—	2	×	EC-1383
FUEL LEVL SEN/CIRC	P0462	0462	—	2	×	EC-1385
FUEL LEVL SEN/CIRC	P0463	0463	—	2	×	EC-1385
VEH SPEED SEN/CIRC*7	P0500	0500	—	2	×	EC-1387
ISC SYSTEM	P0506	0506	—	2	×	EC-1389
ISC SYSTEM	P0507	0507	—	2	×	EC-1391
ECM	P0605	0605	—	1 or 2	— or ×	EC-1393
ECM	P0607	0607	—	1 (CVT) 1 (A/T) 2 (M/T)	× (CVT) × (A/T) — (M/T)	EC-1393
SENSOR POWER/CIRC	P0643	0643	—	1	×	EC-1396
PNP SW/CIRC	P0705	0705	—	2	×	AT-91 (A/T) CVT-244 (CVT)

Items (CONSULT-III screen terms)	DTC*1		SRT code	Trip	MIL lighting up	Reference
	CONSULT-III GST*2	ECM*3				
ATF TEMP SEN/CIRC*8	P0710	0710	—	2 (A/T) 1 (CVT)	×	AT-96 (A/T) CVT-249 (CVT)
INPUT SPD SEN/CIRC	P0715	0715	—	2	×	CVT-254
VEH SPD SEN/CIR AT*7	P0720	0720	—	2	×	AT-101 (A/T) CVT-258 (CVT)
ENGINE SPEED SIG	P0725	0725	—	2	× (A/T) — (CVT)	AT-106 (A/T) CVT-263 (CVT)
A/T 1ST GR FNCTN*8	P0731	0731	—	2	×	AT-110
A/T 2ND GR FNCTN*8	P0732	0732	—	2	×	AT-113
A/T 3RD GR FNCTN*8	P0733	0733	—	2	×	AT-116
A/T 4TH GR FNCTN*8	P0734	0734	—	2	×	AT-119
TCC SOLENOID/CIRC	P0740	0740	—	2	×	AT-124 (A/T) CVT-266 (CVT)
A/T TCC S/V FNCTN	P0744	0744	—	2	×	AT-129 (A/T) CVT-271 (CVT)
L/PRESS SOL/CIRC	P0745	0745	—	2	×	AT-134 (A/T) CVT-273 (CVT)
PRS CNT SOL/A FCTN	P0746	0746	—	1	×	CVT-278
SFT SOL A/CIRC	P0750	0750	—	1	×	AT-139
SFT SOL B/CIRC	P0755	0755	—	1	×	AT-144
PRS CNT SOL/B FCTN	P0776	0776	—	2	×	CVT-280
PRS CNT SOL/B CIRC	P0778	0778	—	2	×	CVT-282
TR PRS SENS/A CIRC	P0840	0840	—	2	×	CVT-287
P-N POS SW/CIRCUIT	P0850	0850	—	2	×	EC-1401
CLOSED LOOP-B1	P1148	1148	—	1	×	EC-1407
ENG OVER TEMP	P1217	1217	—	1	×	EC-1408
CTP LEARNING-B1	P1225	1225	—	2	—	EC-1417
CTP LEARNING-B1	P1226	1226	—	2	—	EC-1419
COLD START CONTROL	P1421	1421	—	2	×	EC-1421
ASCD SW	P1564	1564	—	1	—	EC-1423
ASCD BRAKE SW	P1572	1572	—	1	—	EC-1429
ASCD VHL SPD SEN	P1574	1574	—	1	—	EC-1438
LOCK MODE	P1610	1610	—	2	—	BL-259
ID DISCORD,IMMU-ECM	P1611	1611	—	2	—	BL-259
CHAIN OF ECM-IMMU	P1612	1612	—	2	—	BL-259
CHAIN OF IMMU-KEY	P1614	1614	—	2	—	BL-259
DIFFERENCE OF KEY	P1615	1615	—	2	—	BL-259
IN PULY SPEED	P1715	1715	—	2	—	EC-1440 (A/T) EC-1441 (CVT)
LU-SLCT SOL/CIRC	P1740	1740	—	2	×	CVT-306
O/R CLTCH SOL/CIRC	P1760	1760	—	2	×	AT-149
STEP MOTR CIRC	P1777	1777	—	1	×	CVT-311
STEP MOTR FNC	P1778	1778	—	2	×	CVT-315
BRAKE SW/CIRCUIT	P1805	1805	—	2	—	EC-1443

Items (CONSULT-III screen terms)	DTC*1		SRT code	Trip	MIL lighting up	Reference
	CONSULT-III GST*2	ECM*3				
ETC MOT PWR-B1	P2100	2100	—	1	×	EC-1447
ETC FNCTN/CIRC-B1	P2101	2101	—	1	×	EC-1451
ETC MOT PWR	P2103	2103	—	1	×	EC-1447
ETC MOT-B1	P2118	2118	—	1	×	EC-1457
ETC ACTR-B1	P2119	2119	—	1	×	EC-1462
APP SEN 1/CIRC	P2122	2122	—	1	×	EC-1464
APP SEN 1/CIRC	P2123	2123	—	1	×	EC-1464
APP SEN 2/CIRC	P2127	2127	—	1	×	EC-1469
APP SEN 2/CIRC	P2128	2128	—	1	×	EC-1469
TP SENSOR-B1	P2135	2135	—	1	×	EC-1476
APP SENSOR	P2138	2138	—	1	×	EC-1481
A/F SENSOR1 (B1)	P2A00	2A00	—	2	×	EC-1488

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J2012.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: The troubleshooting for this DTC needs CONSULT-III.

*5: When the ECM in the mode of displaying SRT status, MIL may flash. For the details, refer to "How to Display SRT Status".

*6: SRT code will not be set if the self-diagnostic result is NG.

*7: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

*8: When erasing this DTC, always use CONSULT-III or GST.

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 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 blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.

Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION".

For malfunctions in which 1st trip DTCs are displayed, refer to "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS". These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-III.

1st trip DTC is specified in Service $07 of SAE J1979. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a malfunction. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to EC-1089, "Trouble Diagnosis Introduction". Then perform DTC Confirmation Procedure or Overall Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

WITH CONSULT-III

WITH GST

CONSULT-III or GST (Generic Scan Tool) Examples: P0340, P0850, P1148, etc.

These DTCs are prescribed by SAE J2012.

(CONSULT-III also displays the malfunctioning component or system.)

NO TOOLS

The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0340, 0850, 1148, etc.

These DTCs are controlled by NISSAN.

- **1st trip DTC No. is the same as DTC No.**
- **Output of a DTC indicates a malfunction. However, GST and the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-III can identify malfunction status as shown below. Therefore, using CONSULT-III (if available) is recommended.**

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].

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.

Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-III or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-III screen, not on the GST. For details, see EC-1116, "CONSULT-III Function (ENGINE)".

Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items (Includes A/T or CVT related items)
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS".

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Service $01 of SAE J1979.

As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.

If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating “INCMP”, use the information in this Service Manual to set the SRT to “CMPLT”.

In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate “CMPLT” for each application system. Once set as “CMPLT”, the SRT status remains “CMPLT” until the self-diagnosis memory is erased.

Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate “INCMP” for these items.

NOTE:

The SRT will also indicate “INCMP” if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.
If, during the state emissions inspection, the SRT indicates “CMPLT” for all test items, the inspector will continue with the emissions test. However, if the SRT indicates “INCMP” for one or more of the SRT items the vehicle is returned to the customer untested.
NOTE:
If MIL is ON during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates “CMPLT” for all test items. Therefore, it is important to check SRT (“CMPLT”) and DTC (No DTCs) before the inspection.

SRT Item
The table below shows required self-diagnostic items to set the SRT to “CMPLT”.

SRT item (CONSULT-III indication)	Performance Priority*	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420
EVAP SYSTEM	2	EVAP control system purge flow monitoring	P0441
	1	EVAP control system	P0442
	2	EVAP control system	P0456
HO2S	2	Air fuel ratio (A/F) sensor 1	P0133
		Heated oxygen sensor 2	P0137
		Heated oxygen sensor 2	P0138
		Heated oxygen sensor 2	P0139

*: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT-III.

SRT Set Timing
SRT is set as “CMPLT” after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

Self-diagnosis result		Example				
		Diagnosis	Ignition cycle ← ON →	OFF ← ON →	OFF ← ON →	OFF ← ON →
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)
		P0402	OK (1)	— (1)	— (1)	OK (2)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“CMPLT”	“CMPLT”	“CMPLT”	“CMPLT”
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)
		P0402	— (0)	— (0)	OK (1)	— (1)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“INCMP”	“INCMP”	“CMPLT”	“CMPLT”
NG exists	Case 3	P0400	OK	OK	—	—
		P0402	—	—	—	—
		P1402	NG	—	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MIL “ON”)
		SRT of EGR	“INCMP”	“INCMP”	“INCMP”	“CMPLT”

OK: Self-diagnosis is carried out and the result is OK.
NG: Self-diagnosis is carried out and the result is NG.
—: Self-diagnosis is not carried out.

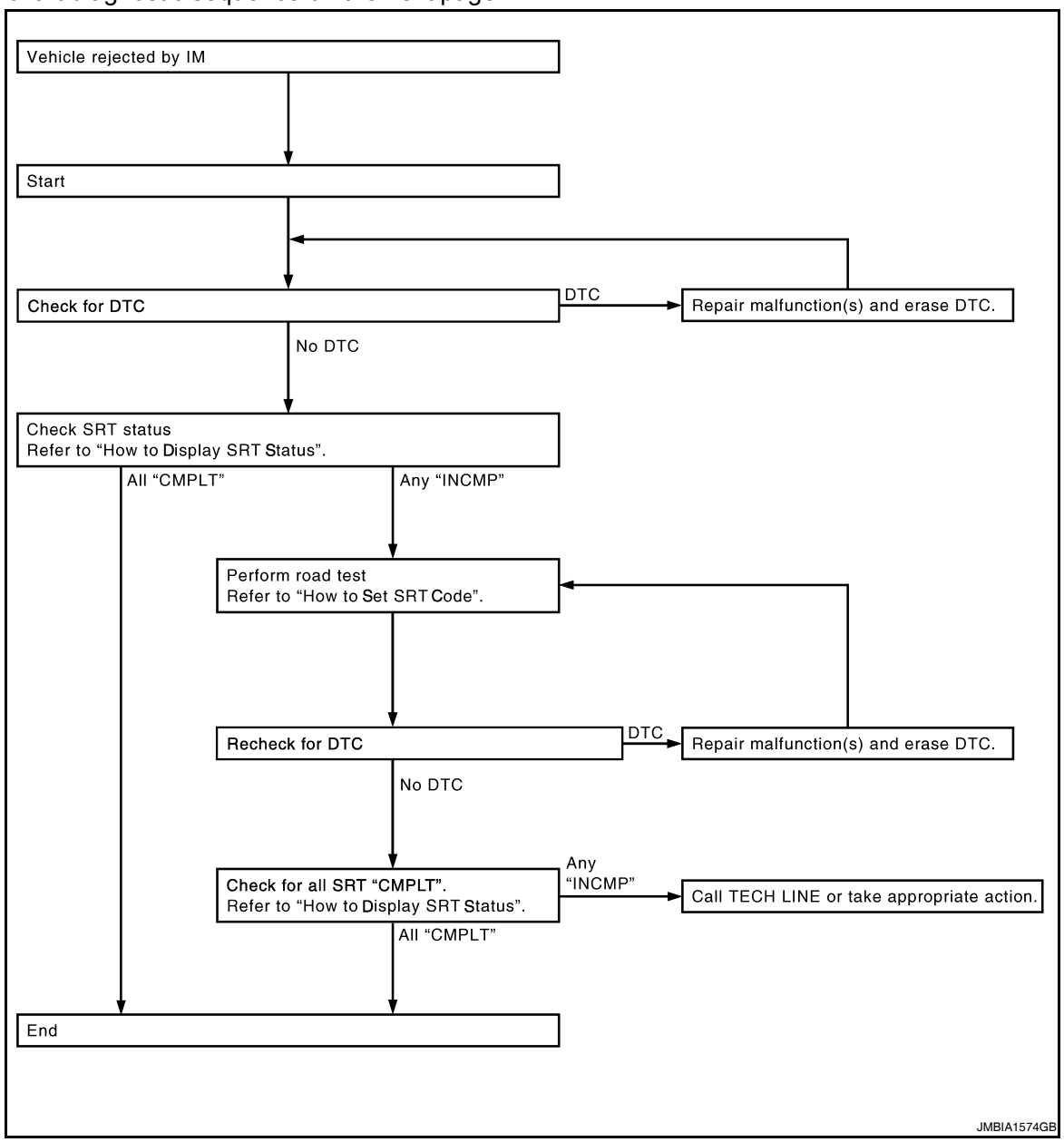
When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate “CMPLT”. → Case 1 above
When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses have at least one OK result. → Case 2 above
If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate “CMPLT”. → Case 3 above
The table above shows that the minimum number of cycles for setting SRT as “INCMP” is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

- The SRT will indicate “CMPLT” at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires “CMPLT” of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to “CMPLT” of SRT, the self-diagnosis memory must be erased from ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate “INCMP”.

  NOTE:
  SRT can be set as “CMPLT” together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates “CMPLT”.

SRT Service Procedure

If a vehicle has failed the state emissions inspection due to one or more SRT items indicating “INCMP”, review the flowchart diagnostic sequence on the next page.



How to Display SRT Status

WITH CONSULT-III

Selecting “SRT STATUS” in “DTC & SRT ONFIRMATION” mode with CONSULT-III.
For items whose SRT codes are set, a “CMPLT” is displayed on the CONSULT-III screen; for items whose SRT codes are not set, “INCMP” is displayed.

NOTE:

Though displayed on the CONSULT-III screen, “HO2S HTR” is not SRT item.

WITH GST

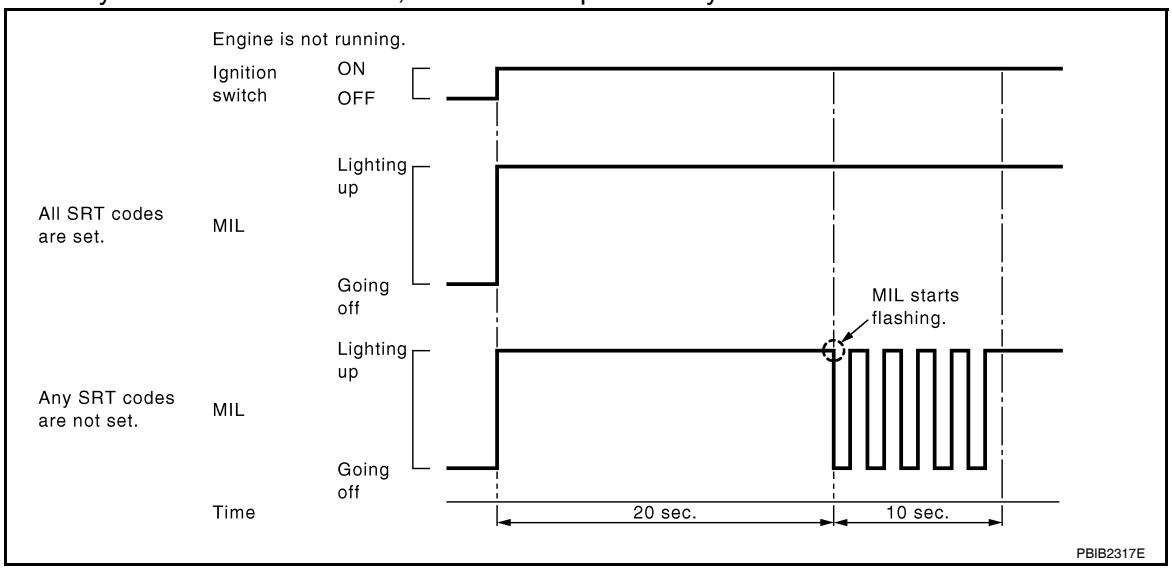
Selecting Service $01 with GST (Generic Scan Tool)

NO TOOLS

A SRT code itself can not be displayed while only SRT status can be.

1. Turn ignition switch ON and wait 20 seconds.
2. SRT status is indicated as shown below.
   - When all SRT codes are set, MIL lights up continuously.

- When any SRT codes are not set, MIL will flash periodically for 10 seconds.



How to Set SRT Code

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

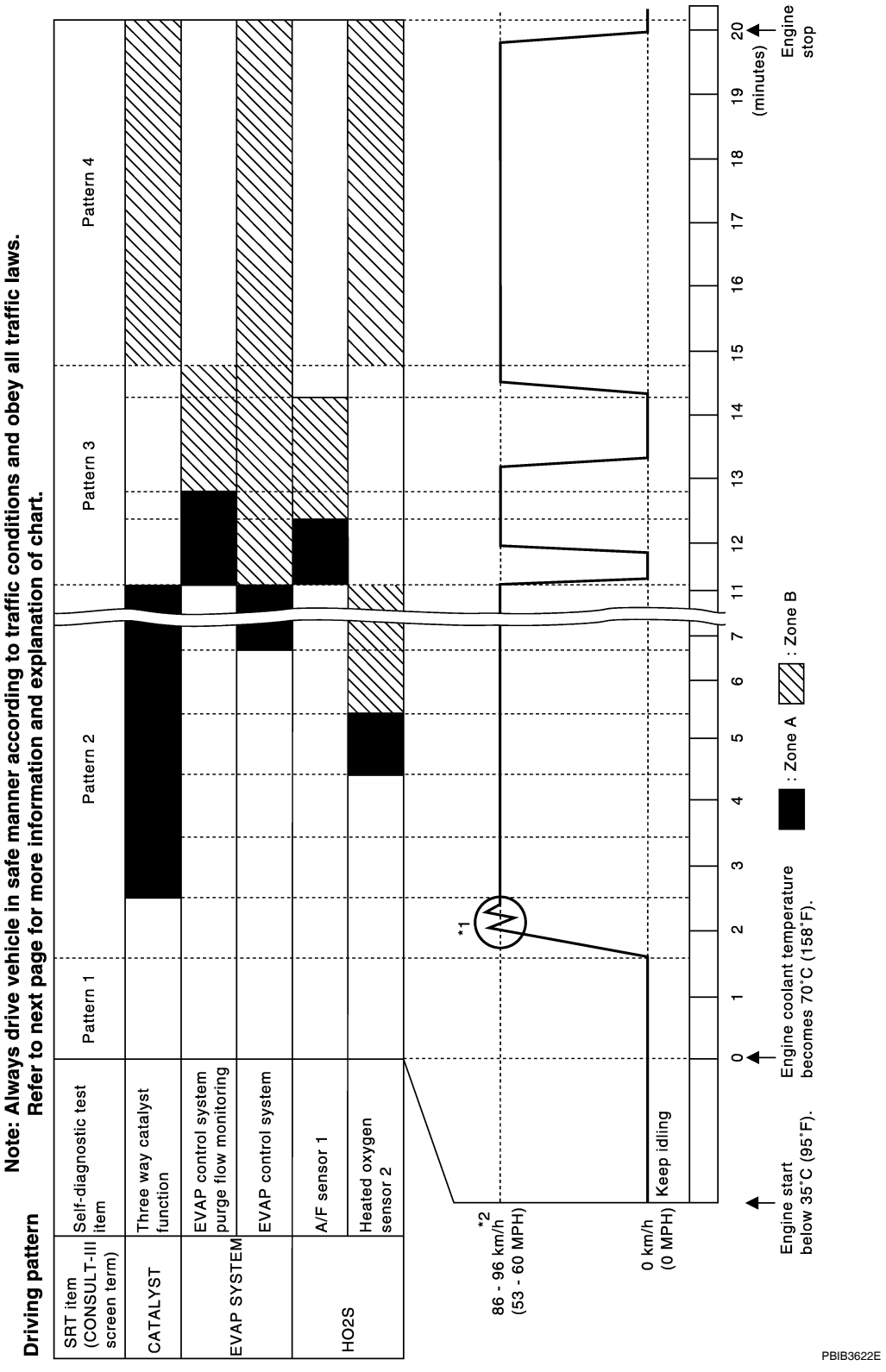
WITH CONSULT-III

Perform corresponding DTC Confirmation Procedure one by one based on Performance Priority in the table on "SRT Item".

WITHOUT CONSULT-III

The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes.

Driving Pattern



- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
  Zone A refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest.
  Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

- Sea level
- Flat road
- Ambient air temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.
  Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1:

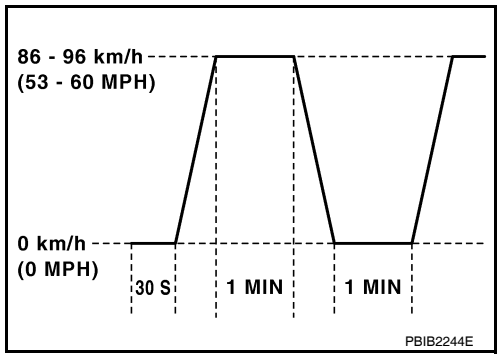
- **The engine is started at the engine coolant temperature of −10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 38 and ground is 3.0 - 4.3V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 38 and ground is lower than 1.4V).**
- **The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 43 and ground is less than 4.1V).**

Pattern 2:

- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:

- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during decelerating vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).



Pattern 4:

- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.

*2: Checking the vehicle speed with GST is advised.

Suggested Transmission Gear Position for A/T and CVT Models

Set the selector lever in the D position (CVT), D position with the overdrive switch turned ON (A/T).

Suggested upshift speeds for M/T models

Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.

	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:	For quick acceleration in low altitude areas	For high attitude areas [over 1,219m (4,000 ft)]:
Gear change	ACCEL shift point km/h (MPH)	km/h (MPH)	km/h (MPH)
1st to 2nd	13 (8)	24 (15)	24 (15)
2nd to 3rd	27 (17)	40 (25)	40 (25)
3rd to 4th	40 (25)	53 (33)	65 (40)
4th to 5th	58 (36)	71 (44)	73 (45)
5th to 6th	82 (51)	82 (51)	82 (51)

Suggested Maximum Speed in Each Gear

Downshift to a lower gear if the engine is not running smoothly, or if you need to accelerate.

Do not exceed the maximum suggested speed (shown below) in any gear. For level road driving, use the highest gear suggested for that speed. Always observe posted speed limits and drive according to the road conditions to ensure safe operation. Do not over-rev the engine when shifting to a lower gear as it may cause engine damage or loss of vehicle control.

Gear	km/h (MPH)
1st	50 (30)
2nd	90 (55)
3rd	—
4th	—
5th	—
6th	—

TEST VALUE AND TEST LIMIT (GST ONLY — NOT APPLICABLE TO CONSULT-III)

The following is the information specified in Service $06 of SAE J1979.

The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

These data (test value and test limit) are specified by On Board Monitor ID(OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.

The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (eg., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	01H	Air fuel ratio (A/F) sensor 1 (Bank 1)	P0131	83H	0BH	Minimum sensor output voltage for test cycle
			P0131	84H	0BH	Maximum sensor output voltage for test cycle
			P0130	85H	0BH	Minimum sensor output voltage for test cycle
			P0130	86H	0BH	Maximum sensor output voltage for test cycle
			P0133	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0133	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A00	89H	84H	The amount of shift in air fuel ratio
			P2A00	8AH	84H	The amount of shift in air fuel ratio
			P0130	8BH	0BH	Difference in sensor output voltage
			P0133	8CH	83H	Response gain at the limited frequency
	02H	Heated oxygen sensor 2 (Bank 1)	P0138	07H	0CH	Minimum sensor output voltage for test cycle
			P0137	08H	0CH	Maximum sensor output voltage for test cycle
			P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
	03H	Heated oxygen sensor 3 (Bank 1)	P0143	07H	0CH	Minimum sensor output voltage for test cycle
			P0144	08H	0CH	Maximum sensor output voltage for test cycle
			P0146	80H	0CH	Sensor output voltage
			P0145	81H	0CH	Difference in sensor output voltage

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P0151	83H	0BH	Minimum sensor output voltage for test cycle
			P0151	84H	0BH	Maximum sensor output voltage for test cycle
			P0150	85H	0BH	Minimum sensor output voltage for test cycle
			P0150	86H	0BH	Maximum sensor output voltage for test cycle
			P0153	87H	04H	Response rate: Response ratio (Lean to Rich)
			P0153	88H	04H	Response rate: Response ratio (Rich to Lean)
			P2A03	89H	84H	The amount of shift in air fuel ratio
			P2A03	8AH	84H	The amount of shift in air fuel ratio
			P0150	8BH	0BH	Difference in sensor output voltage
			P0153	8CH	83H	Response gain at the limited frequency
	06H	Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle
			P0157	08H	0CH	Maximum sensor output voltage for test cycle
			P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
	07H	Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle
			P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
			P0165	81H	0CH	Difference in sensor output voltage
CATA-LYST	21H	Three way catalyst function (Bank1)	P0420	80H	01H	O2 storage index
			P0420	82H	01H	Switching time lag engine exhaust index value
			P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2423	84H	84H	O2 storage index in HC trap catalyst
	22H	Three way catalyst function (Bank2)	P0430	80H	01H	O2 storage index
			P0430	82H	01H	Switching time lag engine exhaust index value
			P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
EGR SYSTEM	31H	EGR function	P0400	80H	96H	Low Flow Faults: EGR temp change rate (short term)
			P0400	81H	96H	Low Flow Faults: EGR temp change rate (long term)
			P0400	82H	96H	Low Flow Faults: Difference between max EGR temp and EGR temp under idling condition
			P0400	83H	96H	Low Flow Faults: Max EGR temp
			P1402	84H	96H	High Flow Faults: EGR temp increase rate
VVT SYSTEM	35H	VVT Monitor (Bank1)	P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
	36H	VVT Monitor (Bank2)	P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
EVAP SYSTEM	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3BH	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)
	3CH	EVAP control system leak (Very small leak)	P0456	80H	05H	Leak area index (for more than 0.02 inch)
			P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close
O2 SENSOR HEATER	41H	A/F sensor 1 heater (Bank 1)	Low Input:P0031 High Input:P0032	81H	0BH	Converted value of Heater electric current to voltage
	42H	Heated oxygen sensor 2 heater (Bank 1)	Low Input:P0037 High Input:P0038	80H	0CH	Converted value of Heater electric current to voltage
	43H	Heated oxygen sensor 3 heater (Bank 1)	P0043	80H	0CH	Converted value of Heater electric current to voltage
	45H	A/F sensor 1 heater (Bank 2)	Low Input:P0051 High Input:P0052	81H	0BH	Converted value of Heater electric current to voltage
	46H	Heated oxygen sensor 2 heater (Bank 2)	Low Input:P0057 High Input:P0058	80H	0CH	Converted value of Heater electric current to voltage
	47H	Heated oxygen sensor 3 heater (Bank 2)	P0063	80H	0CH	Converted value of Heater electric current to voltage

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
SECONDARY AIR	71H	Secondary Air system	P0411	80H	01H	Secondary Air Injection System Incorrect Flow Detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary Air Injection System Insufficient Flow
			P2445	82H	01H	Secondary Air Injection System Pump Stuck Off
			P2448	83H	01H	Secondary Air Injection System High Airflow
			Bank1: P2440 Bank2: P2442	84H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2440	85H	01H	Secondary Air Injection System Switching Valve Stuck Open
			P2444	86H	01H	Secondary Air Injection System Pump Stuck On
FUEL SYSTEM	81H	Fuel injection system function (Bank 1)	P0171 or P0172	80H	2FH	Long term fuel trim
			P0171 or P0172	81H	24H	The number of lambda control clamped
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	80H	2FH	Long term fuel trim
			P0174 or P0175	81H	24H	The number of lambda control clamped

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A1H	Multiple Cylinder Misfires	P0301	80H	24H	Misfiring counter at 1000 revolution of the first cylinder
			P0302	81H	24H	Misfiring counter at 1000 revolution of the second cylinder
			P0303	82H	24H	Misfiring counter at 1000 revolution of the third cylinder
			P0304	83H	24H	Misfiring counter at 1000 revolution of the fourth cylinder
			P0305	84H	24H	Misfiring counter at 1000 revolution of the fifth cylinder
			P0306	85H	24H	Misfiring counter at 1000 revolution of the sixth cylinder
			P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder
			P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder
			P0300	88H	24H	Misfiring counter at 1000 revolution of the multiple cylinders
			P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder
			P0302	8AH	24H	Misfiring counter at 200 revolution of the second cylinder
			P0303	8BH	24H	Misfiring counter at 200 revolution of the third cylinder
			P0304	8CH	24H	Misfiring counter at 200 revolution of the fourth cylinder
			P0305	8DH	24H	Misfiring counter at 200 revolution of the fifth cylinder
			P0306	8EH	24H	Misfiring counter at 200 revolution of the sixth cylinder
			P0307	8FH	24H	Misfiring counter at 200 revolution of the seventh cylinder
			P0308	90H	24H	Misfiring counter at 200 revolution of the eighth cylinder
			P0300	91H	24H	Misfiring counter at 1000 revolution of the single cylinder
			P0300	92H	24H	Misfiring counter at 200 revolution of the single cylinder
			P0300	93H	24H	Misfiring counter at 200 revolution of the multiple cylinders

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A2H	No. 1 Cylinder Misfire	P0301	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0301	0CH	24H	Misfire counts for last/current driving cycles
	A3H	No. 2 Cylinder Misfire	P0302	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0302	0CH	24H	Misfire counts for last/current driving cycles
	A4H	No. 3 Cylinder Misfire	P0303	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0303	0CH	24H	Misfire counts for last/current driving cycles
	A5H	No. 4 Cylinder Misfire	P0304	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0304	0CH	24H	Misfire counts for last/current driving cycles
	A6H	No. 5 Cylinder Misfire	P0305	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0305	0CH	24H	Misfire counts for last/current driving cycles
	A7H	No. 6 Cylinder Misfire	P0306	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0306	0CH	24H	Misfire counts for last/current driving cycles
	A8H	No. 7 Cylinder Misfire	P0307	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0307	0CH	24H	Misfire counts for last/current driving cycles
	A9H	No. 8 Cylinder Misfire	P0308	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0308	0CH	24H	Misfire counts for last/current driving cycles

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase 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.
- If the DTC is not for A/T or CVT related items (see EC-1015), skip step 1.

1. Erase DTC in TCM.
2. Select "ENGINE" with CONSULT-III.
3. Select "SELF-DIAG RESULTS".

4. Touch "ERASE". (The DTC in the ECM will be erased.)

With GST

NOTE:

If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.

1. Select Service $04 with GST.

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
- System readiness test (SRT) codes
- Test values

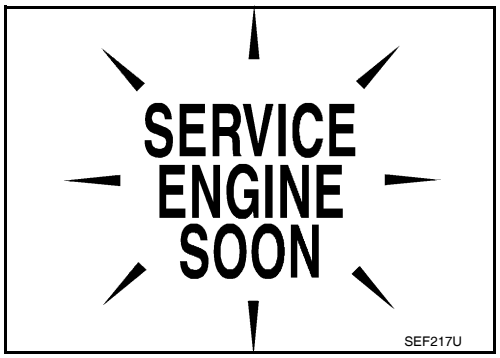
Malfunction Indicator Lamp (MIL)

INFOID:0000000004499927

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 DI-20 or see EC-1532.
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 or blink the MIL in the 1st trip. • Misfire (Possible three way catalyst damage) • One trip detection diagnoses
Mode II	Ignition switch in ON position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by MIL lighting up when there is malfunction on engine control system.
Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.
The fail-safe function also operates when above diagnoses except MIL circuit are detected, and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

MIL Flashing Without DTC
When any SRT codes are not set, MIL may flash without DTC. For the details, refer to EC-1052, "Emission-related Diagnostic Information".

HOW TO SWITCH DIAGNOSTIC TEST MODE

NOTE:
- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
- **Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.**

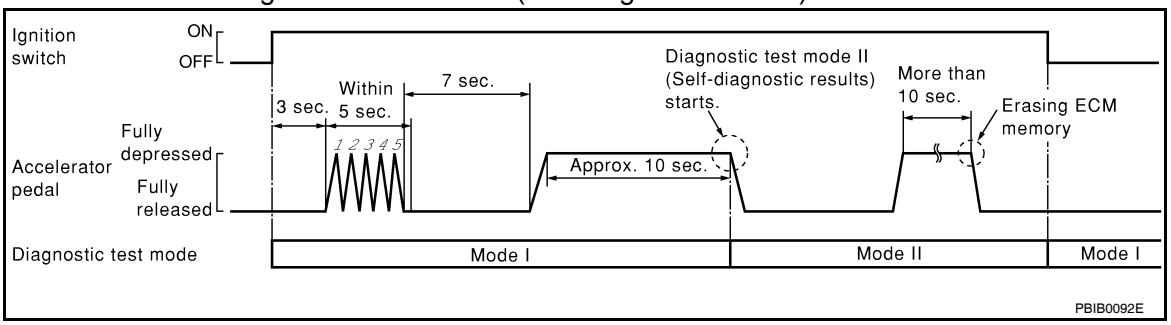
How to Set Diagnostic Test Mode II (Self-diagnostic Results)

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.
b. Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MIL starts blinking.
4. Fully release the accelerator pedal.

ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).



How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results).
   Refer to "How to Set Diagnostic Test Mode II (Self-diagnostic Results)".
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
   The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

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 DI-20 or EC-1532.

DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

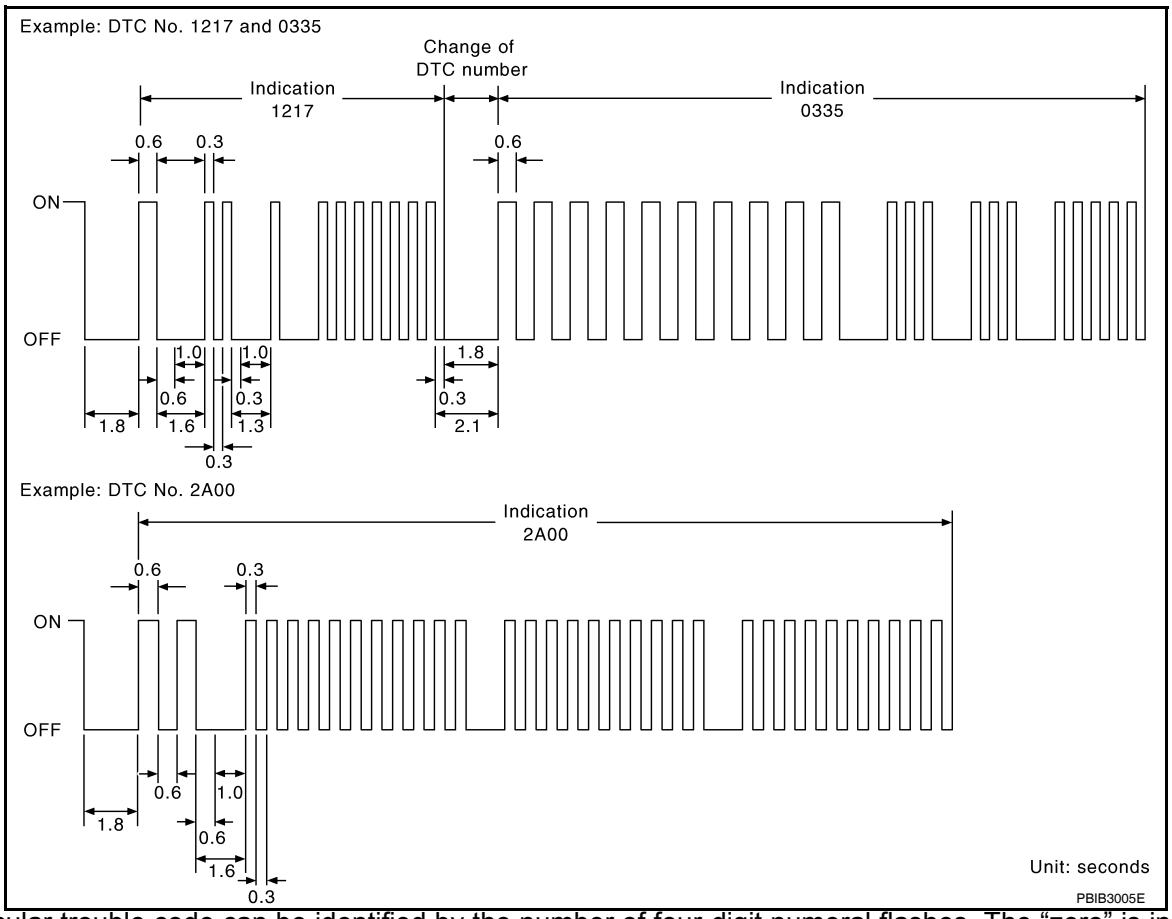
MIL	Condition
ON	When the malfunction is detected.
OFF	No malfunction

These DTC numbers are 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 or GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The “zero” is indicated by the number of ten flashes. The “A” is indicated by the number of eleven flash. 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-1015)

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)
The DTC can be erased from the back-up memory in the ECM by depressing accelerator pedal.
Refer to "How to Erase Diagnostic Test Mode II (Self-diagnostic Results)".
- **If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

OBD System Operation Chart

INFOID:0000000004499928

RELATIONSHIP BETWEEN MIL, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to EC-1051, "Two Trip Detection Logic".
- The MIL will go off after the vehicle is driven 3 times (driving pattern B) with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern

C) without the same malfunction recurring. The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-III will count the number of times the vehicle is driven.

- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

SUMMARY CHART

Items	Fuel Injection System	Misfire	Other
MIL (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

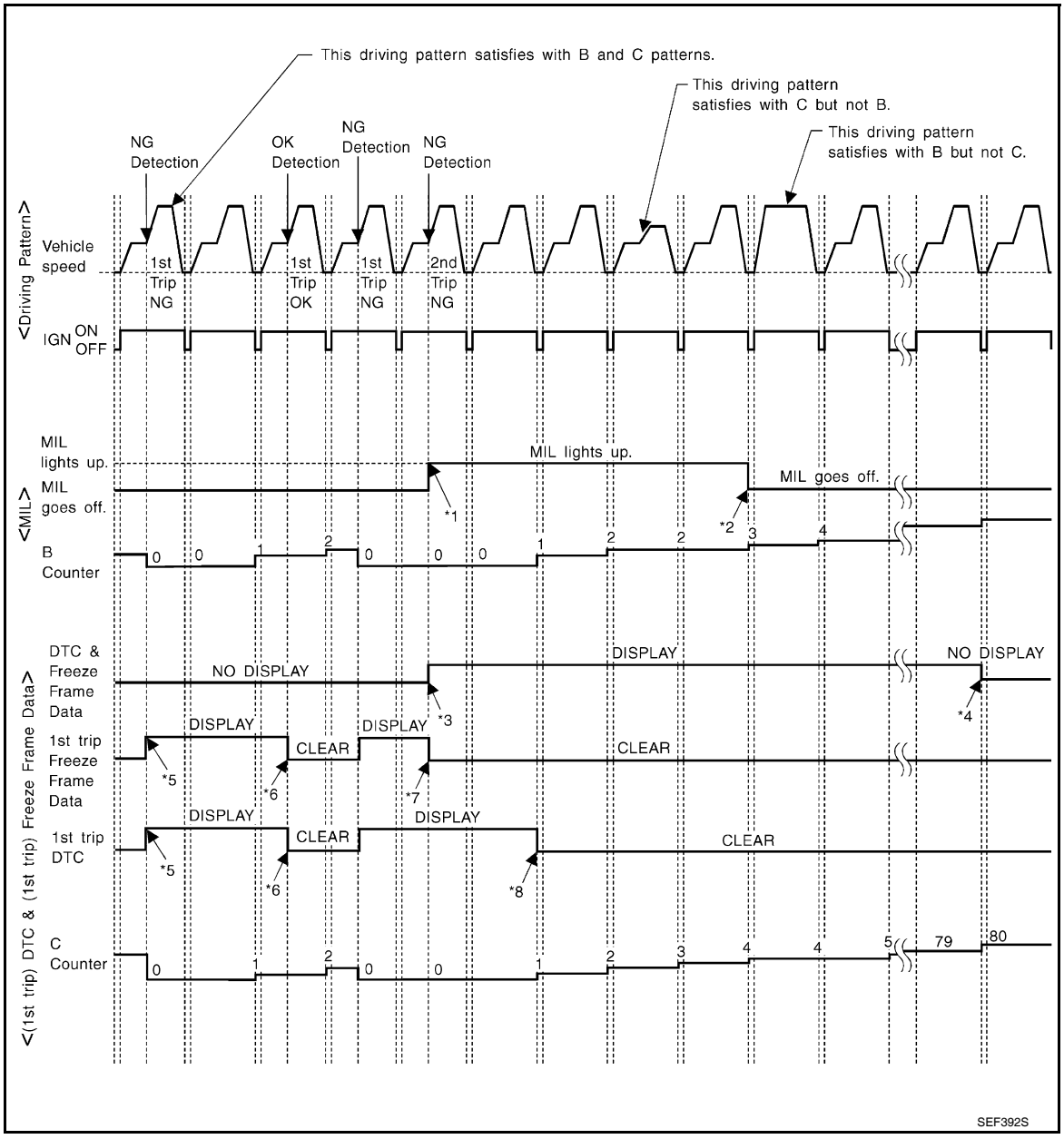
For details about patterns B and C under “Fuel Injection System” and “Misfire”, see "EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM””.

For details about patterns A and B under “Other”, see "EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM””.

*1: Clear timing is at the moment OK is detected.

*2: Clear timing is when the same malfunction is detected in the 2nd trip.

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

*8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”

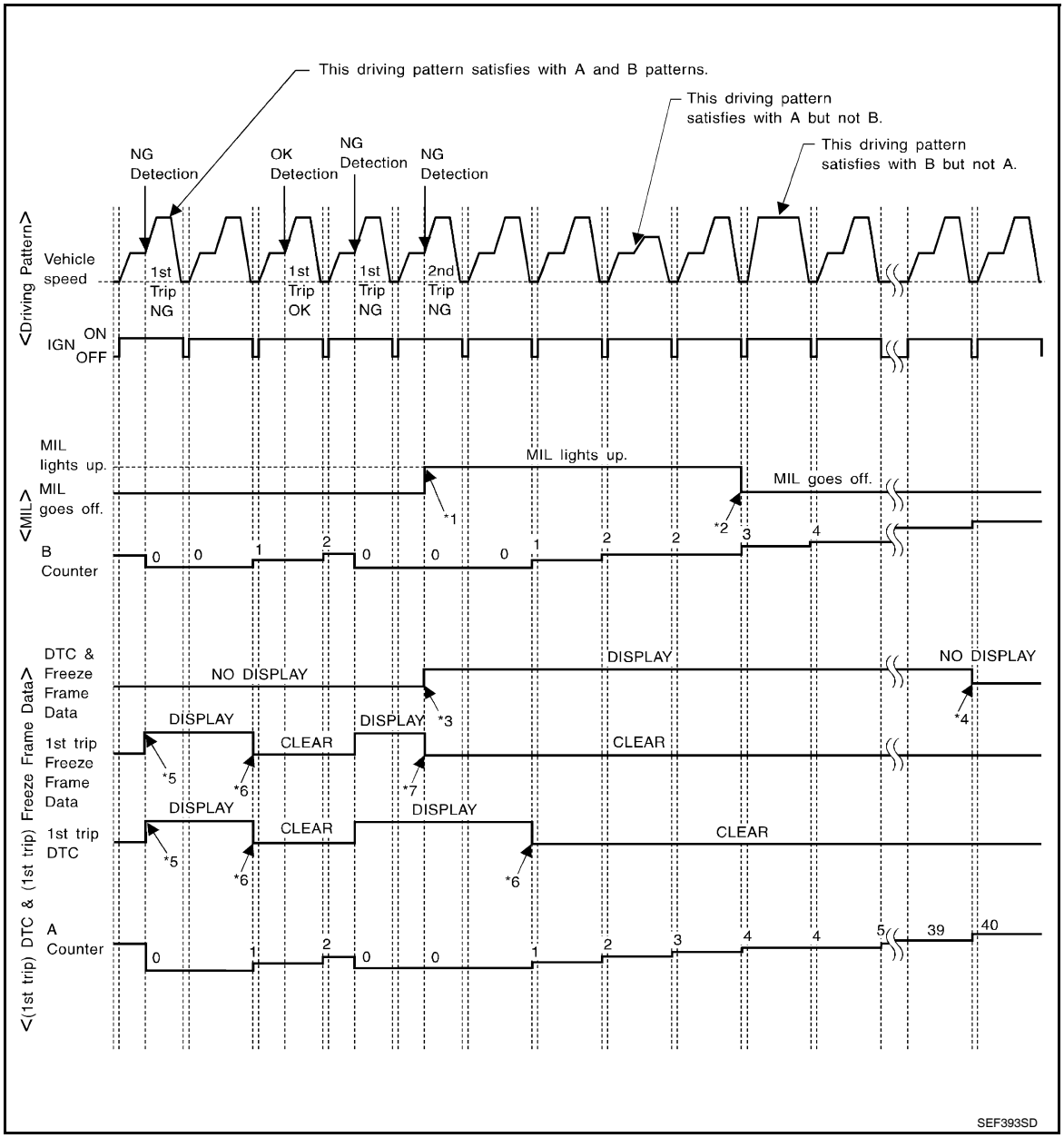
<Driving Pattern B>
Driving pattern B means the vehicle operation as follows:

All components and systems should be monitored at least once by the OBD system.
- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunction.
- The MIL will go off when the B counter reaches 3. (*2 in “OBD SYSTEM OPERATION CHART”)

<Driving Pattern C>
Driving pattern C means the vehicle operation as follows:
The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature (T) condition:
- When the freeze frame data shows lower than 70°C (158°F), “T” should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), “T” should be higher than or equal to 70°C (158°F).

Example:
If the stored freeze frame data is as follows:
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)
To be satisfied with driving pattern C, the vehicle should run under the following conditions:
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)
- The C counter will be cleared when the malfunction is detected regardless of vehicle conditions above.
- The C counter will be counted up when vehicle conditions above is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS EXCEPT FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

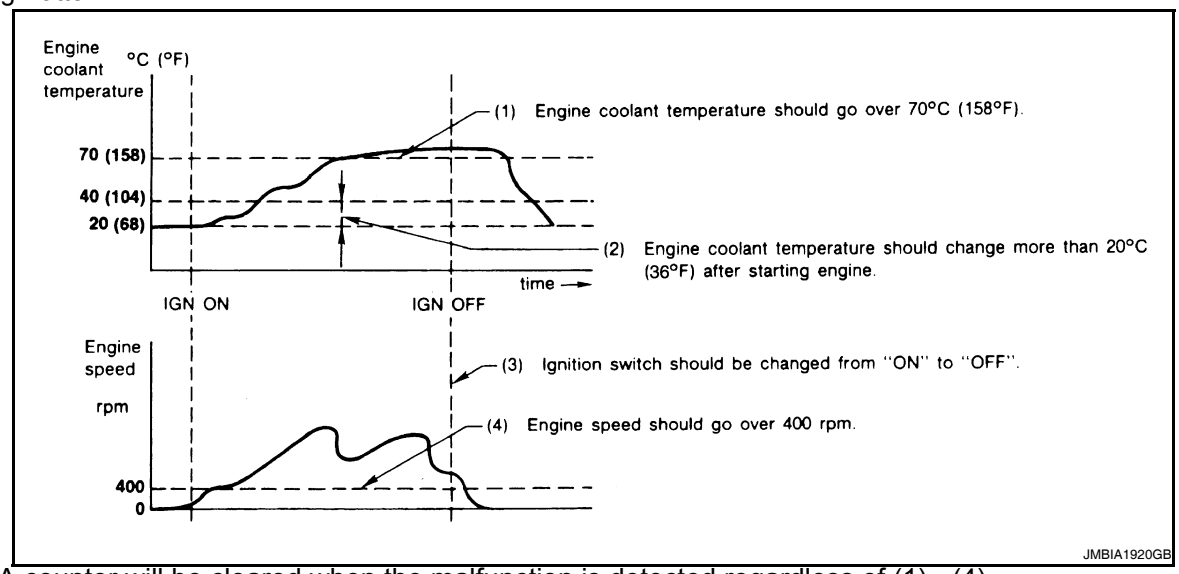
*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

EXPLANATION FOR DRIVING PATTERNS EXCEPT FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”

<Driving Pattern A>



- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will go off when the B counter reaches 3 (*2 in “OBD SYSTEM OPERATION CHART”).

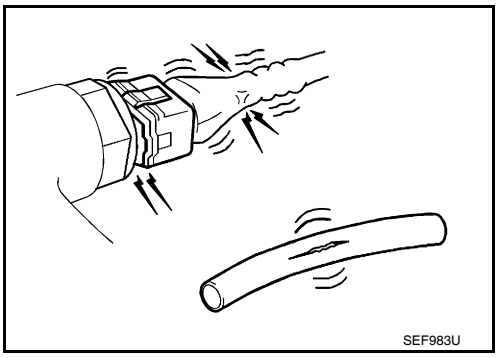
BASIC SERVICE PROCEDURE

Basic Inspection

INFOID:0000000004499929

1.INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket
3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
   Ensure engine stays below 1,000 rpm.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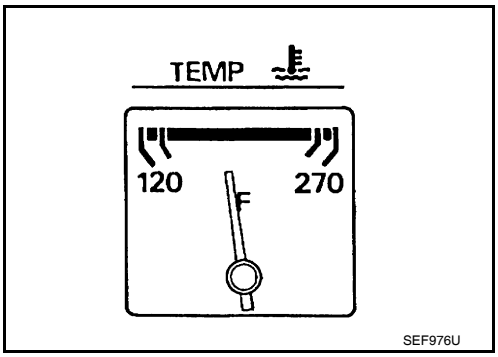

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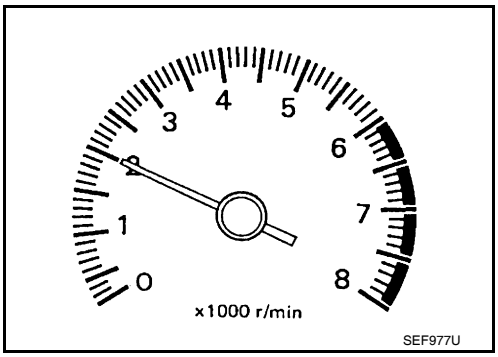
5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT-III or GST.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



SEF977U

2.REPAIR OR REPLACE

Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3.

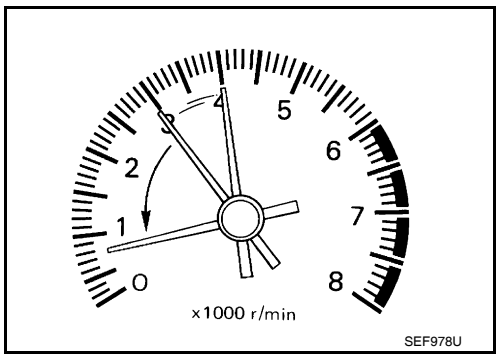
3.CHECK TARGET IDLE SPEED

With CONSULT-III

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. Read idle speed in “DATA MONITOR” mode with CONSULT-III. Refer to EC-1082, "Idle Speed and Ignition Timing Check".

M/T: 700 ± 50 rpm (in Neutral position)
A/T: 700 ± 50 rpm (in P or N position)
CVT: 700 ± 50 rpm (in P or N position)



Without CONSULT-III
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. Refer to EC-1082, "Idle Speed and Ignition Timing Check".

M/T: 700 ± 50 rpm (in Neutral position)
A/T: 700 ± 50 rpm (in P or N position)
CVT: 700 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 4.

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-1084, "Accelerator Pedal Released Position Learning".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-1084, "Throttle Valve Closed Position Learning".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-1084, "Idle Air Volume Learning".
Is Idle Air Volume Learning carried out successfully?

Yes or No

Yes >> GO TO 7.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-III. Refer to EC-1082, "Idle Speed and Ignition Timing Check".

M/T: 700 ± 50 rpm (in Neutral position)
A/T: 700 ± 50 rpm (in P or N position)
CVT: 700 ± 50 rpm (in P or N position)

Without CONSULT-III
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to EC-1082, "Idle Speed and Ignition Timing Check".

M/T: 700 ± 50 rpm (in Neutral position)
A/T: 700 ± 50 rpm (in P or N position)
CVT: 700 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- Check crankshaft position sensor (POS) and circuit.
  Refer to EC-1293.
- Check camshaft position sensor (PHASE) and circuit.
  Refer to EC-1299.

OK or NG

OK >> GO TO 9.
NG >> 1. Repair or replace.
2. GO TO 4.

9. CHECK ECM FUNCTION

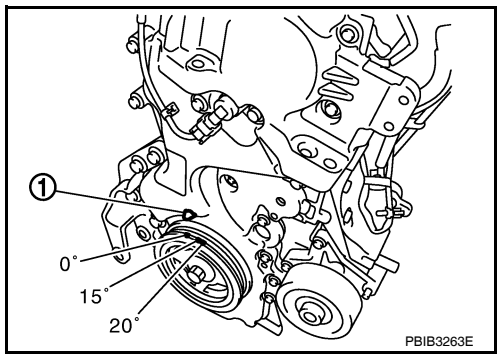
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs.
   Refer to BL-249, "ECM Re-communicating Function".

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light.
   Refer to EC-1082, "Idle Speed and Ignition Timing Check".

- Timing indicator (1)



M/T: 13 ± 5° BTDC (in Neutral position)
A/T: 13 ± 5° BTDC (in P or N position)
CVT: 13 ± 5° BTDC (in P or N position)

OK or NG

OK >> GO TO 19.
NG >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-1084, "Accelerator Pedal Released Position Learning".

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-1084, "Throttle Valve Closed Position Learning".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-1084, "Idle Air Volume Learning".
Is Idle Air Volume Learning carried out successfully?
Yes or No

Yes >> GO TO 14.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-III. Refer to EC-1082, "Idle Speed and Ignition Timing Check".

M/T: 700 ± 50 rpm (in Neutral position)
A/T: 700 ± 50 rpm (in P or N position)
CVT: 700 ± 50 rpm (in P or N position)

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to EC-1082, "Idle Speed and Ignition Timing Check".

M/T: 700 ± 50 rpm (in Neutral position)
A/T: 700 ± 50 rpm (in P or N position)
CVT: 700 ± 50 rpm (in P or N position)

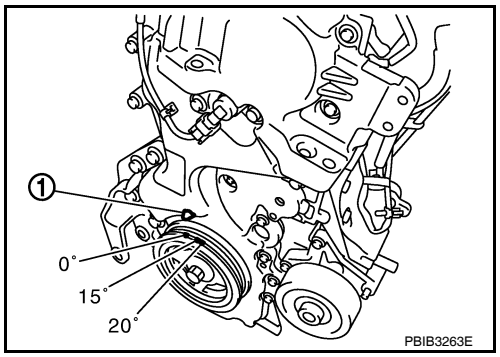
OK or NG

OK >> GO TO 15.
NG >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.
Refer to EC-1082, "Idle Speed and Ignition Timing Check".

- Timing indicator (1)



M/T: 13 ± 5° BTDC (in Neutral position)
A/T: 13 ± 5° BTDC (in P or N position)
CVT: 13 ± 5° BTDC (in P or N position)

OK or NG

OK >> GO TO 19
NG >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-161, "Removal and Installation".

OK or NG

OK >> GO TO 17.
NG >> 1. Repair the timing chain installation.
2. GO TO 4.

17. DETECT MALFUNCTIONING PART

Check the following.

- Check crankshaft position sensor (POS) and circuit.
Refer to EC-1293.
- Check camshaft position sensor (PHASE) and circuit.
Refer to EC-1299.

OK or NG

OK >> GO TO 18.
NG >> 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 NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-249, "ECM Re-communicating Function".

>> GO TO 4.

19. INSPECTION END

Did you replace ECM, referring this Basic Inspection procedure?

Yes or No

Yes >> 1. Perform EC-1084, "VIN Registration".
2. **INSPECTION END**

No >> **INSPECTION END**

Idle Speed and Ignition Timing Check

INFOID:0000000004499930

IDLE SPEED

With CONSULT-III

Check idle speed in “DATA MONITOR” mode with CONSULT-III.

With GST

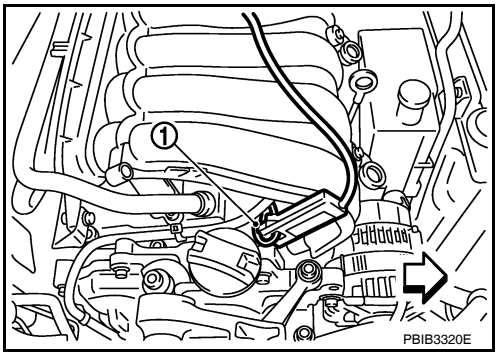
Check idle speed in Service $01 with GST.

IGNITION TIMING

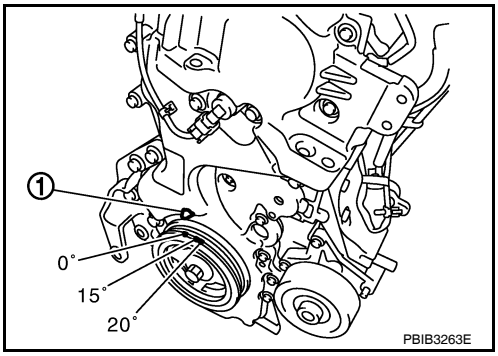
Any of following two methods may be used.

Method A

1. Attach timing light to loop wire (1) as shown.
   - : Vehicle front



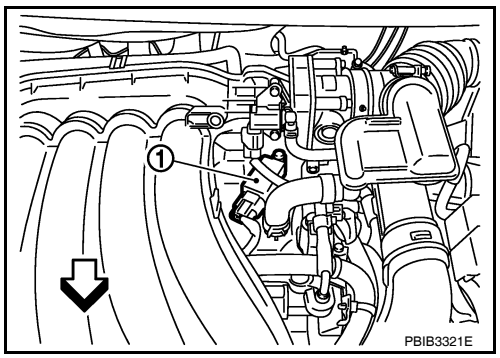
2. Check ignition timing.
   - Timing indicator (1)



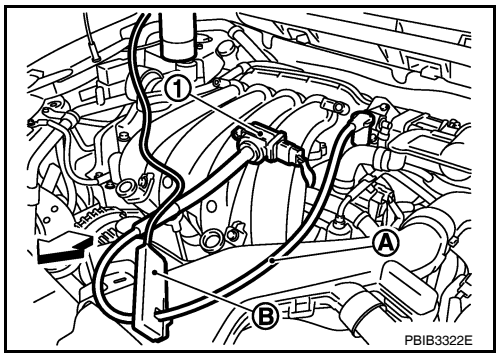
Method B

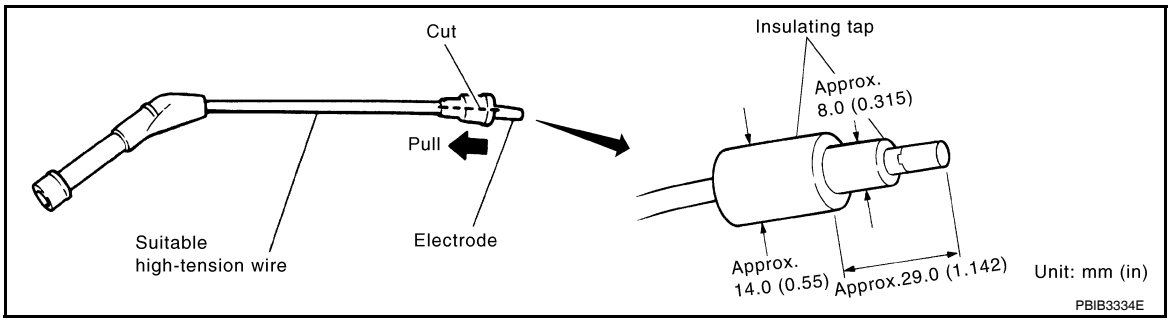
1. Remove No. 4 ignition coil (1).

- : Vehicle front

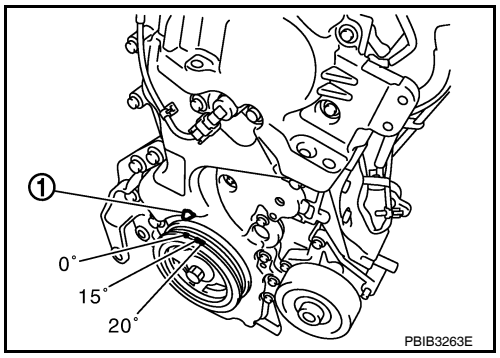


2. Connect No. 4 ignition coil (1) and No. 4 spark plug with suitable high-tension wire (A) as shown, and attach timing light clamp (B) to this wire.
   - : Vehicle front





3. Check ignition timing.
   - Timing indicator (1)



Procedure After Replacing ECM

INFOID:0000000004499931

When replacing ECM, the following procedure must be performed.

1. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-249, "ECM Re-communicating Function".
2. Perform EC-1084, "VIN Registration".
3. Perform EC-1084, "Accelerator Pedal Released Position Learning".
4. Perform EC-1084, "Throttle Valve Closed Position Learning".

5. Perform EC-1084, "Idle Air Volume Learning".

VIN Registration

INFOID:0000000004499932

DESCRIPTION

VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced.

NOTE:

Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).

OPERATION PROCEDURE

With CONSULT-III

1. Check the VIN of the vehicle and note it. Refer to GI-43, "Model Variation".
2. Turn ignition switch ON and engine stopped.
3. Select “VIN REGISTRATION” in “WORK SUPPORT” mode.
4. Follow the instruction of CONSULT-III display.

Accelerator Pedal Released Position Learning

INFOID:0000000004499933

DESCRIPTION

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.

OPERATION PROCEDURE

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.

Throttle Valve Closed Position Learning

INFOID:0000000004499934

DESCRIPTION

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.

OPERATION PROCEDURE

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.

Idle Air Volume Learning

INFOID:0000000004499935

DESCRIPTION

Idle Air Volume Learning is an operation to learn the idle air volume that keeps each engine 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.

PREPARATION

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 - 95°C (158 - 203°F)
- Park/neutral position (PNP) switch: ON
- Electric load switch: OFF

[Air conditioner, headlamp, rear window defogger]
On vehicles equipped with daytime light systems, if the parking brake is applied before the engine is started the headlamp will not be illuminated.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
- Models with CONSULT-III (A/T and CVT models)
- Drive vehicle until “FLUID TEMP SE” in “DATA MONITOR” mode of “A/T” or “CVT” system indicates less than 0.9V.
- Models without CONSULT-III (A/T and CVT models) and M/T models
- Drive vehicle for 10 minutes.

OPERATION PROCEDURE

With CONSULT-III

1. Perform EC-1084, "Accelerator Pedal Released Position Learning".
2. Perform EC-1084, "Throttle Valve Closed Position Learning".
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode.
6. Touch “START” and wait 20 seconds.
7. Make sure that “CMPLT” is displayed on CONSULT-III screen. If “CMPLT” is not displayed, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the DIAGNOSTIC PROCEDURE below.
8. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.
   Refer to EC-1078, "Basic Inspection".

ITEM	SPECIFICATION
Idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position) CVT: 700 ± 50 rpm (in P or N position)
Ignition timing	M/T: 13 ± 5° BTDC (in Neutral position) A/T: 13 ± 5° BTDC (in P or N position) CVT: 13 ± 5° BTDC (in P or N position)

Without CONSULT-III

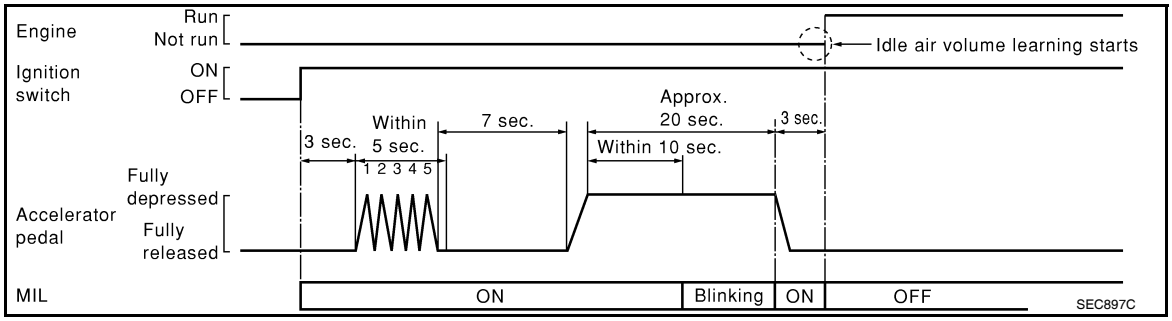
NOTE:
- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**

1. Perform EC-1084, "Accelerator Pedal Released Position Learning".
2. Perform EC-1084, "Throttle Valve Closed Position Learning".
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
7. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.
b. Fully release the accelerator pedal.

8. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops blinking and turned ON.
9. Fully release the accelerator pedal within 3 seconds after the MIL turned ON.
10. Start engine and let it idle.

11. Wait 20 seconds.



12. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications. Refer to EC-1078, "Basic Inspection".

ITEM	SPECIFICATION
Idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position) CVT: 700 ± 50 rpm (in P or N position)
Ignition timing	M/T: 13 ± 5° BTDC (in Neutral position) A/T: 13 ± 5° BTDC (in P or N position) CVT: 13 ± 5° BTDC (in P or N position)

13. If idle speed and ignition timing are not within the specification, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the DIAGNOSTIC PROCEDURE below.

DIAGNOSTIC PROCEDURE

If idle air volume learning cannot be performed successfully, proceed as follows:

1. **Check that throttle valve is fully closed.**
2. **Check PCV valve operation.**
3. **Check that downstream of throttle valve is free from air leakage.**
4. **When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.**
   It is useful to perform EC-1130.
5. **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.**

Fuel Pressure Check

INFOID:0000000004499936

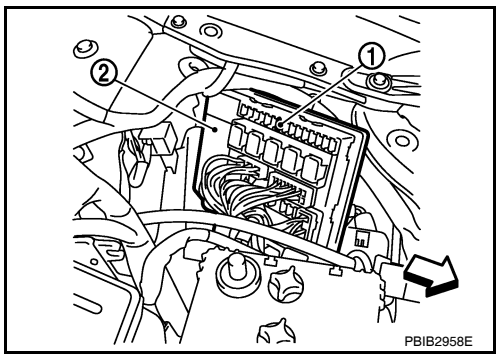
FUEL PRESSURE RELEASE

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 (1) located in IPDM E/R (2).
   - : Vehicle front
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

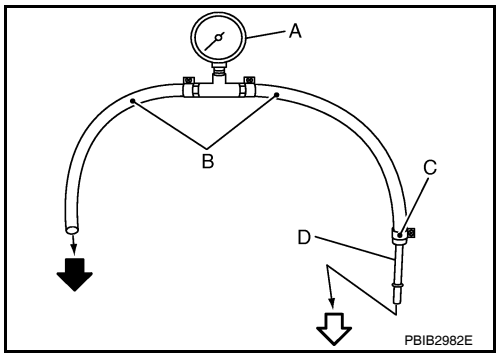
CAUTION:

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

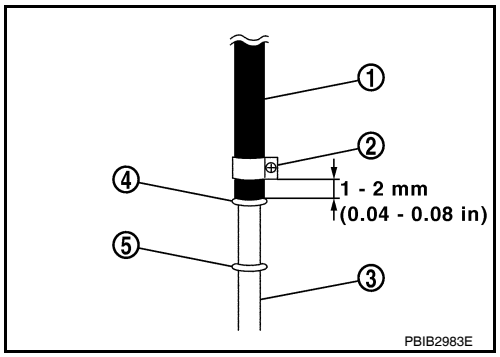
NOTE:

- **Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because C11 models do not have fuel return system.**
- **The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.**
- **Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains seal ability with O-rings inside.**
- **Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.**

1. Release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".
2. Prepare fuel hose for fuel pressure check B and fuel tube adapter (KV10118400) D, then connect fuel pressure gauge A.
   - : To quick connector
   - : To fuel tube (engine side)
   - C: Clamp
   - Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
   - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
   - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
   - Use Pressure Gauge to check fuel pressure.



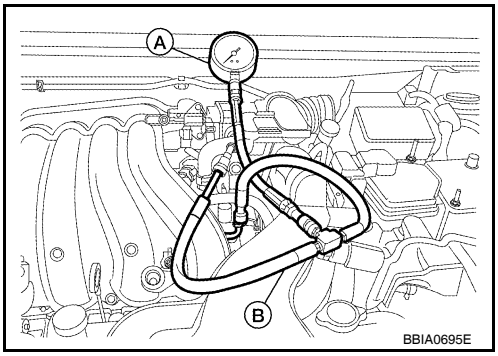
3. Remove fuel hose. Refer to EM-156, "Removal and Installation".
   - Do not twist or kink fuel hose because it is plastic hose.
4. Connect fuel hose for fuel pressure check (1) to fuel tube (engine side) with clamp (2) as shown in the figure.
   - No.2 spool (5)
   - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
   - Apply proper amount of gasoline between top of the fuel tube (3) and No.1 spool (4).
   - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
   - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
   - When reconnecting fuel line, always use new clamps.
   - Use a torque driver to tighten clamps.
   - Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).



Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

- Make sure that clamp screw does not contact adjacent parts.

5. Connect fuel tube adapter to quick connector.
   - A: Fuel pressure gauge
   - B: Fuel hose for fuel pressure check
6. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
7. Turn ignition switch ON and check for fuel leakage.
8. Start engine and check for fuel leakage.
9. Read the indication of fuel pressure gauge.
   - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
   - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.



At idling: Approximately 350 kPa (3.57 kg/cm^2, 51 psi)

10. If result is unsatisfactory, go to next step.
11. Check the following.
    - Fuel hoses and fuel tubes for clogging
    - Fuel filter for clogging
    - Fuel pump
    - Fuel pressure regulator for clogging

    If OK, replace fuel pressure regulator.
    If NG, repair or replace.
12. Check the following.
    - Fuel hoses and fuel tubes for clogging
    - Fuel filter for clogging
    - Fuel pump
    - Fuel pressure regulator for clogging

    If OK, replace fuel pressure regulator.
    If NG, repair or replace.
13. Before disconnecting Fuel Pressure Gauge and Fuel Pressure Adapter J-44321-6, release fuel pressure to zero. Refer to "FUEL PRESSURE RELEASE".

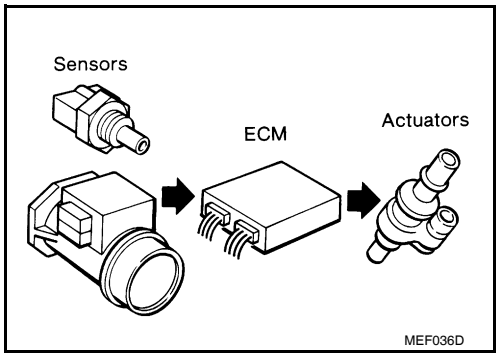
TROUBLE DIAGNOSIS

Trouble Diagnosis Introduction

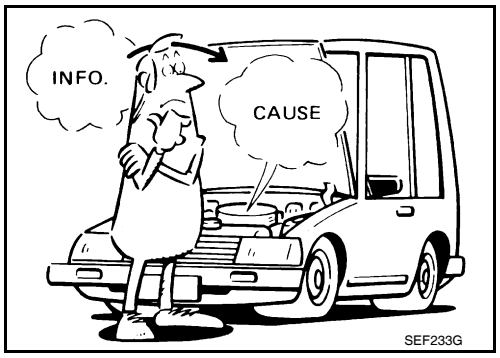
INFOID:0000000004499937

INTRODUCTION

The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, fouled spark plugs, or other malfunctions with the engine.



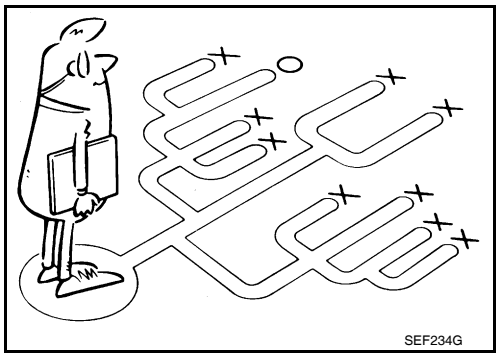
It is much more difficult to diagnose an incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



A visual check only may not find the cause of the incidents. A road test with CONSULT-III (or GST) or a circuit tester connected should be performed. Follow the Work Flow on "WORK FLOW".

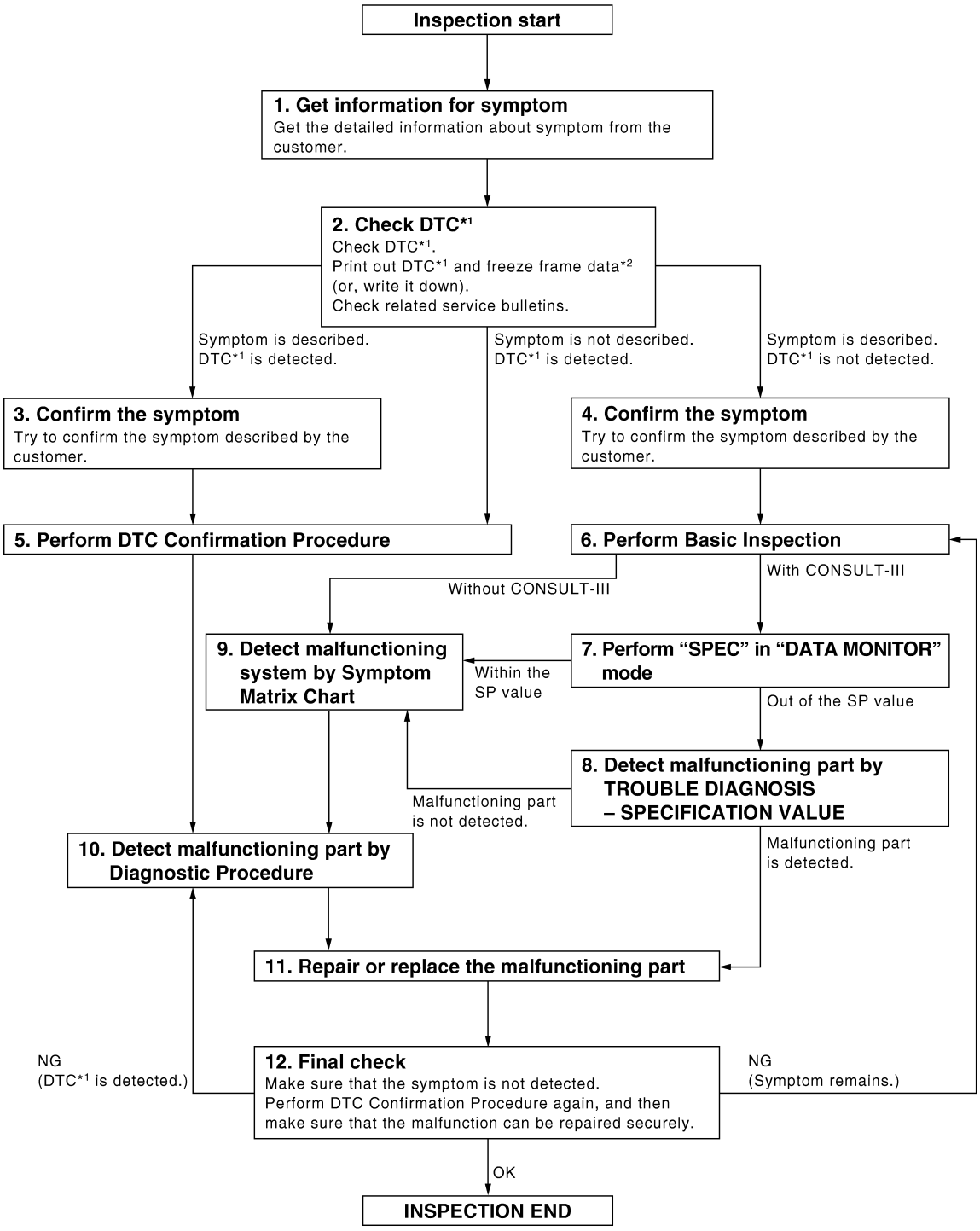
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a drivability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic Worksheet like the example on "Worksheet Sample" should be used.

Start your diagnosis by looking for conventional malfunctions first. This will help troubleshoot drivability malfunctions on an electronically controlled engine vehicle.



WORK FLOW

Overall Sequence



*1: Include 1st trip DTC.
*2: Include 1st trip freeze frame data.

PBIB3456E

Detailed Flow

1. GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the "DIAGNOSTIC WORKSHEET".

>> GO TO 2.

2.CHECK DTC*1

1. Check DTC*1.
2. Perform the following procedure if DTC*1 is displayed.

- Record DTC*1 and freeze frame data*2. (Print them out with CONSULT-III or GST.)
- Erase DTC*1. (Refer to EC-1052, "Emission-related Diagnostic Information")
- Study the relationship between the cause detected by DTC*1 and the symptom described by the customer. (Symptom Matrix Chart is useful. Refer to EC-1095, "Symptom Matrix Chart".)

3. Check related service bulletins for information.

Is any symptom described and any DTC detected?

Symptom is described, DTC*1 is displayed>>GO TO 3.
Symptom is described, DTC*1 is not displayed>>GO TO 4.
Symptom is not described, DTC*1 is displayed>>GO TO 5.

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).
DIAGNOSIS 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.
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*1, and then make sure that DTC*1 is detected again.

If two or more DTCs*1 are detected, refer to EC-1093, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

NOTE:

- Freeze frame data*2 is useful if the DTC*1 is not detected.
- Perform Overall Function Check if DTC Confirmation Procedure is not included on Service Manual. This simplified check procedure is an effective alternative though DTC*1 cannot be detected during this check.
  If the result of Overall Function Check is NG, it is the same as the detection of DTC*1 by DTC Confirmation Procedure.

Is DTC*1 detected?

Yes >> GO TO 10.
No >> Check according to EC-1138.

6.PERFORM BASIC INSPECTION

Perform EC-1078, "Basic Inspection".

With CONSULT-III>>GO TO 7.
Without CONSULT-III>>GO TO 9.

7.PERFORM SPEC IN DATA MONITOR (SPEC) 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 “SPEC” in “DATA MONITOR” mode. Refer to EC-1130, "Inspection Procedure".

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-1130, "Diagnosis Procedure".

Is malfunctioning part detected?

Yes >> GO TO 11.
No >> GO TO 9.

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM MATRIX CHART

Detect malfunctioning system according to EC-1095, "Symptom Matrix Chart" 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-25, "How to Perform Efficient Diagnosis for an Electrical Incident".

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-1109, "ECM Terminal and Reference Value", EC-1126, "CONSULT-III Reference Value in Data Monitor Mode".

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-1052, "Emission-related Diagnostic Information".

>> GO TO 12.

12. FINAL CHECK

When DTC was detected in step 2, perform DTC Confirmation Procedure or Overall Function Check again, and then 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.

OK or NG

NG (DTC*1 is detected)>>GO TO 10.
NG (Symptom remains)>>GO TO 6.
OK >> 1. Before returning the vehicle to the customer, make sure to erase unnecessary DTC*1 in ECM and TCM (Transmission Control Module). (Refer to EC-1052, "Emission-related Diagnostic Information" and AT-39, "OBD-II Diagnostic Trouble Code (DTC)", CVT-209, "OBD-II Diagnostic Trouble Code (DTC)".)
2. If the completion of SRT is needed, drive vehicle under the specific driving pattern. Refer to EC-1052, "Emission-related Diagnostic Information".
3. **INSPECTION END**

*1: Include 1st trip DTC.
*2: Include 1st trip freeze frame data.

DIAGNOSTIC WORKSHEET

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 as shown in the following "Worksheet Sample" in order to organize all the information for troubleshooting.
Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

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

DTC Inspection Priority Chart

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If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
1	• U0101 U0140 U1001 CAN communication line • P0101 P0102 P0103 Mass air flow sensor • P0112 P0113 P0127 Intake air temperature sensor • P0116 P0117 P0118 P0125 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor • P0128 Thermostat function • P0181 P0182 P0183 Fuel tank temperature sensor • P0327 P0328 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 Camshaft position sensor (PHASE) • P0460 P0461 P0462 P0463 Fuel level sensor • P0500 Vehicle speed sensor • P0605 P0607 ECM • P0643 Sensor power supply • P0705 P0850 Park/neutral position (PNP) switch • P1610 - P1615 NATS • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	• P0031 P0032 Air fuel ratio (A/F) sensor 1 heater • P0037 P0038 Heated oxygen sensor 2 heater • P0075 Intake valve timing control solenoid valve • P0130 P0131 P0132 P0133 P2A00 Air fuel ratio (A/F) sensor 1 • P0137 P0138 P0139 Heated oxygen sensor 2 • P0441 EVAP control system purge flow monitoring • P0443 P0444 P0445 EVAP canister purge volume control solenoid valve • P0447 P0448 EVAP canister vent control valve • P0451 P0452 P0453 EVAP control system pressure sensor • P1217 Engine over temperature (OVERHEAT) • P1805 Brake switch • P2100 P2103 Throttle control motor relay • P2101 Electric throttle control function • P2118 Throttle control motor
3	• P0011 Intake valve timing control • P0171 P0172 Fuel injection system function • P0300 - P0304 Misfire • P0420 Three way catalyst function • P0442 P0456 EVAP control system (SMALL LEAK, VERY SMALL LEAK) • P0455 EVAP control system (GROSS LEAK) • P0506 P0507 Idle speed control system • P0710 P0715 P0720 P0725 P0731 P0732 P0733 P0734 P0740 P0744 P0745 P0746 P0750 P0755 P0776 P0778 P0840 P0845 P1705 P1740 P1760 P1777 P1778 A/T or CVT related sensors, solenoid valves and switches • P1148 Closed loop control • P1421 Cold start control • P1564 ASCD steering switch • P1572 ASCD brake switch • P1574 ASCD vehicle speed sensor • P1715 Turbine revolution sensor (A/T), Primary speed sensor (CVT) • P2119 Electric throttle control actuator

Fail-Safe Chart

INFOID:0000000004499939

When the DTC listed below is detected, the ECM enters fail-safe mode and the MIL lights up.

DTC No.	Detected items	Engine operating condition in fail-safe mode
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 sarting. — 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.
P0643	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P2100 P2103	Throttle control 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 (A/T, 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.

- 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.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Symptom Matrix Chart

INFOID:0000000004499940

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference
		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-1513
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-1086
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-1508
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-1036
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-1048
	Incorrect idle speed adjustment						1	1	1	1		1			EC-1078
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-1451, EC-1462
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-1078
	Ignition circuit	1	1	2	2	2		2	2			2			EC-1518
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-1139
Mass air flow sensor circuit		1	1	2	2	2		2	2			2			EC-1170, EC-1178
Engine coolant temperature sensor circuit					3		3			3					EC-1189, EC-1192, EC-1202
Air fuel ratio (A/F) sensor 1 circuit															EC-1210, EC-1216, EC-1222, EC-1228, EC-1488
Throttle position sensor circuit							2			2					EC-1197, EC-1278, EC-1417, EC-1419, EC-1476
Accelerator pedal position sensor circuit				3	2	1									EC-1396, EC-1464, EC-1469, EC-1481
Knock sensor circuit				2								3			EC-1289
Crankshaft position sensor (POS) circuit		2	2												EC-1293
Camshaft position sensor (PHASE) circuit		3	2												EC-1299
Vehicle speed signal circuit			2	3		3						3			EC-1387
ECM		2	2	3	3	3	3	3	3	3	3	3			EC-1393

	SYMPTOM													Reference
	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	
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-1165
Park/neutral position (PNP) switch circuit			3		3		3	3			3			EC-1401
Refrigerant pressure sensor circuit		2				3			3		4			EC-1527
Electrical load signal circuit							3							EC-1506
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	MTC-22
ABS actuator and electric unit (control unit)			4											BRC-8

1 - 6: The numbers refer to the order of inspection.

(continued on next table)

SYSTEM — ENGINE MECHANICAL & OTHER

		SYMPTOM													Reference
		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													FL-9
	Fuel piping			5	5	5		5	5			5			EM-156
	Vapor lock		5												—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—

		SYMPTOM													Reference
		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	
Air	Air duct		5	5		5		5	5			5			EM-139
	Air cleaner														EM-139
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)	5			5		5			5					EM-139
	Electric throttle control actuator														EM-141
	Air leakage from intake manifold/ Collector/Gasket														EM-141
Cranking	Battery	1	1	1		1		1	1			1		1	SC-7
	Generator circuit														SC-22
	Starter circuit	3													SC-16
	Signal plate	6													EM-200
	Park/neutral position (PNP) switch	4													MT-54, AT-95, CVT-252
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-186
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-200
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mecha-nism	Timing chain	5	5	5	5	5		5	5			5			EM-161
	Camshaft														EM-170
	Intake valve timing control														EM-161
	Intake valve												3		EM-189
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			EM-144, EX-9
	Three way catalyst														
Lubrica-tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5			EM-147, LU-19
	Oil level (Low)/Filthy oil														LU-16

		SYMPTOM													Reference
		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	
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-38
	Thermostat									5					CO-45
	Water control valve														CO-47
	Water pump														CO-43
	Water gallery														CO-34
	Cooling fan									5					CO-42
	Coolant level (Low)/Contaminated coolant														CO-35
NVIS (NISSAN Vehicle Immobilizer System-NATS)		1	1												BL-257

1 - 6: The numbers refer to the order of inspection.

Engine Control Component Parts Location

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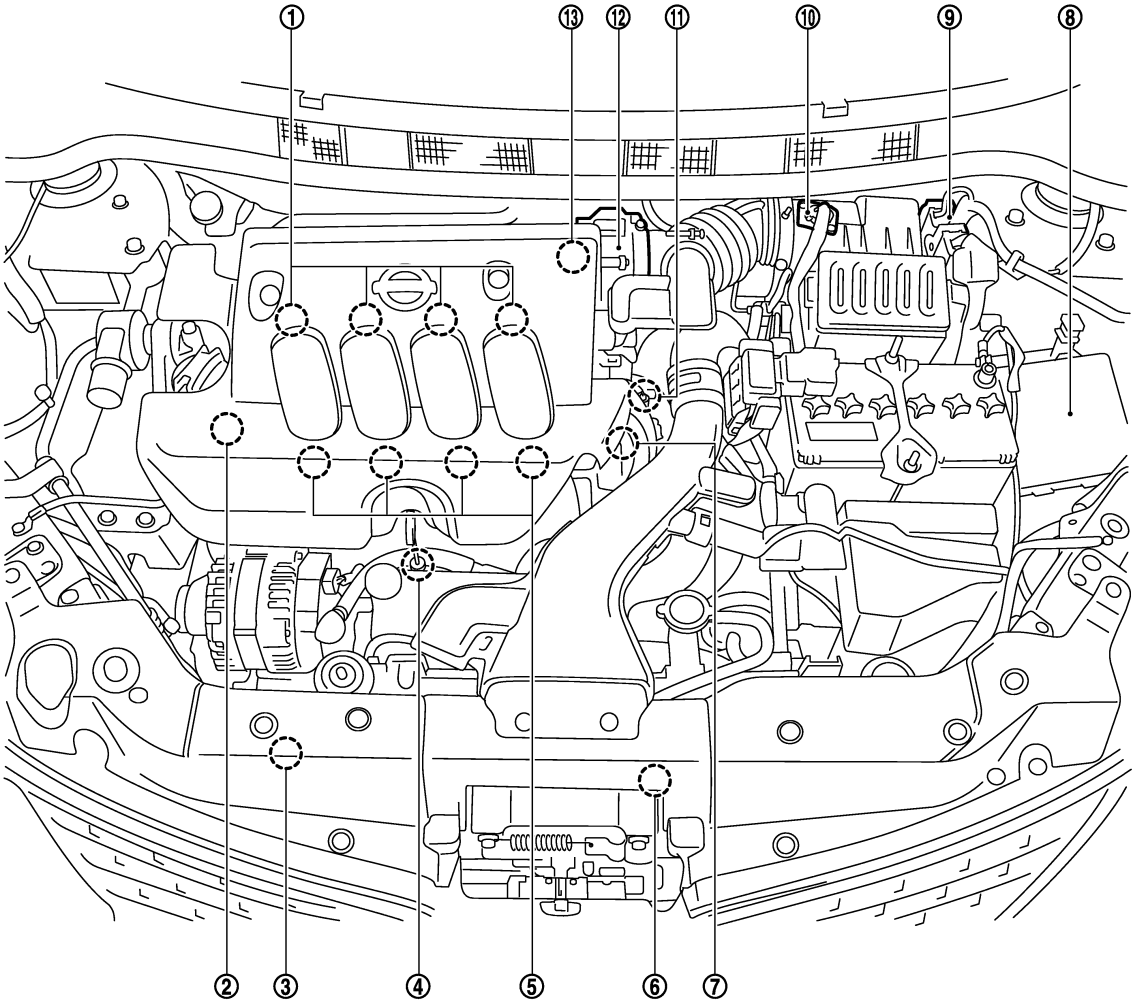
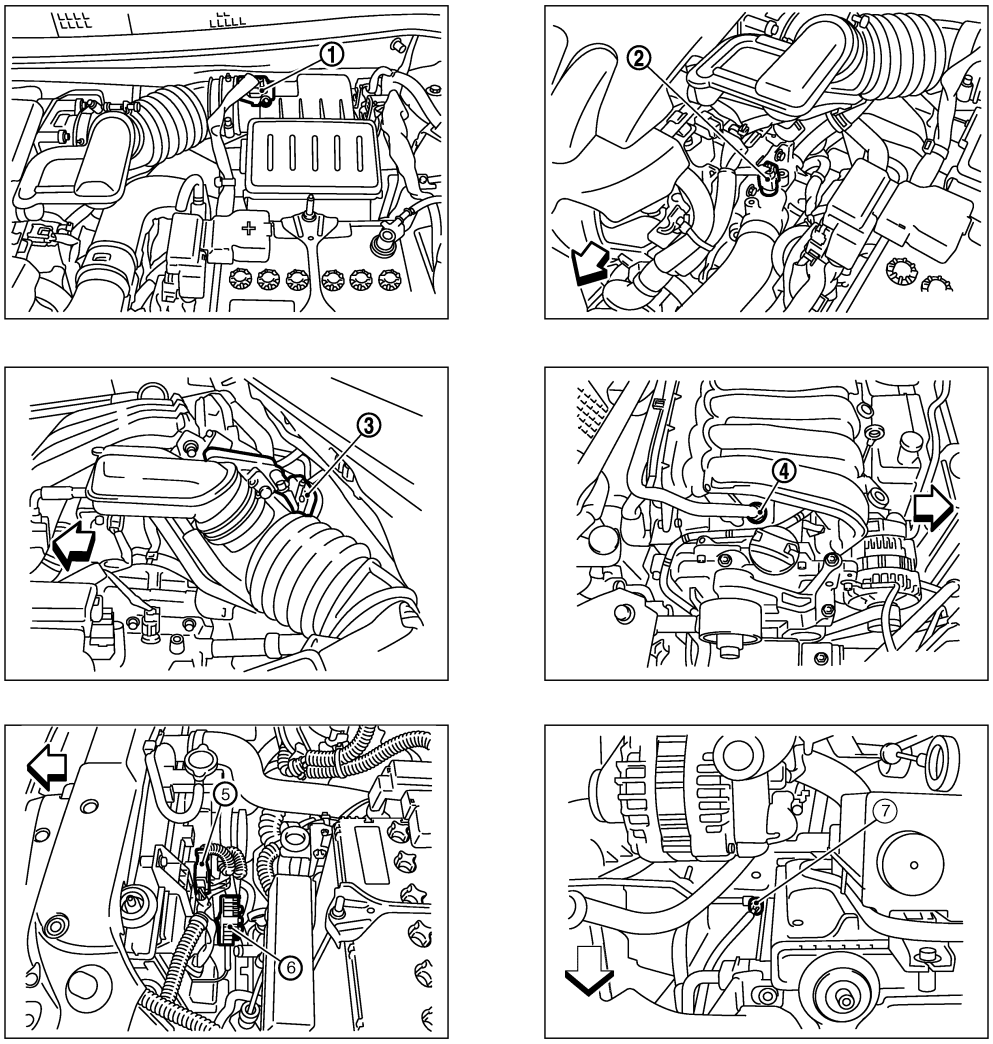


PBIB3261E

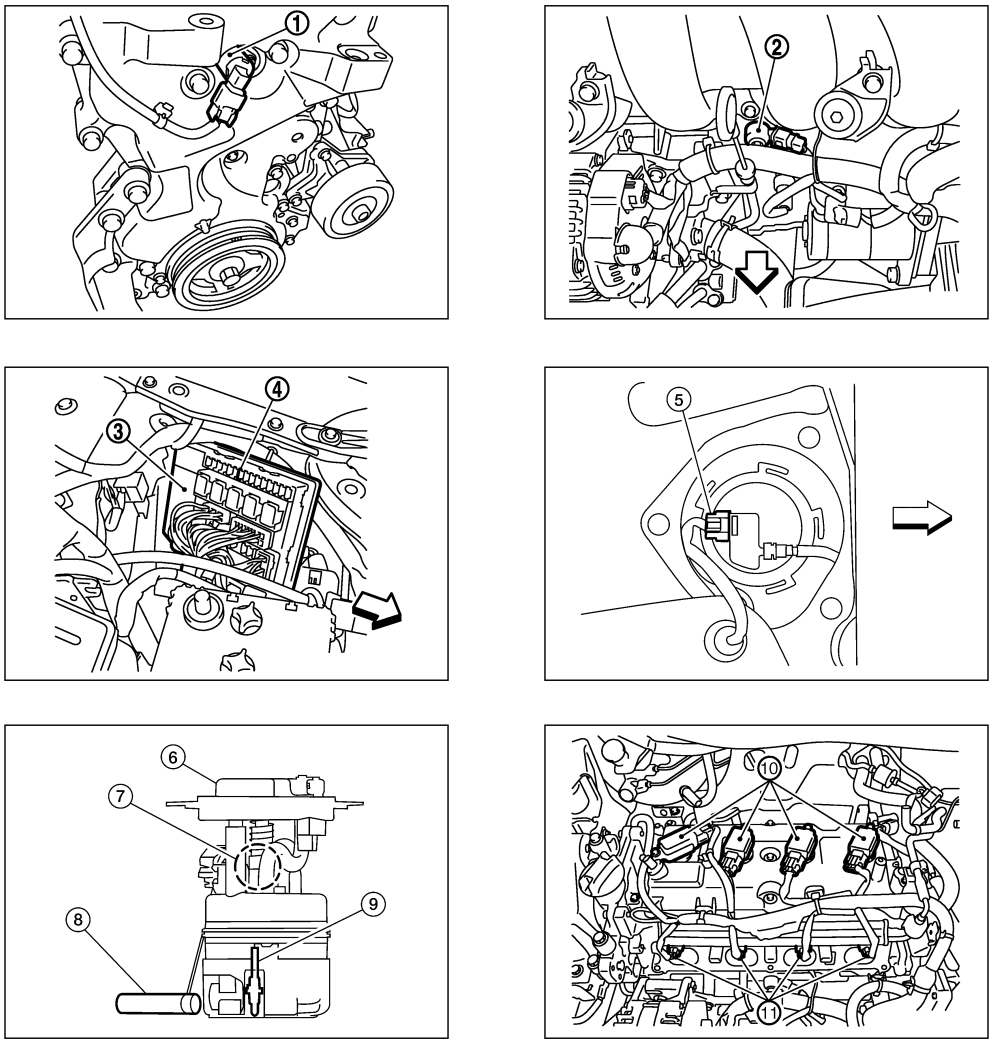
1. Ignition coil (with power transistor) and spark plug
2. Intake valve timing control solenoid valve
3. Refrigerant pressure sensor
4. Knock sensor
5. Fuel injector
6. Cooling fan motor
7. Camshaft position sensor (PHASE)
8. IPDM E/R
9. ECM
10. Mass air flow sensor (with intake air temperature sensor)
11. Engine coolant temperature sensor
12. Electric throttle control actuator (with built-in throttle position sensor, throttle control motor)
13. EVAP canister purge volume control solenoid valve



BBIA0724E

: Vehicle front

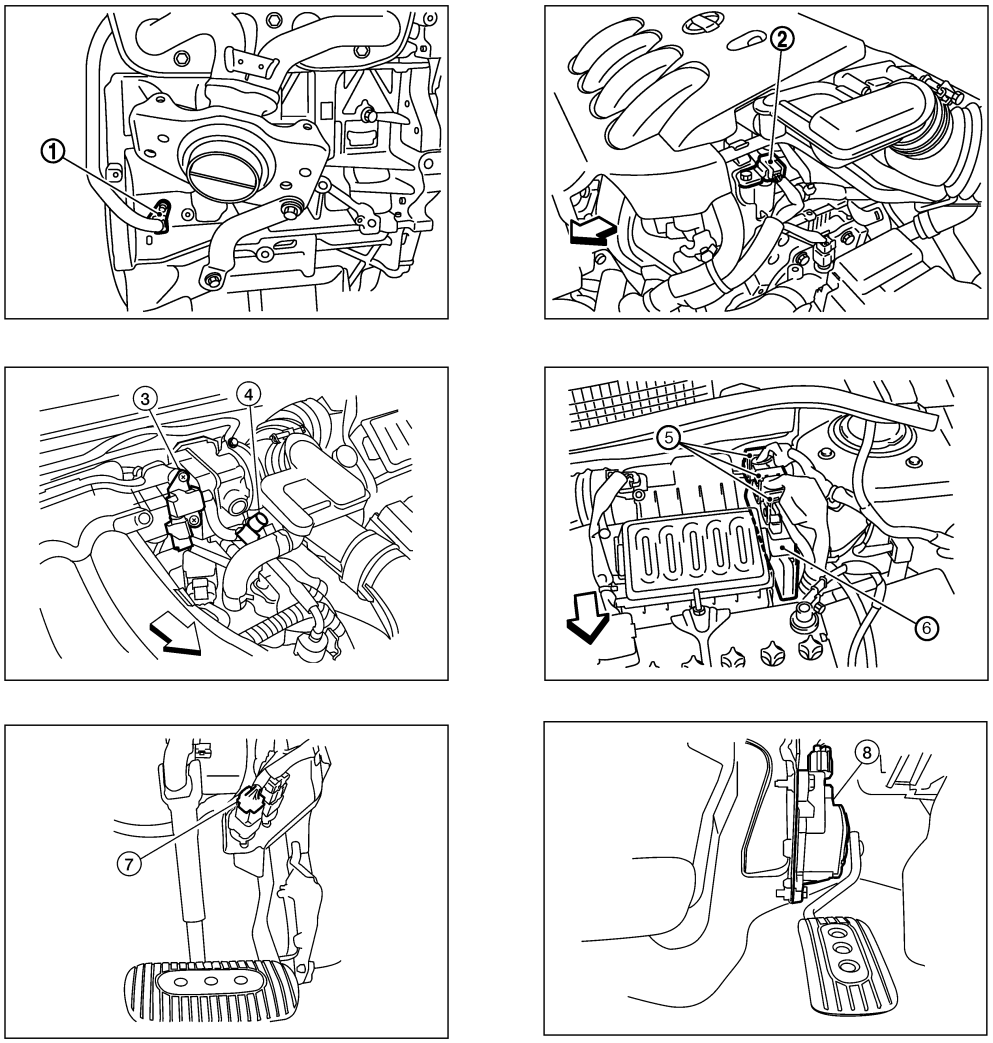
1. Mass air flow sensor (with intake air temperature sensor)
2. Engine coolant temperature sensor
3. Electric throttle control actuator (with built in throttle position sensor, throttle control motor)
4. PCV valve
5. Cooling fan motor
6. Resistor
7. Refrigerant pressure sensor



BBIA0725E

: Vehicle front

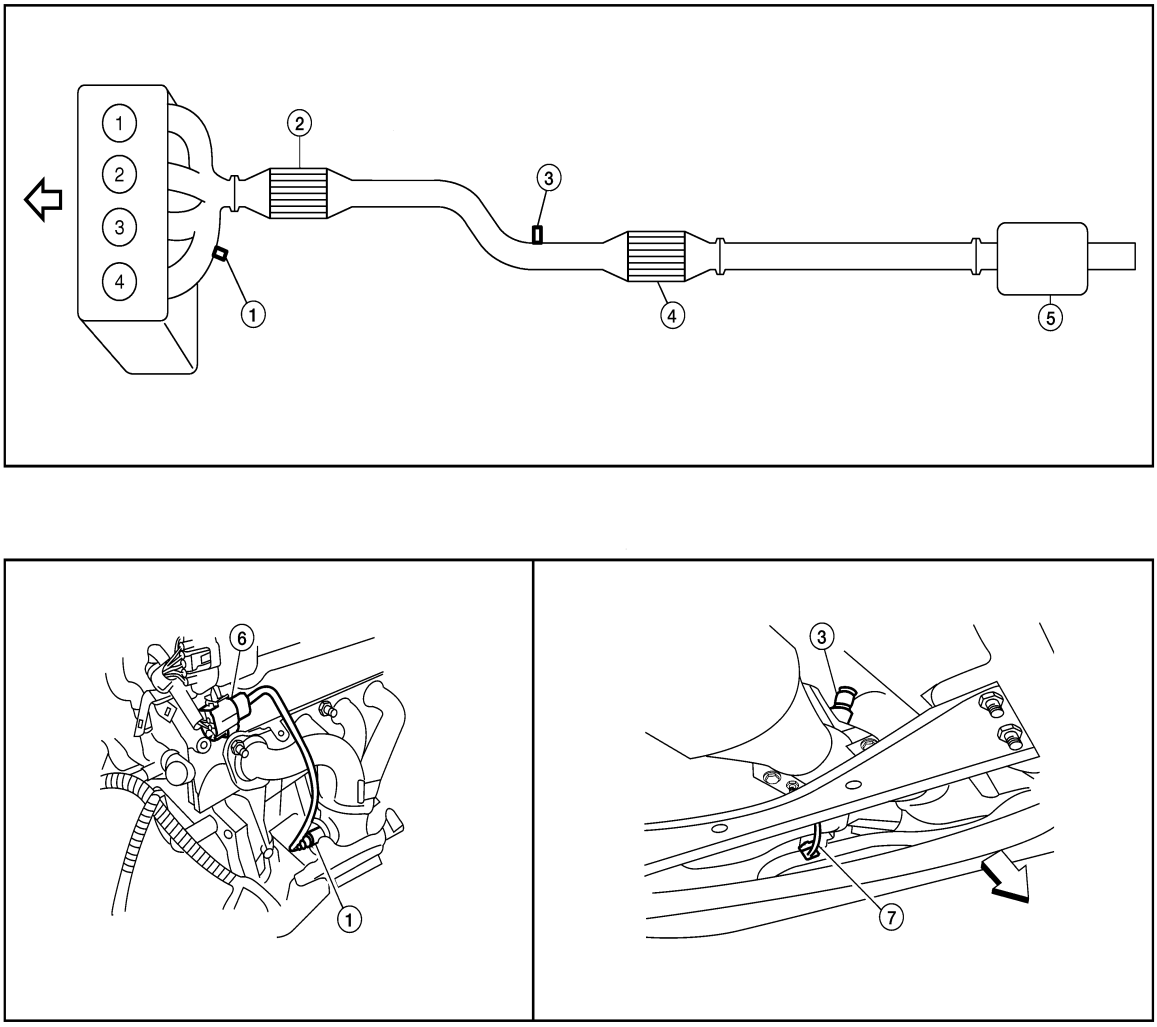
1. Intake valve timing control solenoid valve
2. Knock sensor
3. IPDM E/R
4. Fuel pump fuse (15A)
5. Fuel level sensor unit and fuel pump harness connector (view with inspection hole cover removed)
6. Fuel level sensor unit and fuel pump
7. Fuel pressure regulator
8. Fuel level sensor
9. Fuel tank temperature sensor
10. Ignition coil (with power transistor) and spark plug
11. Fuel injector



BBIA0727E

: Vehicle front

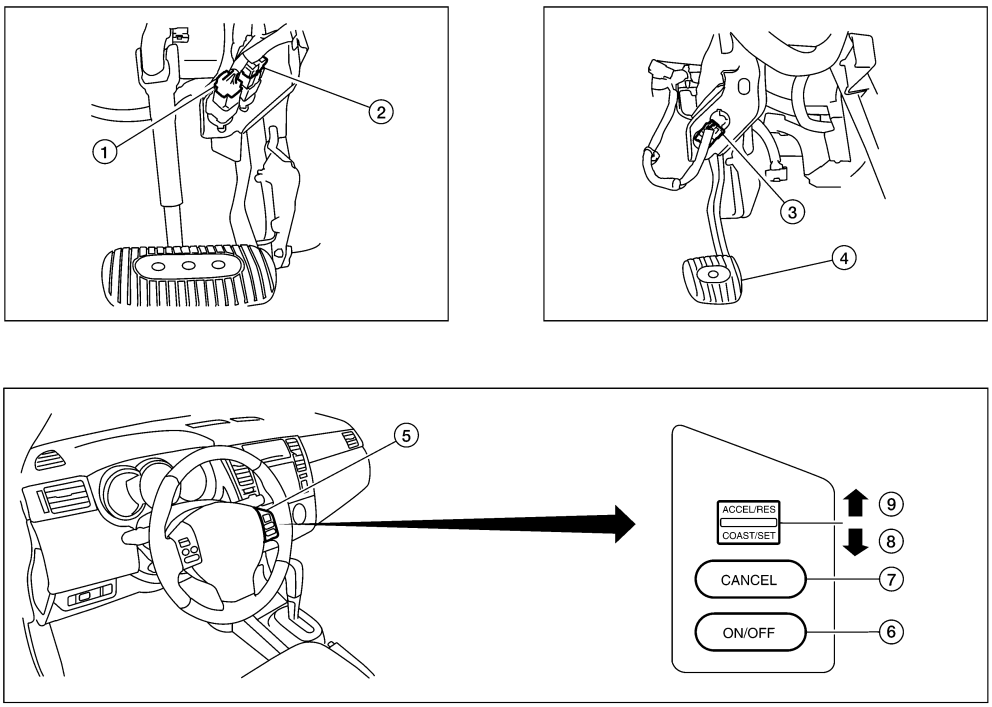
1. Crankshaft position sensor (POS)
2. Camshaft position sensor (PHASE)
3. EVAP canister purge volume control solenoid valve
4. EVAP service port
5. ECM harness connector
6. ECM
7. Stop lamp switch
8. Accelerator pedal position sensor



BBIA0726E

: Vehicle front

1. Air fuel ratio (A/F) sensor 1
2. Three way catalyst (Manifold)
3. Heated oxygen sensor 2
4. Three way catalyst (Under floor)
5. Muffler
6. Air fuel ratio (A/F) sensor 1 harness connector
7. Heated oxygen sensor 2 harness connector

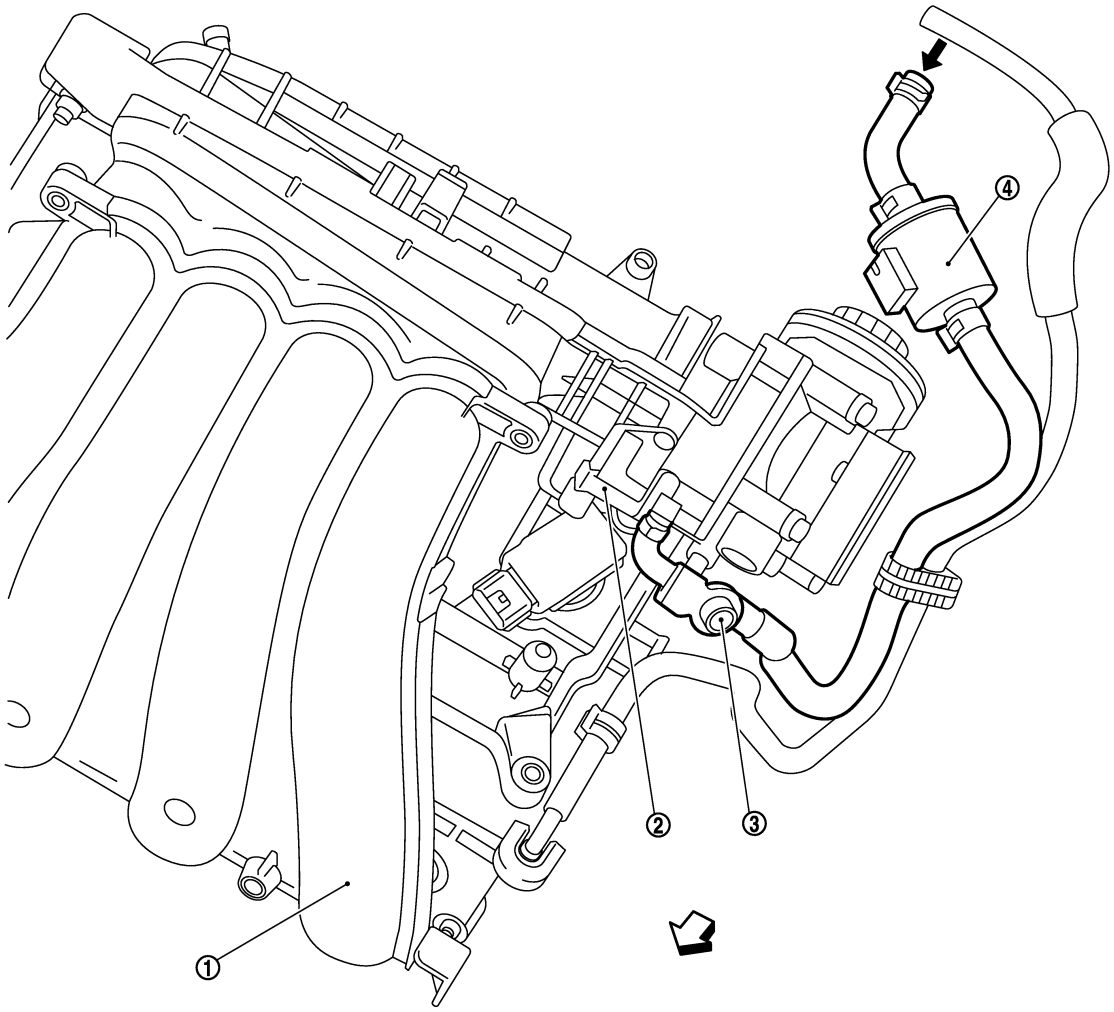


BBIA0728E

1. Stop lamp switch
2. ASCD brake switch
3. ASCD clutch switch
4. Clutch pedal
5. ASCD steering switch
6. MAIN switch
7. CANCEL switch
8. SET/COAST switch
9. RESUME/ACCELERATOR switch
10. EVAP control system pressure sensor
11. EVAP canister
12. EVAP canister vent control valve

Vacuum Hose Drawing

INFOID:0000000004499942



PBIB3330E

: Vehicle front

: From EVAP canister

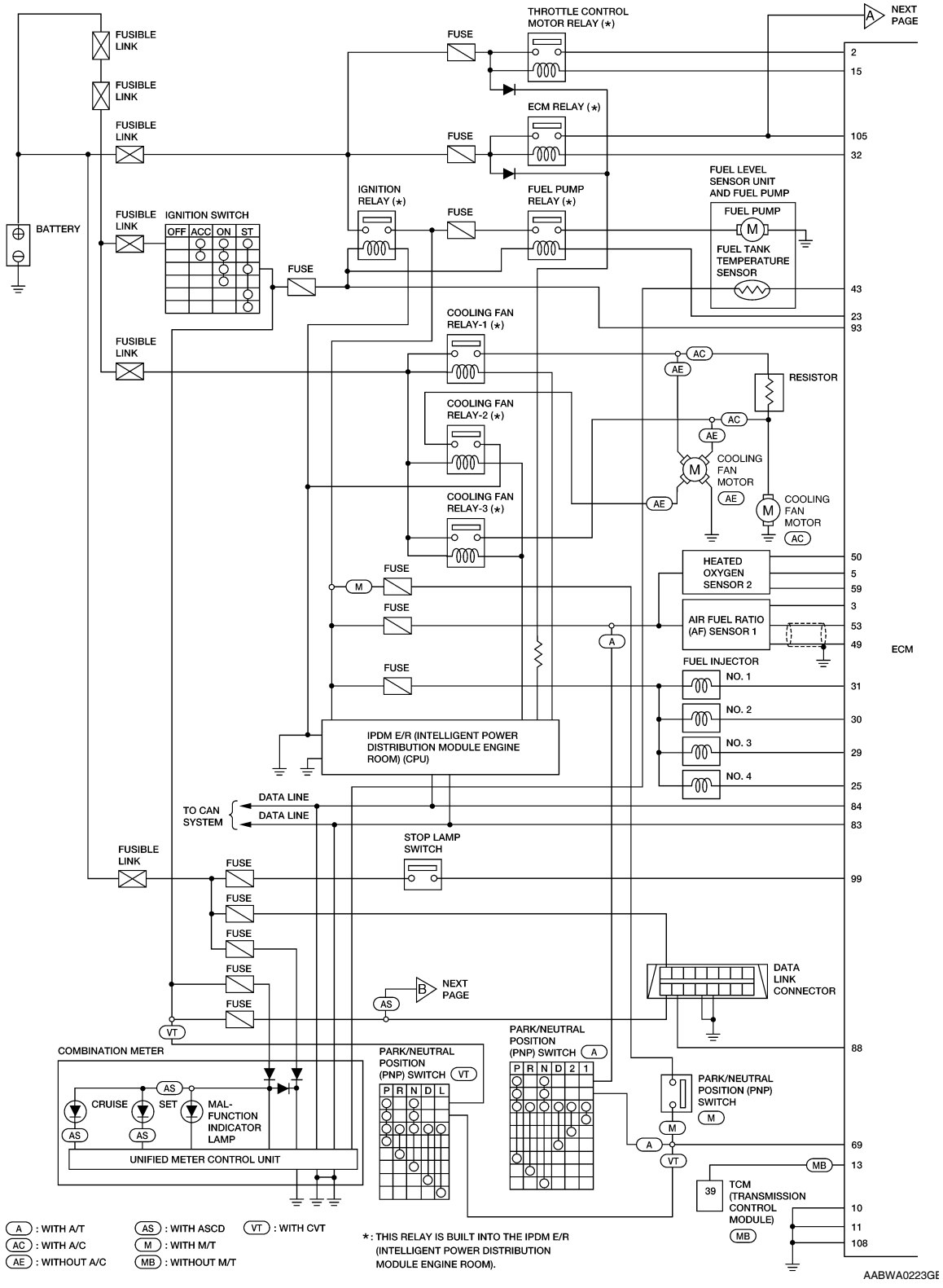
1. Intake manifold
2. EVAP canister purge volume control solenoid valve
3. EVAP service port
4. EVAP purge resonator

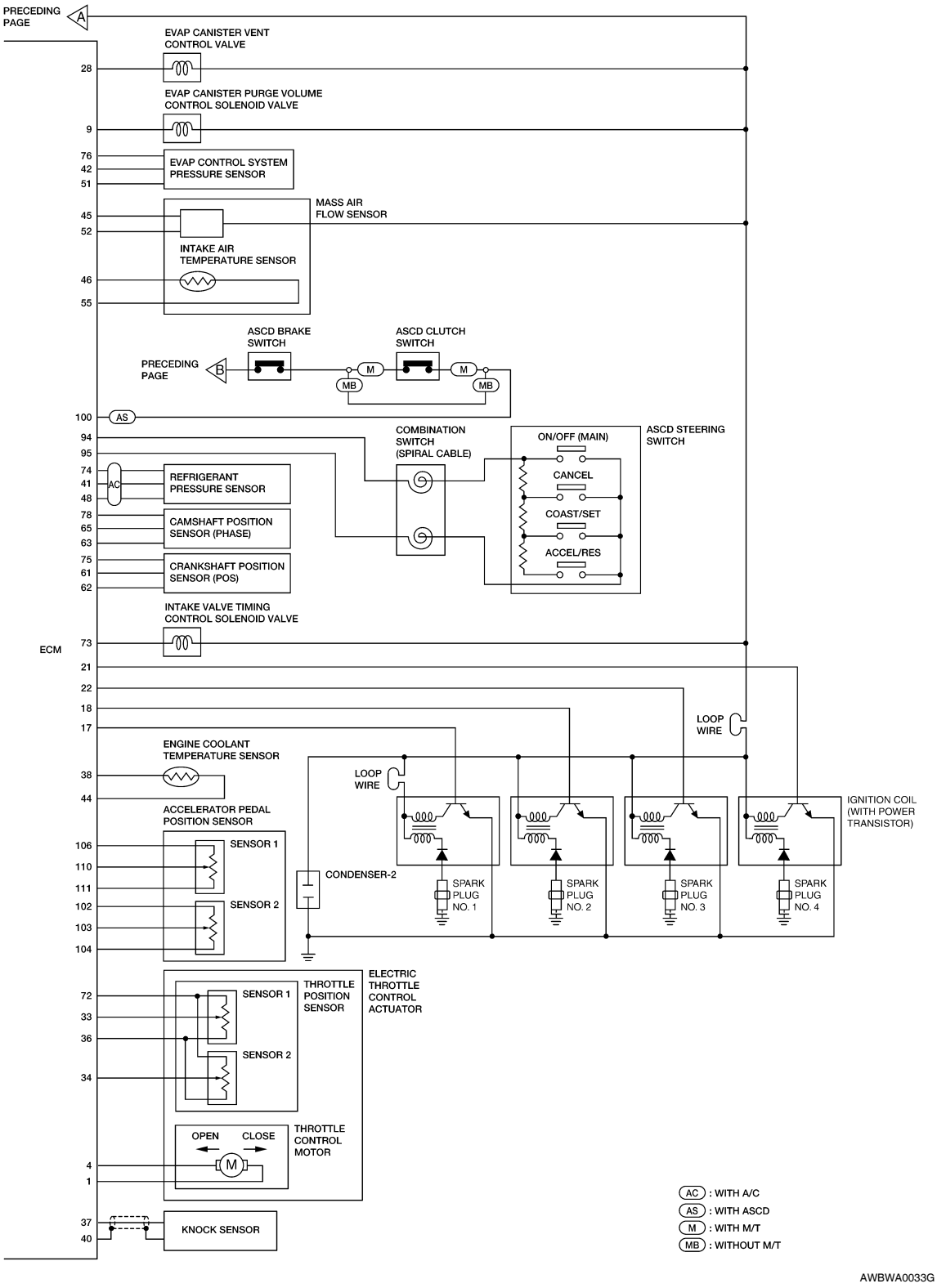
NOTE:
Do not use soapy water or any type of solvent while installing vacuum hoses or purge hoses.

Refer to EC-1027, "Schematic" for Vacuum Control System.

Circuit Diagram

INFOID:0000000004499943




PRECEDING PAGE
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44
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ACCELERATOR PEDAL POSITION SENSOR
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110
111
102
103
104
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SENSOR 2
CONDENSER-2
SPARK PLUG NO. 1
SPARK PLUG NO. 2
SPARK PLUG NO. 3
SPARK PLUG NO. 4
ELECTRIC THROTTLE CONTROL ACTUATOR
72
33
36
34
THROTTLE POSITION SENSOR
SENSOR 1
SENSOR 2
OPEN
CLOSE
THROTTLE CONTROL MOTOR
4
1
37
40
KNOCK SENSOR
AC : WITH A/C
AS : WITH ASCD
M : WITH M/T
MB : WITHOUT M/T
AWBWA0033G

ECM Harness Connector Terminal Layout

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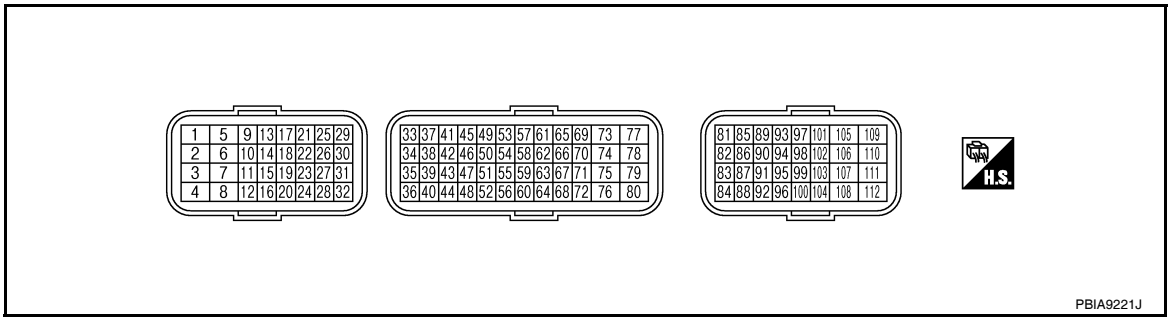

ECM Terminal and Reference Value

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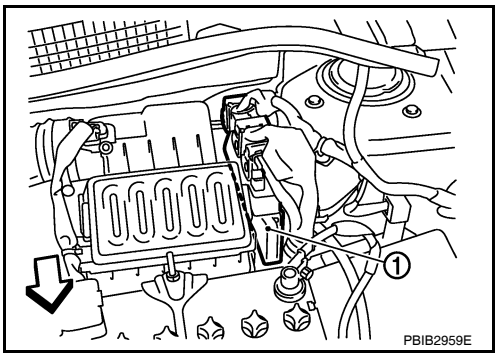
PREPARATION

1. ECM (1) is located in the engine room left side near battery.
   - : Vehicle front

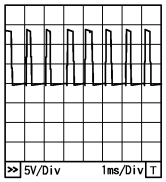
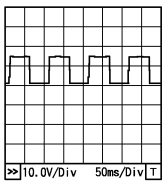


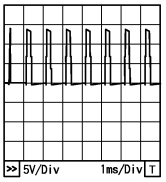
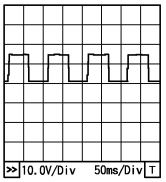
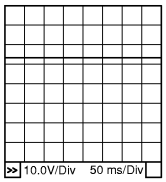
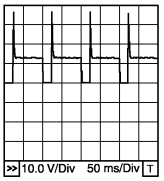
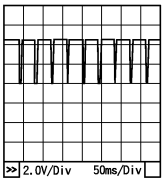
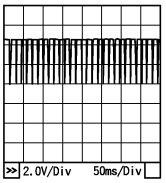
ECM INSPECTION TABLE

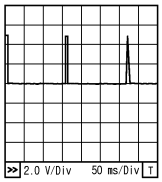
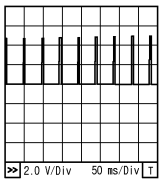
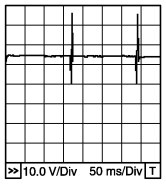
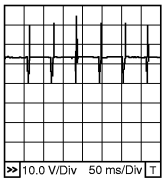
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

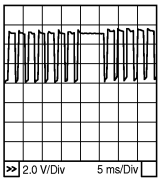
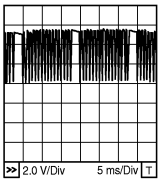
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

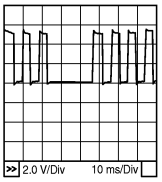
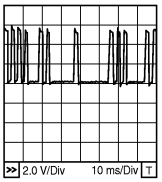
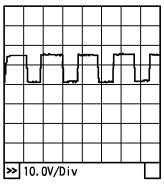
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L	Throttle control motor (Open)	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Approximately 3.2V  PBIA8150J
2	SB	Throttle control motor power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
3	G	A/F sensor 1 heater	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V  PBIA8148J

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	P	Throttle control motor (Close)	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	Approximately 1.8V  PBIA8149J
5	G	Heated oxygen sensor 2 heater	**[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.	Approximately 10V  PBIA8148J
			[Ignition switch: ON] • Engine stopped **[Engine is running]** • Engine speed: Above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
9	P	EVAP canister purge volume control solenoid valve	**[Engine is running]** • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting.	BATTERY VOLTAGE (11 - 14V)  PBIB0050E
			[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V  PBIB0520E
10 11	B B	ECM ground	**[Engine is running]** • Idle speed	Body ground
13	L	Tachometer signal	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	3 - 5V  PBIA8164J
			[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm.	3 - 5V  PBIA8165J

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
15	Y	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V
17 18 21 22	R LG G SB	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 4 Ignition signal No. 3	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 0.3V  PBIA9265J
			[Engine is running] • **Warm-up condition** • Engine speed: 2,500 rpm.	0.2 - 0.5V  PBIA9266J
23	GR	Fuel pump relay	**[Ignition switch: ON]** • For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.0V
			[Ignition switch: ON] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)
25 29 30 31	V Y O L	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 2 Fuel injector No. 1	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14V)  PBIB0529E
			[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  PBIA4943J
28	W	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For a few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	LG	Throttle position sensor 1	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
34	O	Throttle position sensor 2	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
36	Y	Sensor ground (Throttle position sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
37	W	Knock sensor	**[Engine is running]** • Idle speed	Approximately 2.5V
38	P	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
40	—	Sensor ground (Knock sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
41	GR	Refrigerant pressure sensor	**[Engine is running]** • **Warm-up condition** • Both A/C switch and blower fan switch: ON (Compressor operates.)	1.0 - 4.0V
42	V	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8V
43	P	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel tank temperature
44	B	Sensor ground (Engine coolant temperature sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
45	G	Mass air flow sensor	**[Engine is running]** • **Warm-up condition** • Idle speed	0.8 - 1.1V
			[Engine is running] • **Warm-up condition** • Engine speed: 2,500 rpm	1.4 - 1.7V
46	V	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
48	BR	Sensor ground (Refrigerant pressure sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
49	W	A/F sensor 1	**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	W	Heated oxygen sensor 2	**[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 - Approximately 1.0V
51	O	Sensor ground (EVAP control system pressure sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
52	LG	Sensor ground (Mass air flow sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
53	B	A/F sensor 1	**[Ignition switch: ON]**	Approximately 2.2V
55	O	Sensor ground (Intake air temperature sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
59	O	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
61	W	Crankshaft position sensor (POS)	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	Approximately 4.0V  PBIB2998E
			[Engine is running] • Engine speed: 2,000 rpm	Approximately 4.0V  PBIB2999E
62	R	Sensor ground [Crankshaft position sensor (POS)]	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
63	BR	Sensor ground [Camshaft position sensor (PHASE)]	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
65	G	Camshaft position sensor (PHASE)	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	1.0 - 2.0V  PBIB2986E
			[Engine is running] • Engine speed: 2,000 rpm.	1.0 - 2.0V  PBIB2987E
69	L	Park/neutral position (PNP) switch	**[Ignition switch: ON]** • Shift lever: P or N (A/T, CVT), Neutral (M/T)	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] • Except above	Approximately 0V
72	V	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
73	P	Intake valve timing control solenoid valve	**[Engine is running]** • **Warm-up condition** • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • **Warm-up condition** • When revving engine up to 2,000 rpm quickly	7 - 10V  PBIA4937J
74	W	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
75	BR	Sensor power supply [Crankshaft position sensor (POS)]	**[Ignition switch: ON]**	Approximately 5V
76	W	EVAP control system pressure sensor power supply	**[Ignition switch: ON]**	Approximately 5V
78	O	Sensor power supply [Camshaft position sensor (PHASE)]	**[Ignition switch: ON]**	Approximately 5V
83	P	CAN communication line	—	—
84	L	CAN communication line	—	—
88	LG	DATA link connector	—	—
93	O	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
94	R	ASCD steering switch	**[Ignition switch: ON]** • ASCD steering switch: OFF	Approximately 4V
			[Ignition switch: ON] • MAIN switch: Pressed	Approximately 0V
			[Ignition switch: ON] • CANCEL switch: Pressed	Approximately 1V
			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	Approximately 3V
			[Ignition switch: ON] • SET/COAST switch: Pressed	Approximately 2V
95	B	Sensor ground (ASCD steering switch)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
99	R	Stop lamp switch	**[Ignition switch: OFF]** • Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
100	G	ASCD brake switch	**[Ignition switch: ON]** • Brake pedal: Slightly depressed (A/T, CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	Approximately 0V
			[Ignition switch: ON] • Brake pedal: Fully released (A/T, CVT) • Brake pedal and clutch pedal: Fully released (M/T)	BATTTERY VOLTAGE (11 - 14V)
102	SB	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V
103	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4V
104	Y	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
106	P	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V
108	B	ECM ground	**[Engine is running]** • Idle speed	Body ground
110	G	Accelerator pedal position sensor 1	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7V
111	R	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

CONSULT-III Function (ENGINE)

INFOID:0000000004499946

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.
DTC & SRT Confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
ECU Identification	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

		Item	DIAGNOSTIC TEST MODE						
			WORK SUP-PORT	SELF DIAGNOSTIC RESULT		DATA MONI-TOR	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2			SRT STATUS	DTC WORK SUP-PORT
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 signal		×	×	×			
		Accelerator pedal position sensor		×		×			
		Throttle position sensor		×	×	×			
		Fuel tank temperature sensor		×		×	×		
		EVAP control system pressure sensor		×		×			
		Intake air temperature sensor		×	×	×			
		Knock sensor		×					
		Refrigerant pressure sensor				×			
		Closed throttle position switch (Accelerator pedal position sensor signal)				×			
		Air conditioner switch				×			
		Park/neutral position (PNP) switch		×		×			
		Stop lamp switch		×		×			
		Battery voltage				×			
		Load signal				×			
		Fuel level sensor		×		×			
		ASCD steering switch		×		×			
		ASCD brake switch		×		×			
		ASCD clutch switch		×		×			
		Power steering operation signal				×			

Item			DIAGNOSTIC TEST MODE						
			WORK SUP-PORT	SELF DIAGNOSTIC RESULT		DATA MONI-TOR	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2			SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Fuel injector				×	×		
		Power transistor (Ignition timing)				×	×		
		Throttle control motor relay		×		×			
		Throttle control motor		×					
		EVAP canister purge volume control solenoid valve		×		×	×		×
		Air conditioner relay				×			
		Fuel pump relay	×			×	×		
		Cooling fan relay		×		×	×		
		Air fuel ratio (A/F) sensor 1 heater		×		×		×*3	
		Heated oxygen sensor 2 heater		×		×		×*3	
		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-1052, "Emission-related Diagnostic Information".

*3: Always “COMPLT” is displayed.

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
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 the coefficient of self-learning control value

WORK ITEM	CONDITION	USAGE
EVAP SYSTEM CLOSE	CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. • IGN SW “ON” • ENGINE NOT RUNNING • AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). • NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM • FUEL TANK TEMP. IS MORE THAN 0°C (32°F). • WITHIN 10 MINUTES AFTER STARTING “EVAP SYSTEM CLOSE” • WHEN TRYING TO EXECUTE “EVAP SYSTEM CLOSE” UNDER THE CONDITION EXCEPT ABOVE, CONSULT-III WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. **NOTE:** **WHEN STARTING ENGINE, CONSULT-III MAY DISPLAY “BATTERY VOLTAGE IS LOW. CHARGE BATTERY”, EVEN IN USING CHARGED BATTERY.**	When detecting EVAP vapor leak point of EVAP system
TARGET IDLE RPM ADJ*	• IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	• IDLE CONDITION	When adjusting target ignition timing
VIN REGISTRATION	• IN THIS MODE, VIN IS REGISTERED IN ECM.	When registering VIN in ECM

*: 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-1052, "Emission-related Diagnostic Information".

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	• The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to EC-1015)
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 are 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

Monitored item [Unit]	Description	Remarks
ENG SPEED [rpm]	• Indicates the engine speed computed from the signals of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	• Accuracy becomes poor if engine speed drops below the idle rpm. • If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1 [V]	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated. • When engine is running, specification range is indicated in "SPEC".
B/FUEL SCHDL [msec]	• “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	• When engine is running, specification range is indicated in "SPEC".
A/F ALPHA-B1 [%]	• The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • This data also includes the data for the air/fuel ratio learning control. • When engine is running, specification range is indicated in "SPEC".
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 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 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
FUEL T/TMP SE [°C] or [°F]	• The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.	
INT/A TEMP SE [°C] or [°F]	• The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
EVAP SYS PRES [V]	• The signal voltage of EVAP control system pressure sensor is displayed.	
FUEL LEVEL SE [V]	• The signal voltage of the fuel level sensor is displayed.	
START SIGNAL [ON/OFF]	• Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	• After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS [ON/OFF]	• Indicates idle position [ON/OFF] computed by the ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG [ON/OFF]	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	• Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL [ON/OFF]	• [ON/OFF] condition of the power steering system (determined by the signal sent from EPS control unit) is indicated.	
LOAD SIGNAL [ON/OFF]	• Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW [ON/OFF]	• Indicates [ON/OFF] condition from ignition switch.	
HEATER FAN SW [ON/OFF]	• Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW [ON/OFF]	• Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1 [msec]	• Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	• When the engine is stopped, a certain computed value is indicated.
IGN TIMING [BTDC]	• Indicates the ignition timing computed by ECM according to the input signals.	• When the engine is stopped, a certain value is indicated.
CAL/LD VALUE [%]	• “Calculated load value” indicates the value of the current airflow divided by peak airflow.	
MASS AIRFLOW [g·m/s]	• Indicates the mass airflow computed by ECM according to the signal voltage of the mass air flow sensor.	
PURG VOL C/V [%]	• Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
INT/V TIM (B1) [°CA]	• Indicates [°CA] of intake camshaft advanced angle.	
INT/V SOL (B1) [%]	• The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signal) 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.	

Monitored item [Unit]	Description	Remarks
VENT CONT/V [ON/OFF]	• The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. ON: Closed OFF: Open	
THRTL RELAY [ON/OFF]	• Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
COOLING FAN [HI/LOW/OFF]	• Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI: High speed operation LOW: Low speed operation OFF: Stop	
HO2S2 HTR (B1) [ON/OFF]	• Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
I/P PULLY SPD [rpm]	• Indicates the engine speed computed from the turbine revolution sensor signal.	
VEHICLE SPEED [km/h] or [MPH]	• The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
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) [%]	• Indicates 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 TCM 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 increased to excessively high 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 compared with the ASCD set speed, 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.	• For M/T models always “OFF” is displayed

Monitored item [Unit]	Description	Remarks
AT OD CANCEL [ON/OFF]	• Indicates [ON/OFF] condition of A/T O/D cancel signal sent from the TCM.	• For M/T models always “OFF” is displayed
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.	
A/F ADJ-B1	• Indicates the correction 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 air fuel ratio (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 (A/T, CVT), Neutral (M/T) • Cut off each fuel injector signal one at a time using CONSULT-III.	Engine runs rough or dies.	• Harness and connectors • Compression • Fuel injector • Power transistor • Spark plug • Ignition coil
COOLING FAN*	• Ignition switch: ON • Turn the cooling fan “LOW”, “HI” and “OFF” with CONSULT-III.	Cooling fan moves and stops.	• Harness and connectors • 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 • EVAP canister purge volume control solenoid valve
FUEL/T TEMP SEN	• Change the fuel tank temperature using CONSULT-III.		

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 • EVAP canister vent control valve
V/T ASSIGN ANGLE	• Engine: Return to the original trouble condition • Change intake valve timing using CONSULT-III.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Intake valve timing control solenoid valve

*: Leaving cooling fan OFF with CONSULT-III while engine is running may cause the engine to overheat.

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode
For details, refer to EC-1052, "Emission-related Diagnostic Information".

SRT WORK SUPPORT Mode
This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

DTC WORK SUPPORT Mode

Test mode	Test item	Corresponding DTC No.	Reference
EVAPORATIVE SYSTEM	PURG FLOW P0441	P0441	EC-1310
	EVP SML LEAK P0442/P1442*	P0442	EC-1315
		P0455	EC-1366
	EVP V/S LEAK P0456/P1456*	P0456	EC-1373
	PURG VOL CN/V P1444	P0443	EC-1322
A/F SEN1	A/F SEN1 (B1) P1276	P0130	EC-1210
	A/F SEN1 (B1) P1278/P1279	P0133	EC-1228
HO2S2	HO2S2 (B1) P0139	P0139	EC-1251
	HO2S2 (B1) P1146	P0138	EC-1242
	HO2S2 (B1) P1147	P0137	EC-1235

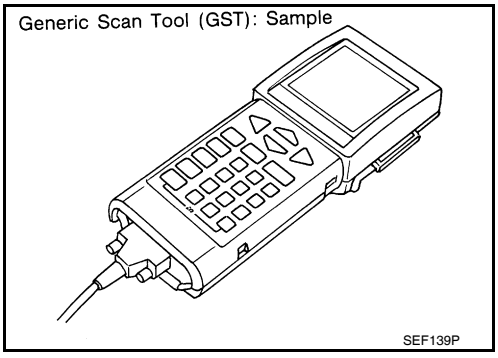
*: DTC P1442 and P1456 does not apply to C11 models but appears in DTC Work Support Mode screens.

Generic Scan Tool (GST) Function

INFOID:0000000004499947

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 different functions explained below.
ISO 15765-4 is used as the protocol.
The name GST or Generic Scan Tool is used in this service manual.

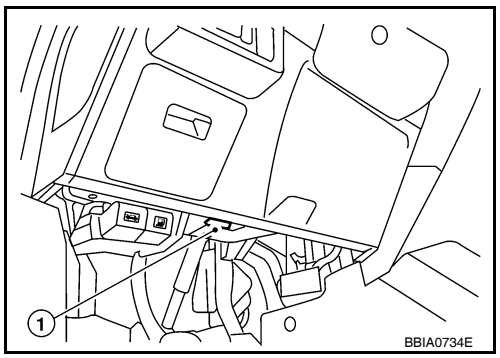


FUNCTION

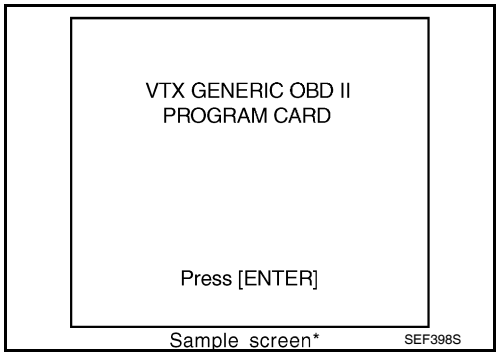
Diagnostic test mode		Function
Service $01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
Service $02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-1116, "CONSULT-III Function (ENGINE)".
Service $03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.
Service $04	CLEAR DIAG INFO	This diagnostic service can clear all emission-related diagnostic information. This includes: • Clear number of diagnostic trouble codes (Service $01) • Clear diagnostic trouble codes (Service $03) • Clear trouble code for freeze frame data (Service $01) • Clear freeze frame data (Service $02) • Reset status of system monitoring test (Service $01) • Clear on board monitoring test results (Service $06 and $07)
Service $06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
Service $07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
Service $08	—	This diagnostic service can close EVAP system in ignition switch ON position (Engine stopped). When this diagnostic service is performed, EVAP canister vent control valve can be closed. In the following conditions, this diagnostic service cannot function. • Low ambient temperature • Low battery voltage • Engine running • Ignition switch OFF • Low fuel temperature • Too much pressure is applied to EVAP system
Service $09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

INSPECTION PROCEDURE

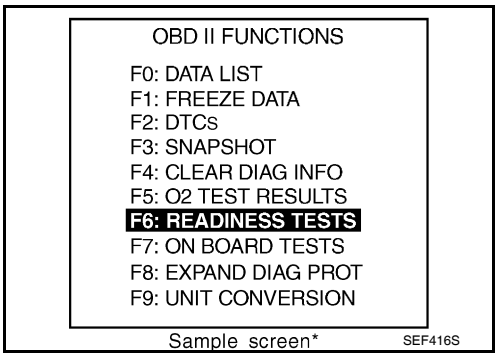
1. Turn ignition switch OFF.
2. Connect GST to data link connector (1), which is located under LH dash panel.



3. Turn ignition switch ON.
4. Enter the program according to instruction on the screen or in the operation manual.
(*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic service according to each service procedure.
For further information, see the GST Operation Manual of the tool maker.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004499948

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		SPECIFICATION
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-1130.		
B/FUEL SCHDL	See EC-1130.		
A/F ALPHA-B1	See EC-1130.		
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 2.2V
HO2S2 (B1)	• 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 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ←→ RICH
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication.
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2*	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
EVAP SYS PRES	• Ignition switch: ON		Approx. 1.8 - 4.8V
TP SEN 1-B1 TP SEN 2-B1*	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T, CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	• Ignition switch: ON	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		SPECIFICATION
P/N POSI SW	• Ignition switch: ON	Shift lever: P or N (A/T, CVT), Neutral (M/T)	ON
		Shift lever: Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd	ON
		Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	• Ignition switch: ON	Heater fan: Operating	ON
		Heater fan: Not operating	OFF
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle	8° - 18° BTDC
		2,000 rpm	25° - 45° BTDC
CAL/LD VALUE	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	2.0 - 10.0 g·m/s
PURG VOL C/V	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle (Accelerator pedal is not depressed even slightly, after engine starting)	0%
		2,000 rpm	0 - 50%
INT/V TIM (B1)	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle	–5° - 5°CA
		When revving engine up to 2,000 rpm quickly	Approx. 0° - 40°CA
INT/V SOL (B1)	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle	0% - 2%
		When revving engine up to 2,000 rpm quickly	Approx. 0% - 90%
AIR COND RLY	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	• For 1 second after turning ignition switch ON • Engine running or cranking		ON
	• Except above conditions		OFF

MONITOR ITEM	CONDITION		SPECIFICATION
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 (207°F) or less	OFF
		Engine coolant temperature: Between 98°C (208°F) and 99°C (210°F)	LOW
		Engine coolant temperature: 100°C (212°F) or more	HIGH
HO2S2 HTR (B1)	• 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
TRVL AFTER MIL	• Ignition switch: ON	Vehicle has traveled after MIL has turned ON.	0 - 65,535 km (0 - 40,723 mile)
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 • Air conditioner switch: ON (Compressor operates)		1.0 - 4.0V
VHCL SPEED SE	• Turn drive wheels and compare speedometer indication with the CONSULT-III value.		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	• Ignition switch: ON	• Brake pedal: Fully released (A/T, CVT) • Brake pedal and clutch pedal: Fully released (M/T)	ON
		• Brake pedal: Slightly depressed (A/T, CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	OFF
BRAKE SW2	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
CRUISE LAMP	• Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF

MONITOR ITEM	CONDITION		SPECIFICATION
SET LAMP	• MAIN switch: ON • Vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ACSD: Operating	ON
		ASCD: Not operating	OFF

*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:0000000004499949

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)

Testing Condition

INFOID:0000000004499950

- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm^2, 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up
  - A/T and CVT models: After the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T or CVT) fluid temperature sensor signal) indicates more than 60°C (140°F).
  - M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied
  - Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.
- Engine speed: Idle

Inspection Procedure

INFOID:0000000004499951

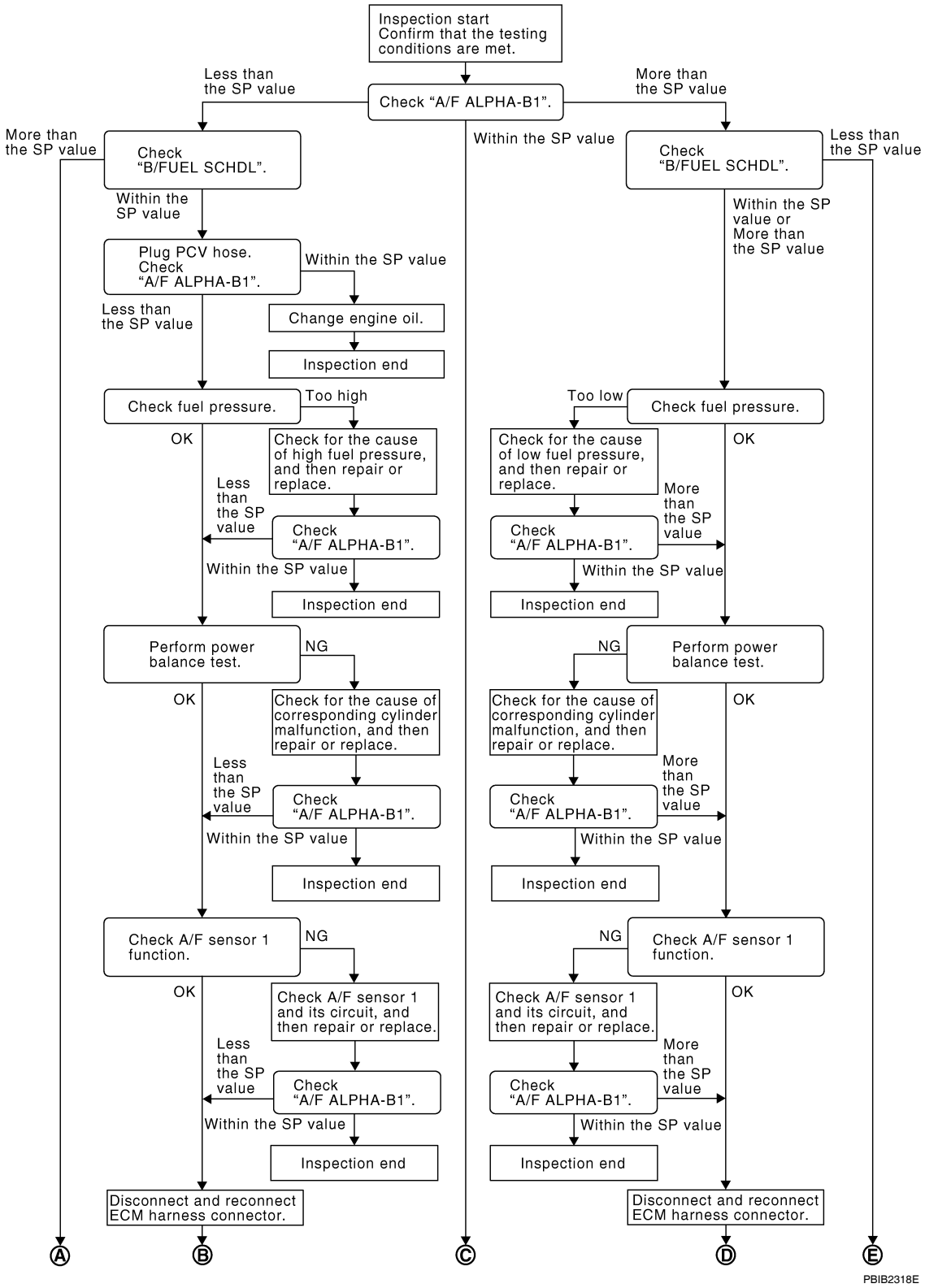
NOTE:
Perform “SPEC” of “DATA MONITOR” mode in maximum scale display.

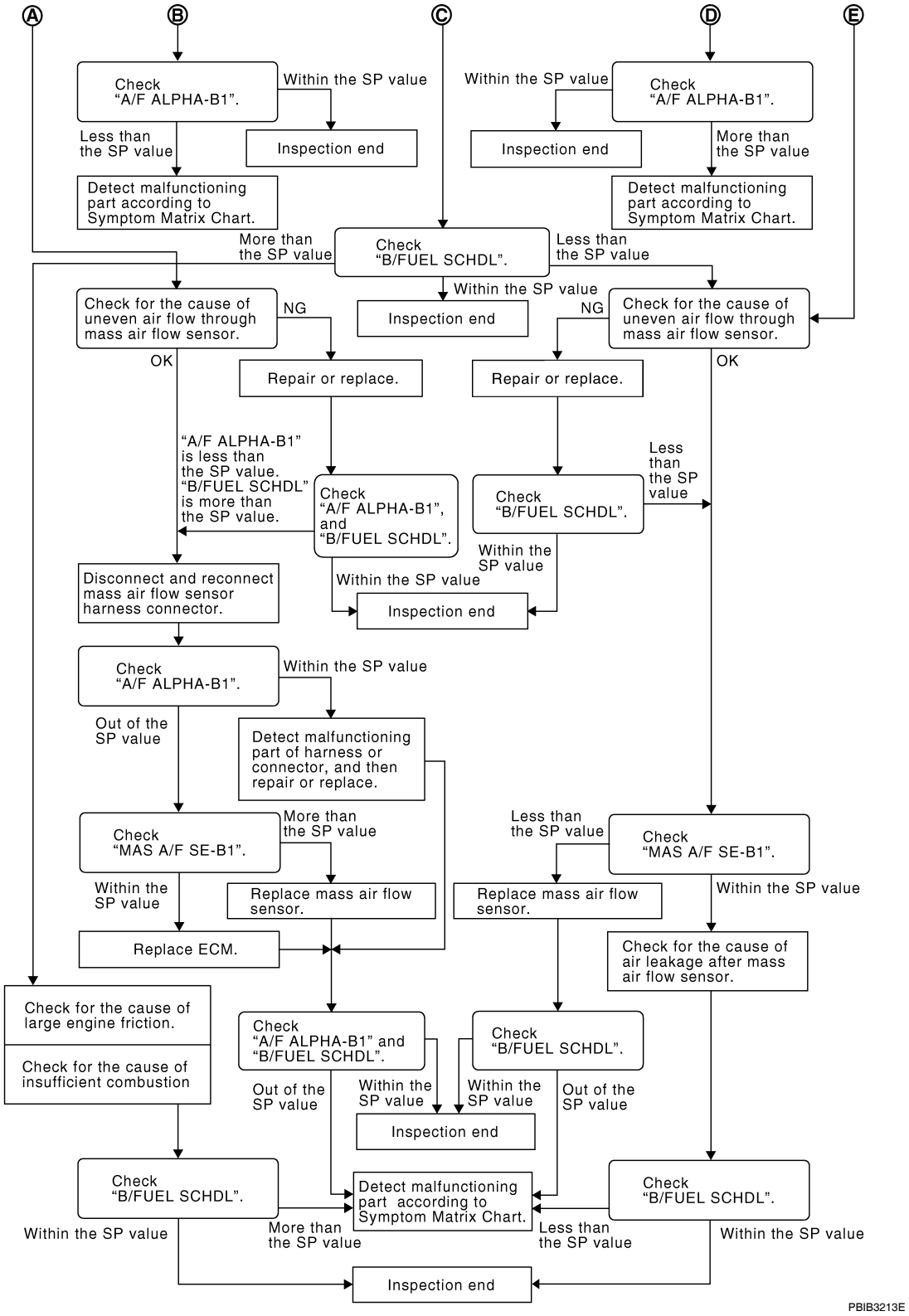
1. Perform EC-1078, "Basic Inspection".
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode with CONSULT-III.
4. Make sure that monitor items are within the SP value.
5. If NG, go to EC-1130, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004499952

OVERALL SEQUENCE


Inspection start
Confirm that the testing conditions are met.
Check "A/F ALPHA-B1".
Less than the SP value
More than the SP value
Within the SP value
Check "B/FUEL SCHDL".
More than the SP value
Less than the SP value
Within the SP value
Within the SP value or More than the SP value
Plug PCV hose. Check "A/F ALPHA-B1".
Within the SP value
Less than the SP value
Change engine oil.
Inspection end
Check fuel pressure.
Too high
Too low
OK
Check for the cause of high fuel pressure, and then repair or replace.
Check for the cause of low fuel pressure, and then repair or replace.
Less than the SP value
More than the SP value
Check "A/F ALPHA-B1".
Within the SP value
Inspection end
Perform power balance test.
NG
OK
Check for the cause of corresponding cylinder malfunction, and then repair or replace.
Check A/F sensor 1 function.
Check A/F sensor 1 and its circuit, and then repair or replace.
Disconnect and reconnect ECM harness connector.
Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
PBIB2318E



DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1"

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-1130, "Testing Condition".
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

NOTE:

Check “A/F ALPHA-B1” for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.

OK or NG

OK >> GO TO 17.
NG (Less than the SP value)>>GO TO 2.
NG (More than the SP value)>>GO TO 3.

2. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 4.
NG (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.

OK or NG

OK >> GO TO 6.
NG (More than the SP value)>>GO TO 6.
NG (Less than the SP value)>>GO TO 25.

4. CHECK “A/F ALPHA-B1”

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.

OK or NG

OK >> GO TO 5.
NG >> GO TO 6.

5. CHANGE ENGINE OIL

1. Stop the engine.
2. Change engine oil. Refer to LU-17, "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-1086, "Fuel Pressure Check".)

OK or NG

OK >> GO TO 9.
NG (Fuel pressure is too high)>>Replace fuel pressure regulator, refer to EC-1086, "Fuel Pressure Check". GO TO 8.
NG (Fuel pressure is too low)>>GO TO 7.

7. DETECT MALFUNCTIONING PART

1. Check the following.
- Clogged and bent fuel hose and fuel tube
- Clogged fuel filter
- Fuel pump and its circuit (Refer to EC-1513.)
2. If NG, repair or replace the malfunctioning part. (Refer to EC-1086, "Fuel Pressure Check".)
If OK, replace fuel pressure regulator.

>> 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.

OK or NG

OK >> **INSPECTION END**
NG >> 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.

OK or NG

OK >> GO TO 12.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

1. Check the following.
- Ignition coil and its circuit (Refer to EC-1518.)
- Fuel injector and its circuit (Refer to EC-1508.)
- Intake air leakage
- Low compression pressure (Refer to EM-185, "On-Vehicle Service".)
2. If NG, repair or replace the malfunctioning part.
   If OK, replace fuel injector. (It may be caused by leakage from fuel injector or clogging.)

>> 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.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 12.

12. CHECK A/F SENSOR 1 FUNCTION

Perform all DTC Confirmation Procedure related with A/F sensor 1.
- For DTC P0130, refer to EC-1210, "DTC Confirmation Procedure".
- For DTC P0131, refer to EC-1216, "DTC Confirmation Procedure".
- For DTC P0132, refer to EC-1222, "DTC Confirmation Procedure".
- For DTC P0133, refer to EC-1228, "DTC Confirmation Procedure".
- For DTC P2A00, refer to EC-1488, "DTC Confirmation Procedure".

OK or NG

OK >> GO TO 15.
NG >> GO TO 13.

13. CHECK A/F SENSOR 1 CIRCUIT

Perform Diagnostic Procedure according to corresponding DTC.

>> GO TO 14.

14. CHECK “A/F ALPHA-B1”

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.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 15.

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect ECM harness connector. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 16.

16. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-1095, "Symptom Matrix Chart".

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.

OK or NG

OK >> **INSPECTION END**
NG (More than the SP value)>>GO TO 18.
NG (Less than the SP value)>>GO TO 25.

18. DETECT MALFUNCTIONING PART

1. Check for the cause of large engine friction. Refer to the following.
- Engine oil level is too high
- Engine oil viscosity
- Belt tension of alternator, A/C compressor, etc. is excessive
- Noise from engine
- Noise from transmission, etc.
2. Check for the cause of insufficient combustion. Refer to the following.
- Valve clearance malfunction
- Intake valve timing control function malfunction
- Camshaft sprocket installation malfunction, etc.

>> Repair or replace malfunctioning part, and then GO TO 30.

19. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

OK or NG

OK >> GO TO 21.
NG >> Repair or replace malfunctioning part, and then GO TO 20.

20. CHECK “A/F ALPHA-B1” AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1” and “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG (“B/FUEL SCHDL” is more, “A/F ALPHA-B1” is less than the SP value)>>GO TO 21.

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.

2. Disconnect mass air flow sensor harness connector. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 22.

22. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> 1. Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-1170.
2. GO TO 29.

NG >> GO TO 23.

23. CHECK “MAS A/F SE-B1”

Select “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 24.

NG (More than the SP value)>>Replace mass air flow sensor, and then GO TO 29.

24. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS(NATS) system and registration of all NVIS(NATS) ignition key IDs. Refer to BL-249, "ECM Re-communicating Function".
3. Perform EC-1084, "VIN Registration".
4. Perform EC-1084, "Accelerator Pedal Released Position Learning".
5. Perform EC-1084, "Throttle Valve Closed Position Learning".
6. Perform EC-1084, "Idle Air Volume Learning".

>> 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

OK or NG

OK >> GO TO 27.

NG >> Repair or replace malfunctioning part, and then GO TO 26.

26. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG (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.

OK or NG

OK >> GO TO 28.

NG (Less than the SP value)>>Replace mass air flow sensor, and then GO TO 30.

28. CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.

- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts
- Malfunctioning seal of intake air system, etc.

>> GO TO 30.

29. CHECK “A/F ALPHA-B1” AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1” and “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-1095, "Symptom Matrix Chart".

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.

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-1095, "Symptom Matrix Chart".

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

Description

INFOID:0000000004499953

Intermittent incidents may occur. In many cases, the malfunction resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of Intermittent Incidents occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

Common Intermittent Incidents Report Situations

STEP in Work Flow	Situation
2	The CONSULT-III is used. The SELF-DIAG RESULTS screen shows time data other than 0 or [1t].
3 or 4	The symptom described by the customer does not recur.
5	(1st trip) DTC does not appear during the DTC Confirmation Procedure.
10	The Diagnostic Procedure for PXXXX does not indicate the malfunctioning area.

Diagnosis Procedure

INFOID:0000000004499954

1.INSPECTION START

Erase (1st trip) DTCs.
Refer to EC-1052, "Emission-related Diagnostic Information".

>> GO TO 2.

2.CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.
Refer to EC-1144, "Ground Inspection".

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3.SEARCH FOR ELECTRICAL INCIDENT

Perform GI-25, "How to Perform Efficient Diagnosis for an Electrical Incident", “INCIDENT SIMULATION TESTS”.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4.CHECK CONNECTOR TERMINALS

Refer to GI-22, "How to Check Terminal", “HOW TO PROBE CONNECTORS”, “How to Check Enlarged Contact Spring of Terminal”.

OK or NG

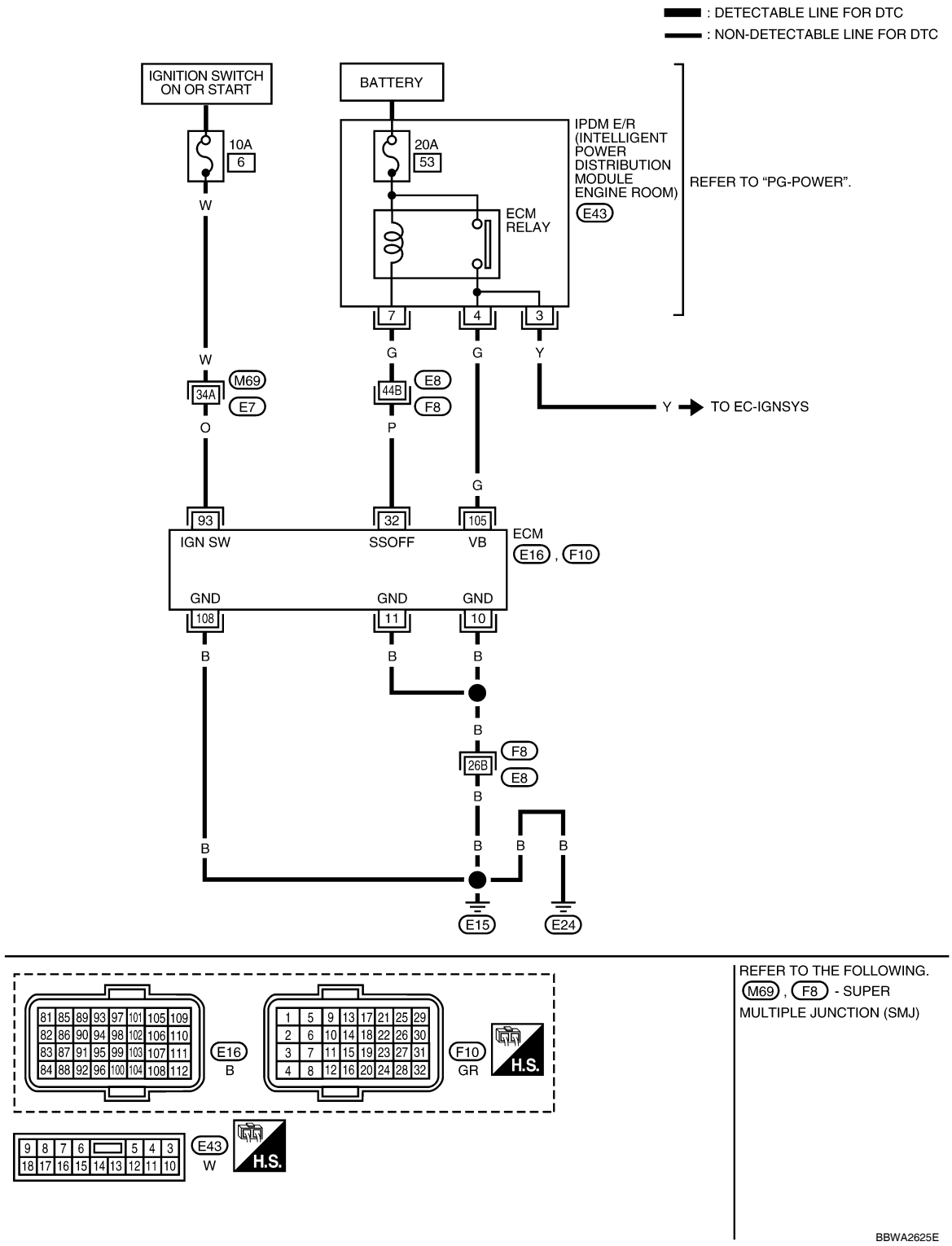
OK >> **INSPECTION END**
NG >> Repair or replace connector.

POWER SUPPLY AND GROUND CIRCUIT

Wiring Diagram

INFOID:0000000004499955

EC-MAIN-01



Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
10 11	B B	ECM ground	**[Engine is running]** • Idle speed	Body ground
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For 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)
93	O	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
108	B	ECM ground	**[Engine is running]** • Idle speed	Body ground

Diagnosis Procedure

INFOID:0000000004499956

1.INSPECTION START

Start engine.
Is engine running?

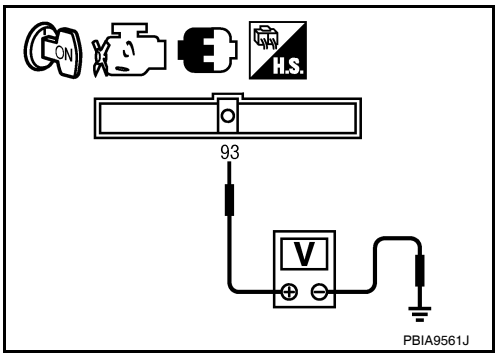
Yes or No

Yes >> GO TO 8.
No >> GO TO 2.

2.CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF and then ON.
2. Check voltage between ECM terminal 93 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

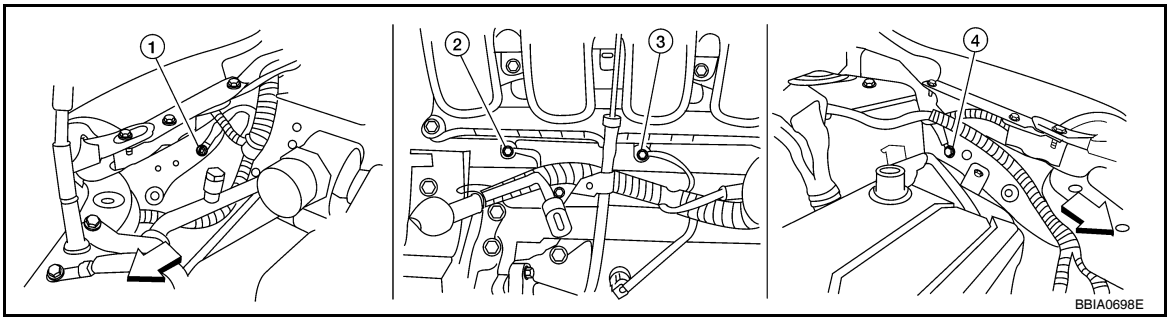
3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 5.
NG >> Repair or replace ground connections.

5. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 10, 11, 108 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

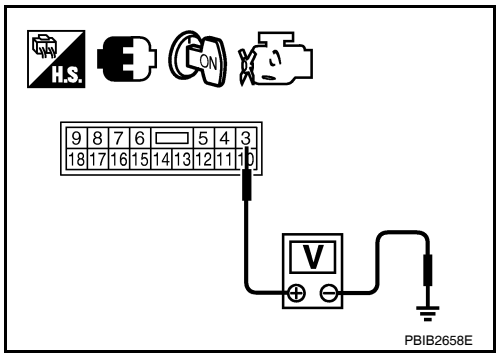
Check the following.
- Harness connectors F8, E8
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

7. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Reconnect ECM harness connector.
2. Turn ignition switch ON.
3. Check voltage between IPDM E/R terminal 3 and ground with CONSULT-III or tester.

Voltage: Battery voltage



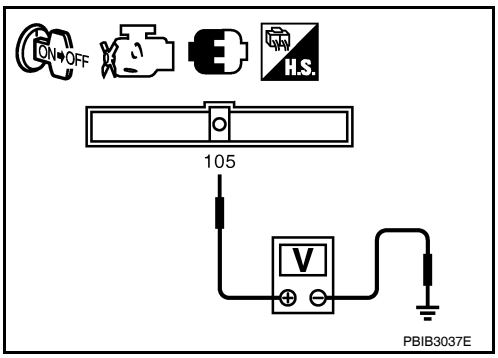
OK or NG

OK >> Go to EC-1518.
NG >> GO TO 8.

8. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON and then OFF.

3. Check voltage between ECM terminal 105 and ground with CONSULT-III or tester.



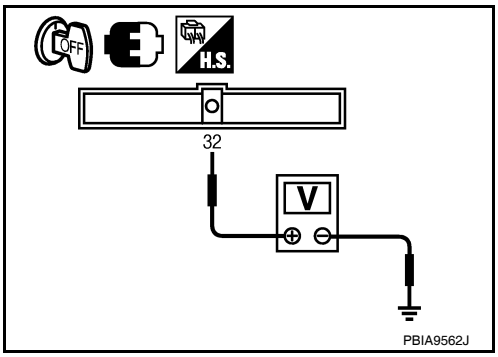
Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.

OK or NG

OK >> GO TO 14.
NG (Battery voltage does not exist.)>>GO TO 9.
NG (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 voltage between ECM terminal 32 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 10.
NG >> GO TO 11.

10. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E43.
3. Check harness continuity between ECM terminal 105 and IPDM E/R terminal 4. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 17.
NG >> 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 E43.
3. Check harness continuity between ECM terminal 32 and IPDM E/R terminal 7. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK 20A FUSE

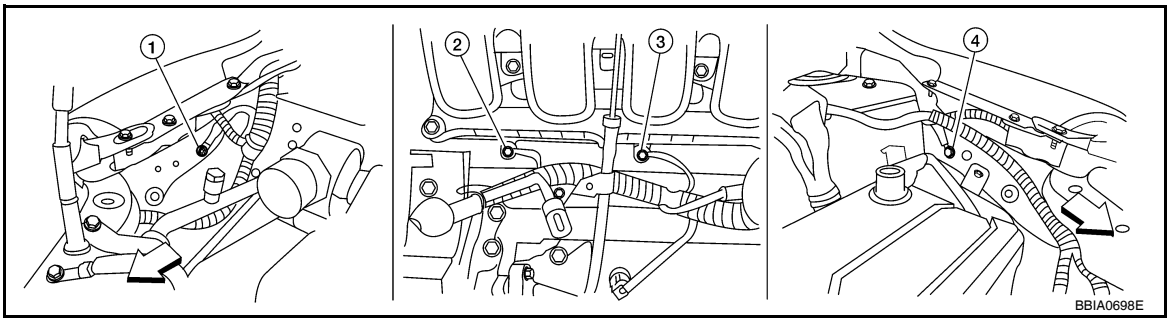
1. Disconnect 20A fuse from IPDM E/R.
2. Check 20A fuse.

OK or NG

OK >> GO TO 17.
NG >> Replace 20A fuse.

14. CHECK GROUND CONNECTIONS

1. Loosen and retighten ground screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 15.
NG >> Repair or replace ground connections.

15. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 10, 11, 108 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 17.
NG >> GO TO 16.

16. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F8, E8
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

17. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

OK or NG

OK >> Replace IPDM E/R. Refer to PG-27, "Removal and Installation of IPDM E/R".
NG >> Repair open circuit or short to power in harness or connectors.

Ground Inspection

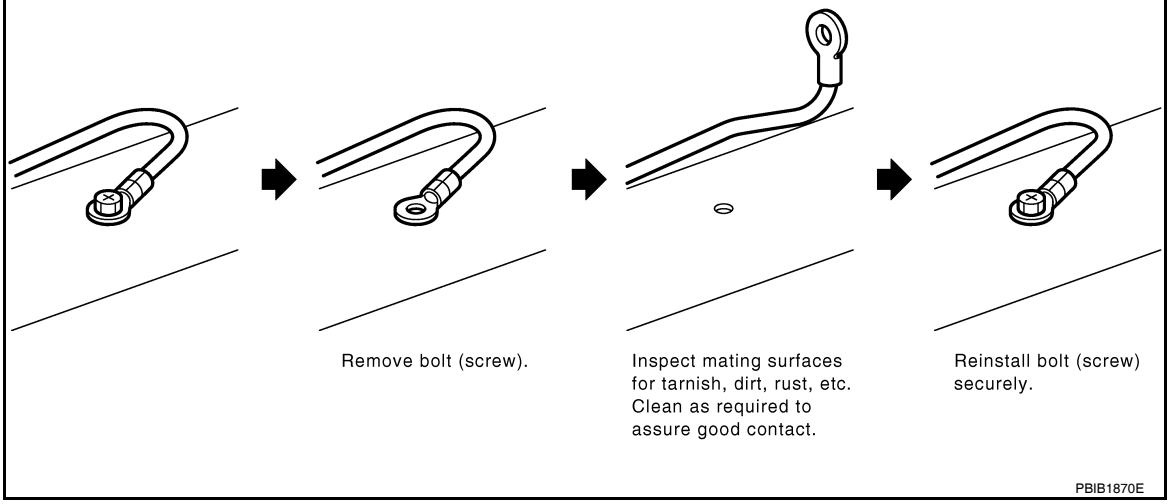
INFOID:0000000004499957

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.
When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for “add-on” accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to PG-29, "Ground Distribution".

Ground Inspection



DTC U0101 CAN COMMUNICATION LINE

Description

INFOID:0000000004306003

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

INFOID:0000000004306004

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0101 0101	Lost communication with TCM	When ECM is not transmitting or receiving CAN communication signal of OBD (emission-related diagnosis) with TCM for 2 seconds or more.	• CAN communication line between TCM and ECM • CAN communication line is open or shorted.

DTC Confirmation Procedure

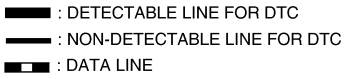
INFOID:0000000004306005

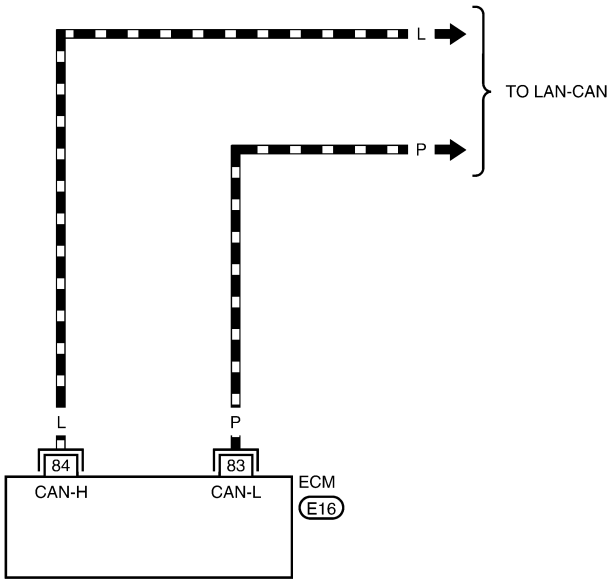
1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.
3. If DTC is detected, go to EC-1146, "Diagnosis Procedure".

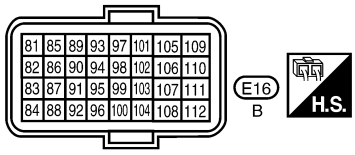
Wiring Diagram

INFOID:0000000004306006

EC-CAN-01







BBWA2626E

Diagnosis Procedure

INFOID:0000000004306007

Go to LAN-26, "CAN System Specification Chart".

DTC U0140 CAN COMMUNICATION LINE

Description

INFOID:0000000004477023

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

INFOID:0000000004477024

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U0140 0140	Lost communication with BCM	When ECM is not transmitting or receiving CAN communication signal of OBD (emission-related diagnosis) with BCM for 2 seconds or more.	• CAN communication line between BCM and ECM • CAN communication line is open or shorted.

DTC Confirmation Procedure

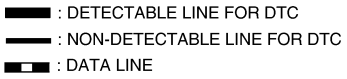
INFOID:0000000004477025

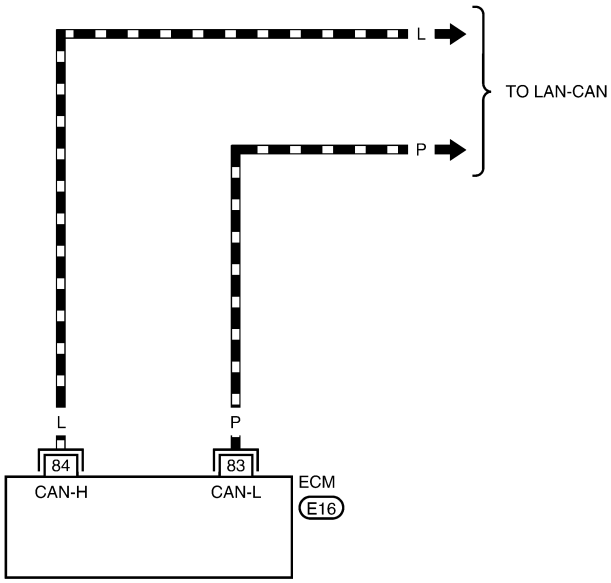
1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.
3. If DTC is detected, go to EC-1148, "Diagnosis Procedure".

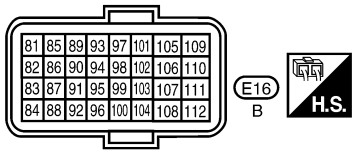
Wiring Diagram

INFOID:0000000004477026

EC-CAN-01







BBWA2626E

Diagnosis Procedure

INFOID:0000000004477027

Go to LAN-26, "CAN System Specification Chart".

DTC U1001 CAN COMMUNICATION LINE

Description

INFOID:0000000004477028

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

INFOID:0000000004477029

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1001 1001	CAN communication line	When ECM is not transmitting or receiving CAN communication signal other than OBD (emission-related diagnosis) for 2 seconds or more.	• Harness or connectors (CAN communication line is open or shorted.)

DTC Confirmation Procedure

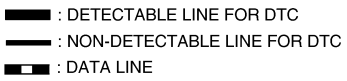
INFOID:0000000004477030

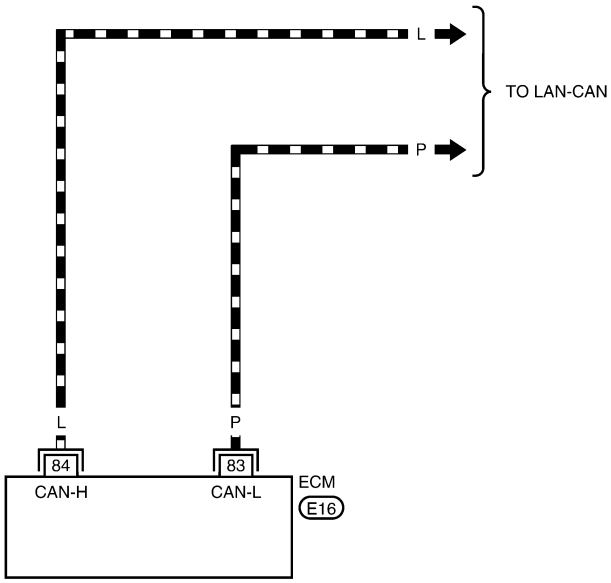
1. Turn ignition switch ON and wait at least 3 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-1150, "Diagnosis Procedure".

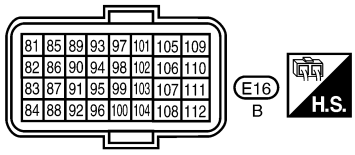
Wiring Diagram

INFOID:0000000004477031

EC-CAN-01







BBWA2626E

Diagnosis Procedure

INFOID:0000000004477032

Go to LAN-26, "CAN System Specification Chart".

DTC P0011 IVT CONTROL

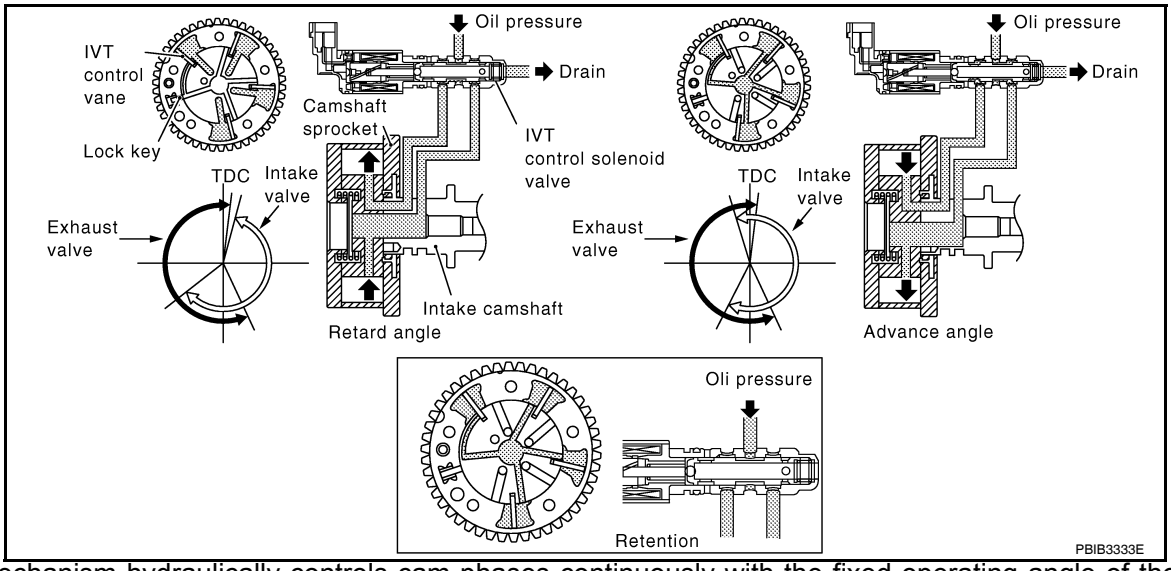
Description

INFOID:0000000004499967

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed and piston position	Intake valve timing control	Intake valve timing control solenoid valve
Engine coolant temperature sensor	Engine coolant temperature		
ABS actuator and electric unit (control unit)	Vehicle speed*		
Combination meter			

*: This signal is sent to the ECM through CAN communication line.



This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve. The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing 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.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004499968

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM (B1)	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle	–5° - 5°CA
		When revving engine up to 2,000 rpm quickly	Approx. 0° - 40°CA
INT/V SOL (B1)	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle	0% - 2%
		When revving engine up to 2,000 rpm quickly	Approx. 0% - 90%

On Board Diagnosis Logic

INFOID:0000000004499969

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0011 0011	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 timing 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

FAIL-SAFE MODE

ECM enters in fail-safe mode when the malfunction is detected.

Detected items	Engine operating condition in fail-safe mode
Intake valve timing control	The signal is not energized to the solenoid valve and the valve control does not function

DTC Confirmation Procedure

INFOID:0000000004499970

CAUTION:
Always drive at a safe speed.
NOTE:
- **If DTC P0011 is displayed with DTC P0075, first perform trouble diagnosis for DTC P0075. See EC-1165.**
- 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.

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 10 consecutive seconds.
   Hold the accelerator pedal as steady as possible.

ENG SPEED	1,200 - 2,000 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 3.87 msec
Shift lever	P or N position (A/T, CVT) Neutral position (M/T)

4. Let engine idle for 10 seconds.
5. If 1st trip DTC is detected, go to EC-1153, "Diagnosis Procedure".
   If 1st trip DTC is not detected, go to next step.
6. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	2,000 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	70 - 105°C (158 - 221°F)
Shift lever	1st or 2nd position
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

7. If 1st trip DTC is detected, go to EC-1153, "Diagnosis Procedure".

WITH GST

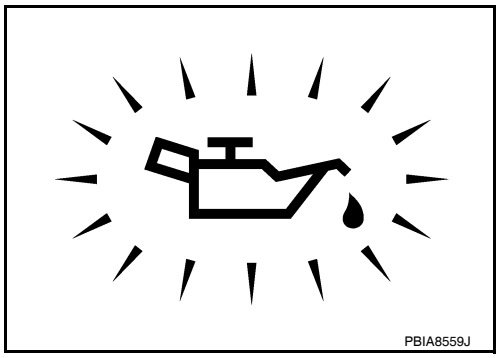
Follow the procedure “WITH CONSULT-III” above.

Diagnosis Procedure

INFOID:0000000004499971

1.CHECK OIL PRESSURE WARNING LAMP

1. Start engine.
2. Check oil pressure warning lamp and confirm it is not illuminated.



OK or NG

OK >> GO TO 2.
NG >> Go to LU-16, "Inspection".

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-1154, "Component Inspection".

OK or NG

OK >> GO TO 3.
NG >> Replace intake valve timing control solenoid valve.

3.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-1298, "Component Inspection".

OK or NG

OK >> GO TO 4.
NG >> Replace crankshaft position sensor (POS).

4.CHECK CAMSHAFT POSITION SENSOR (PHASE)

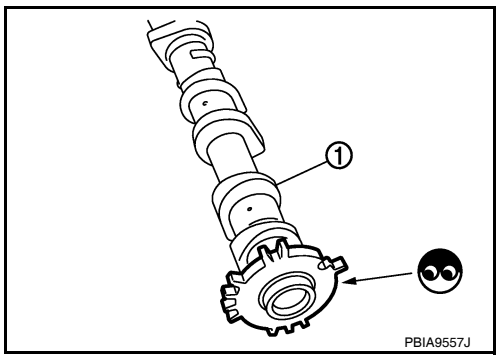
Refer to EC-1303, "Component Inspection".

OK or NG

OK >> GO TO 5.
NG >> 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



OK or NG

OK >> GO TO 6.
NG >> 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 or No

Yes >> Check timing chain installation. Refer to EM-161, "Removal and Installation".
No >> GO TO 7.

7.CHECK LUBRICATION CIRCUIT

Refer to EM-170, "Removal and Installation".

OK or NG

OK >> GO TO 8.
NG >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.
For Wiring Diagram, refer to EC-1294, "Wiring Diagram" for CKP sensor (POS) and EC-1300, "Wiring Diagram" for CMP sensor (PHASE).

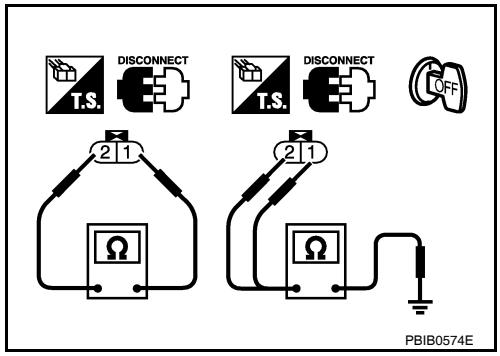
>> **INSPECTION END**

Component Inspection

INFOID:0000000004499972

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve as follows.

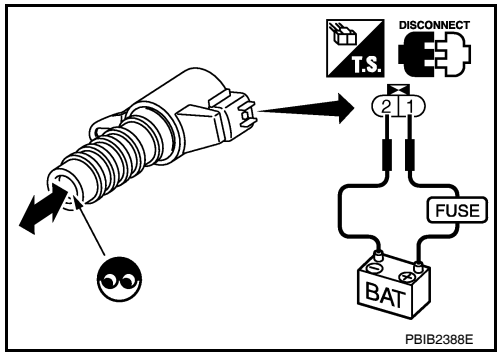


Terminal	Resistance
1 and 2	6.7 - 7.7Ω [at 20°C (68°F)]
1 or 2 and ground	∞Ω (Continuity should not exist.)

If NG, replace intake valve timing control solenoid valve.
If OK, go to next step.

3. Remove intake valve timing control solenoid valve.

4. Provide 12V DC between intake valve timing control solenoid valve terminals and then interrupt it. 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.
If NG, replace intake valve timing control solenoid valve.
NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.



Removal and Installation

INFOID:0000000004499973

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EM-161, "Removal and Installation".

DTC P0031, P0032 A/F SENSOR 1 HEATER

Description

INFOID:0000000004499974

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.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004499975

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F S1 HTR (B1)	• Engine: After warming up, idle the engine (More than 140 seconds after starting engine.)	4 - 100%

On Board Diagnosis Logic

INFOID:0000000004499976

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031 0031	Air fuel ratio (A/F) sensor 1 heater control circuit low	The current amperage in the air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. [An excessively low voltage signal is sent to ECM through the air fuel ratio (A/F) sensor 1 heater.]	• Harness or connectors [Air fuel ratio (A/F) sensor 1 heater circuit is open or shorted.] • Air fuel ratio (A/F) sensor 1 heater
P0032 0032	Air fuel ratio (A/F) sensor 1 heater control circuit high	The current amperage in the air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. [An excessively high voltage signal is sent to ECM through the air fuel ratio (A/F) sensor 1 heater.]	• Harness or connectors [Air fuel ratio (A/F) sensor 1 heater circuit is shorted.] • Air fuel ratio (A/F) sensor 1 heater

DTC Confirmation Procedure

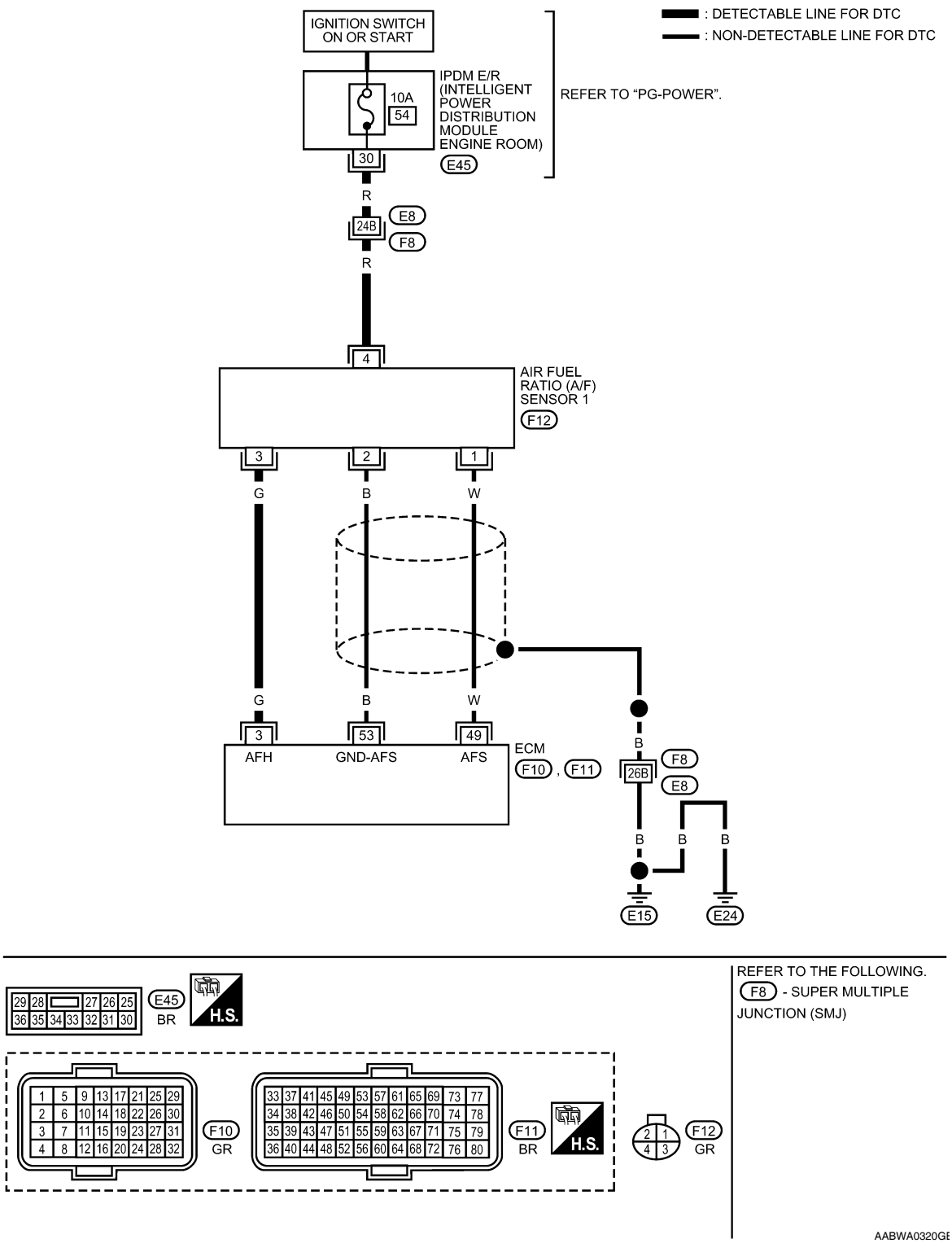
INFOID:0000000004499977

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.
1. Start engine and run it for at least 10 seconds at idle speed.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-1157, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004499978

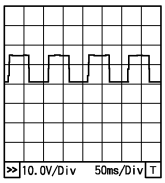
EC-A/FH-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V  PBIA8148J
49	W	A/F sensor 1	**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	**[Ignition switch: ON]**	Approximately 2.2V

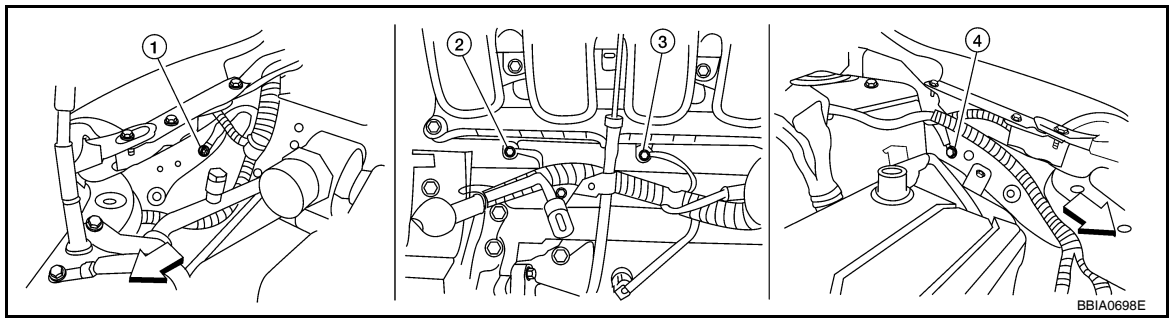
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004499979

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
Refer to EC-1144, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

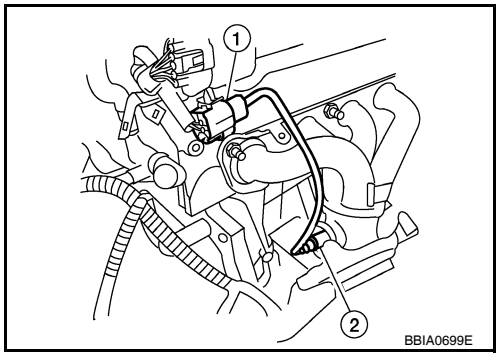
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

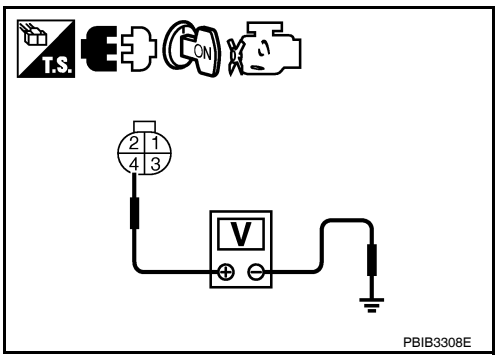
2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector (1).
2. Turn ignition switch ON.

- Air fuel ratio (A/F) sensor 1 (2)



3. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- 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 ECM terminal 3 and A/F sensor 1 terminal 3. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK A/F SENSOR 1 HEATER

Refer to EC-1158, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace air fuel ratio (A/F) sensor 1.

6. CHECK INTERMITTENT INCIDENT

Perform EC-1138.

>> **INSPECTION END**

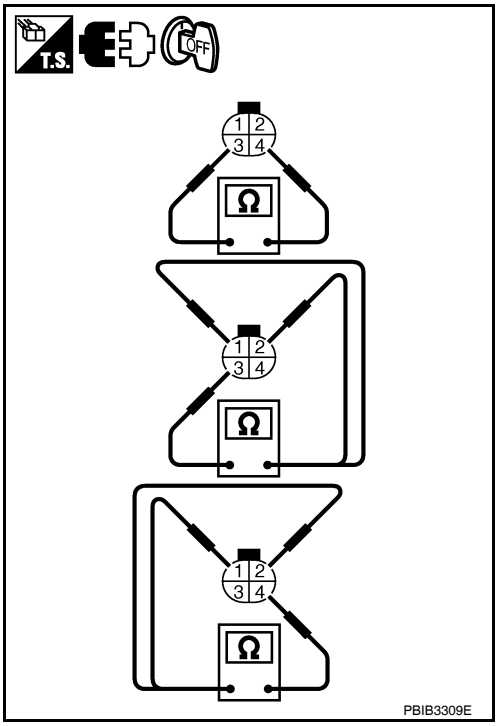
Component Inspection

INFOID:0000000004499980

AIR FUEL RATIO (A/F) SENSOR 1 HEATER

1. Check resistance between A/F sensor 1 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	



2. If NG, 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 Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

INFOID:0000000004499981

AIR FUEL RATIO SENSOR HEATER

Refer to EM-144, "Removal and Installation".

DTC P0037, P0038 HO2S2 HEATER

Description

INFOID:0000000004499982

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Crankshaft position sensor (POS)			
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

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004499983

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
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

On Board Diagnosis Logic

INFOID:0000000004499984

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037 0037	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	• Harness or connectors (Heated oxygen sensor 2 heater circuit is open or shorted.) • Heated oxygen sensor 2 heater
P0038 0038	Heated oxygen sensor 2 heater control circuit high	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	• Harness or connectors (Heated oxygen sensor 2 heater circuit is shorted.) • Heated oxygen sensor 2 heater

DTC Confirmation Procedure

INFOID:0000000004499985

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

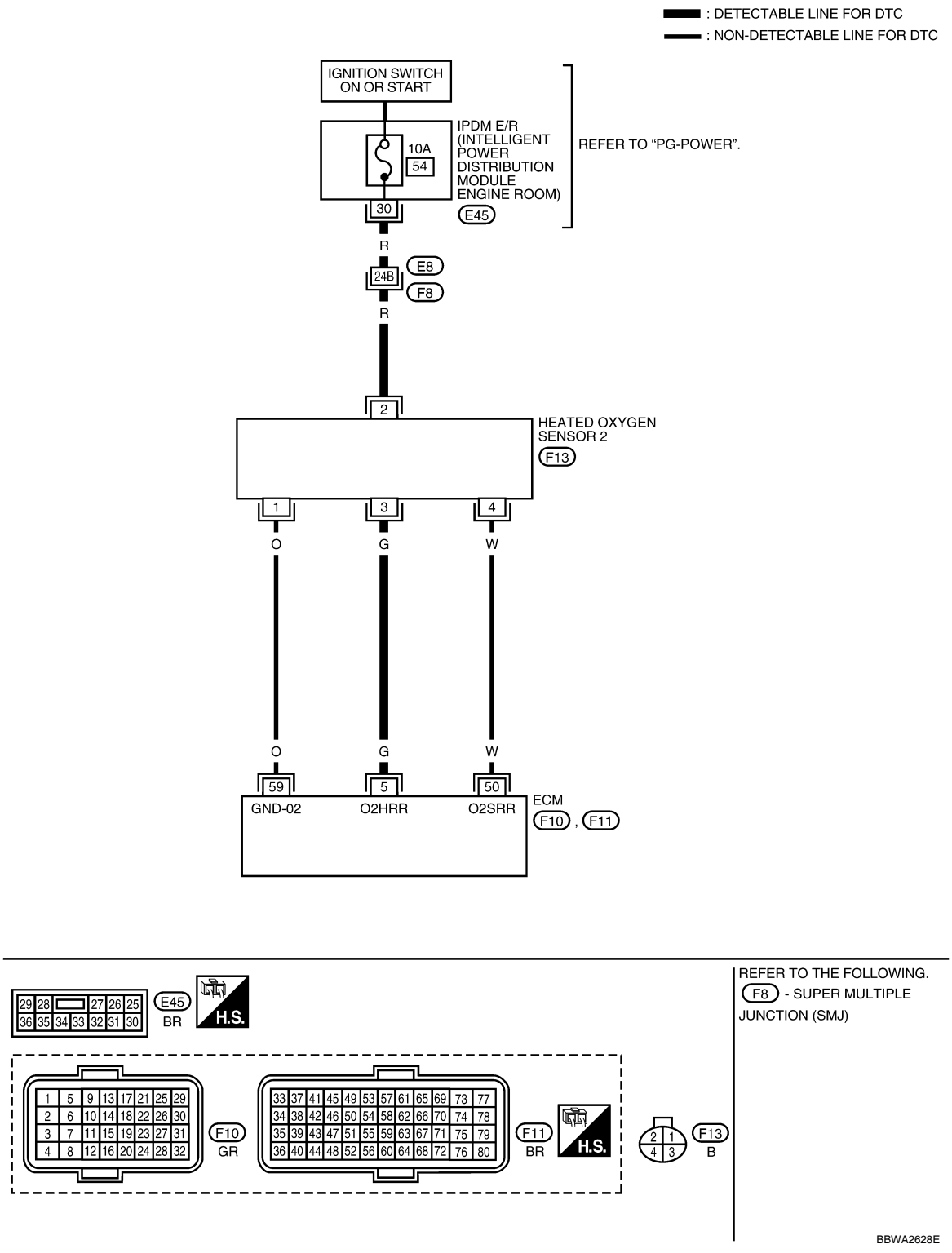
1. Start engine and warm it up to the normal operating temperature.

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.
6. If 1st trip DTC is detected, go to EC-1162, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004499986

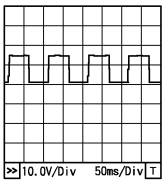
EC-HO2S2H-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	G	Heated oxygen sensor 2 heater	**[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.	Approximately 10V  PBIA8148J
			[Ignition switch: ON] • Engine stopped **[Engine is running]** • Engine speed: Above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
50	W	Heated oxygen sensor 2	**[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 - Approximately 1.0V
59	O	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

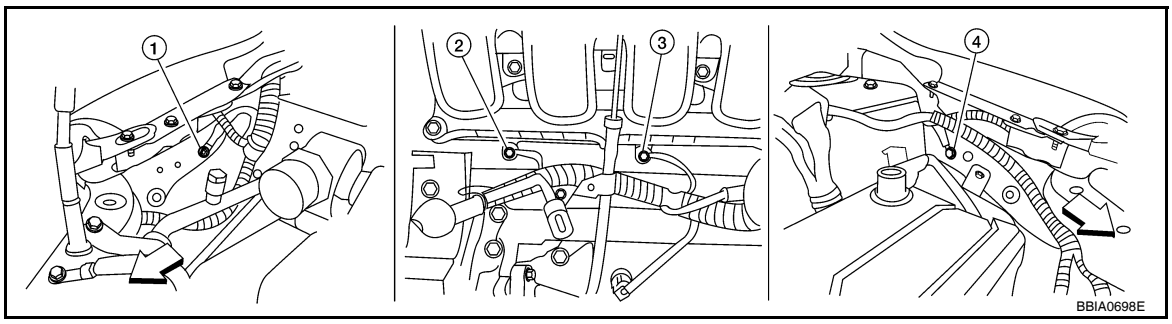
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004499987

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

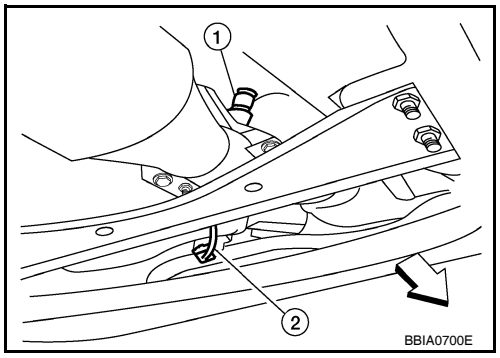
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

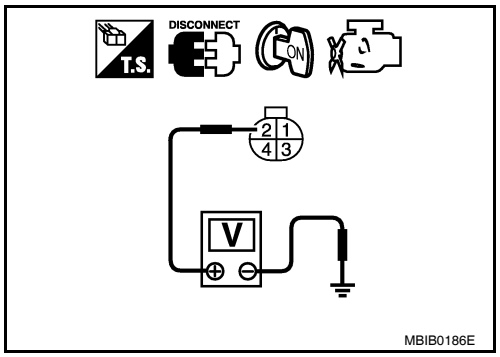
2. CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 2 harness connector (2).
- : Vehicle front
- Heated oxygen sensor 2 (1)
2. Turn ignition switch ON.



3. Check voltage between HO2S2 terminal 2 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- 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 harness continuity between ECM terminal 5 and HO2S2 terminal 3. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-1164, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

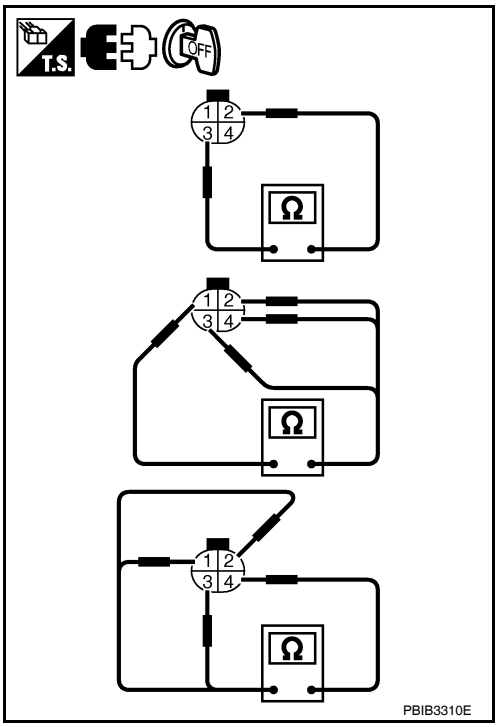
Component Inspection

INFOID:0000000004499988

HEATED OXYGEN SENSOR 2 HEATER

1. Check resistance between HO2S2 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	



2. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

INFOID:0000000004499989

HEATED OXYGEN SENSOR 2

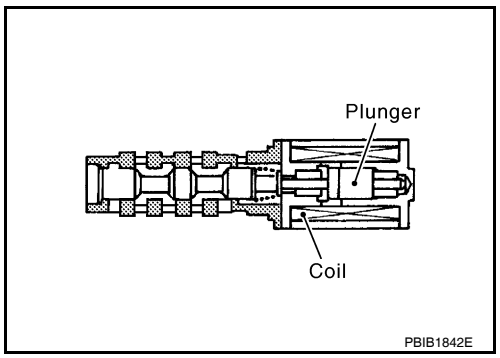
Refer to EM-144, "Removal and Installation".

DTC P0075 IVT CONTROL SOLENOID VALVE

Component Description

INFOID:0000000004499990

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.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004499991

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL (B1)	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle	0% - 2%
		When revving engine up to 2,000 rpm quickly	Approx. 0% - 90%

On Board Diagnosis Logic

INFOID:0000000004499992

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0075 0075	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

INFOID:0000000004499993

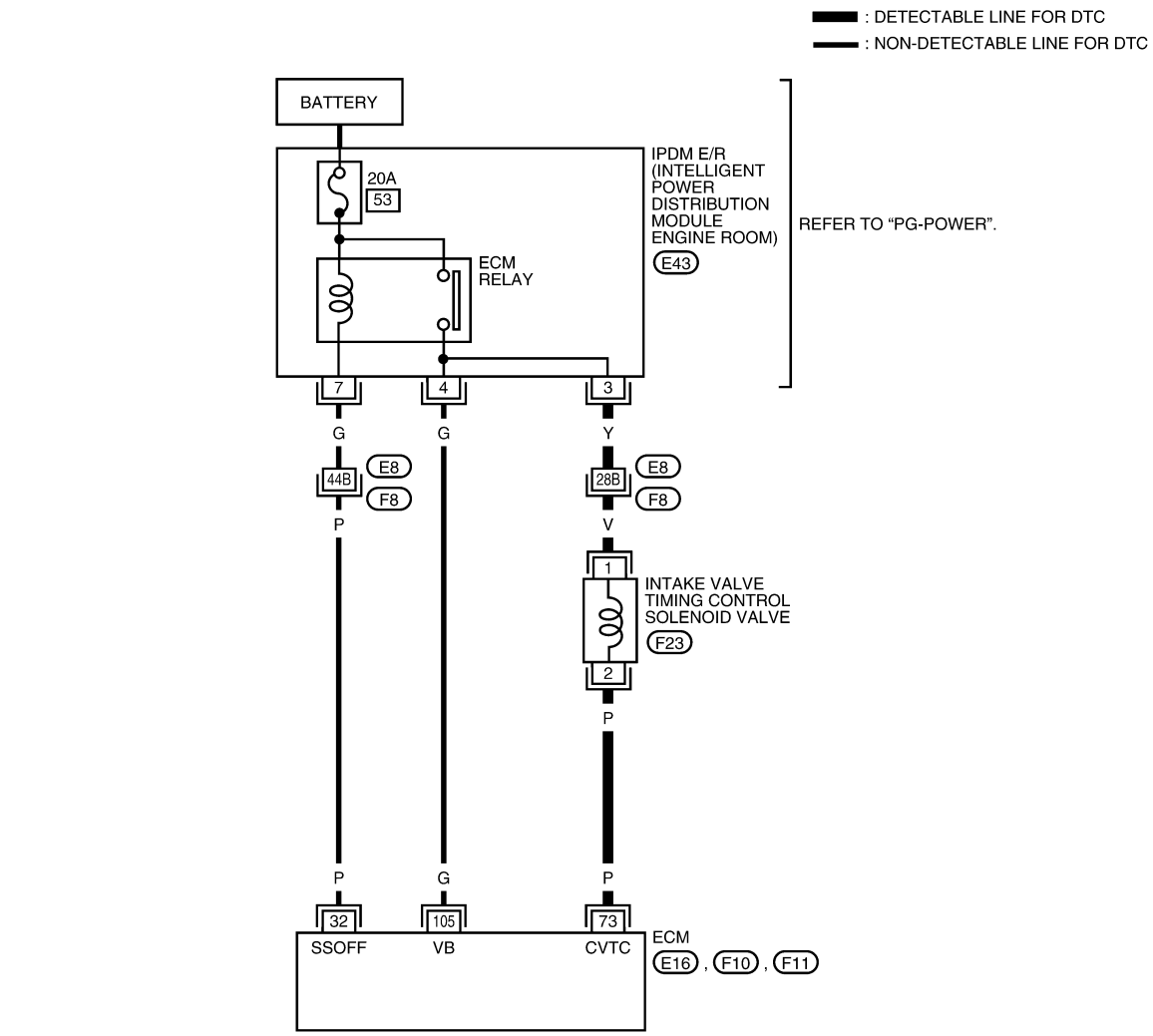
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

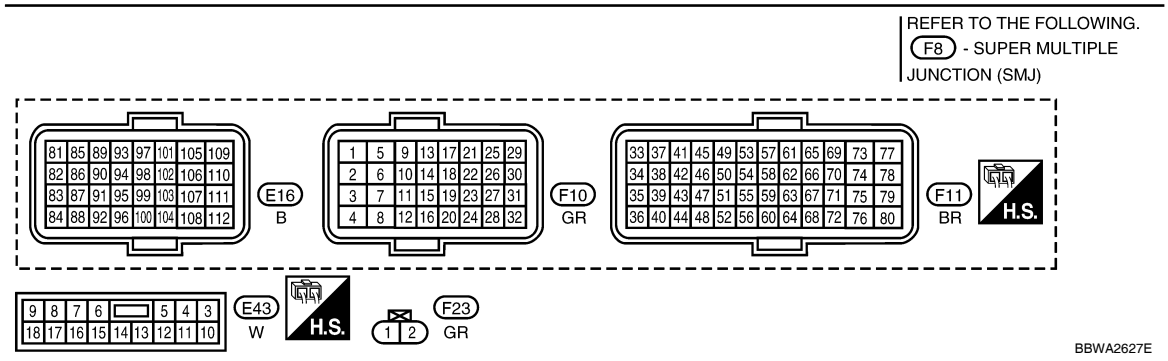
1. Start engine and let it idle for 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-1167, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004499994

EC-IVC-01

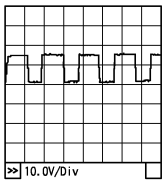




Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For 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)
73	P	Intake valve timing control solenoid valve	**[Engine is running]** • **Warm-up condition** • Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] • **Warm-up condition** • When revving engine up to 2,000 rpm quickly	7 - 10V  PBIA4937J
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

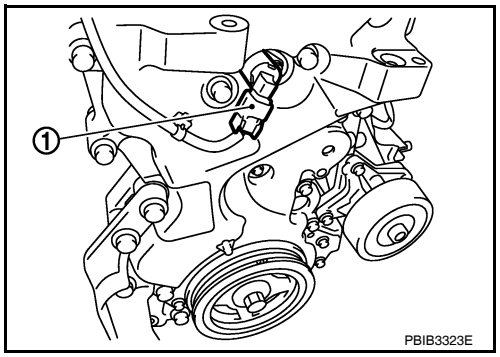
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004499995

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve (1) harness connector.
3. Turn ignition switch ON.



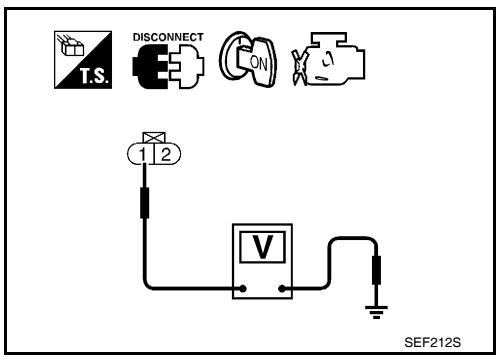
PBIB3323E

4. Check voltage between intake valve timing control solenoid valve terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



SEF212S

2. DETECT MALFUNCTION PART

Check the following.

- Harness connectors E8, F8
- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R

>> Repair or replace harness or connectors.

3.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 73 and intake valve timing control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-1168, "Component Inspection".

OK or NG

OK >> GO TO 5.
NG >> Replace intake valve timing control solenoid valve.

5.CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

Component Inspection

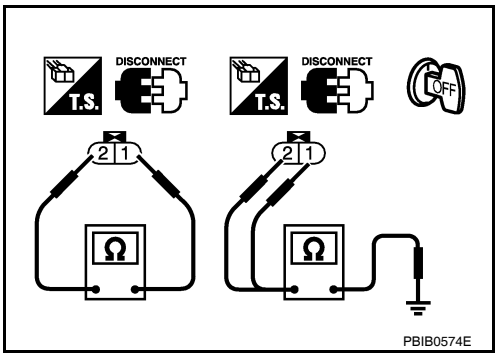
INFOID:0000000004501126

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve as follows.

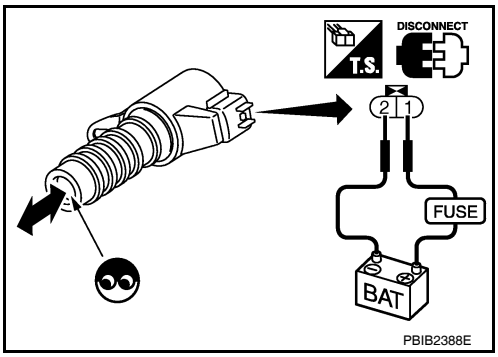
Terminal	Resistance
1 and 2	6.7 - 7.7Ω [at 20°C (68°F)]
1 or 2 and ground	∞Ω (Continuity should not exist.)

If NG, replace intake valve timing control solenoid valve.
If OK, go to next step.



3. Remove intake valve timing control solenoid valve.
4. Provide 12V DC between intake valve timing control solenoid valve terminals and then interrupt it. 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.
If NG, replace intake valve timing control solenoid valve.
NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.



Removal and Installation

INFOID:0000000004501127

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

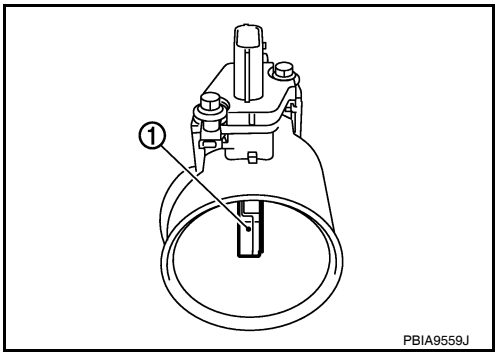
Refer to EM-161, "Removal and Installation".

DTC P0101 MAF SENSOR

Component Description

INFOID:0000000004499998

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.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004499999

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	• See EC-1130.		
CAL/LD VALUE	• Engine: After warming up • Shift lever: P or N (A/T, CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	• Engine: After warming up • Shift lever: P or N (A/T, CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	4.0 - 10.0 g·m/s

On Board Diagnosis Logic

INFOID:0000000004500000

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0101 0101	Mass air flow sensor circuit range/performance	A)	A high voltage from the sensor is sent to ECM under light load driving condition.	• Harness or connectors (Mass air flow sensor circuit is open or shorted.) • Mass air flow sensor • EVAP control system pressure sensor • Intake air temperature sensor
		B)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	• Harness or connectors (Mass air flow sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor • EVAP control system pressure sensor • Intake air temperature sensor

DTC Confirmation Procedure

INFOID:0000000004500001

Perform PROCEDURE FOR MALFUNCTION A first.
If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

NOTE:

If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch ON) instead of running engine at idle speed.

1. Start engine and warm it up to normal operating temperature.
2. Run engine for at least 10 seconds at idle speed.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-1174, "Diagnosis Procedure".

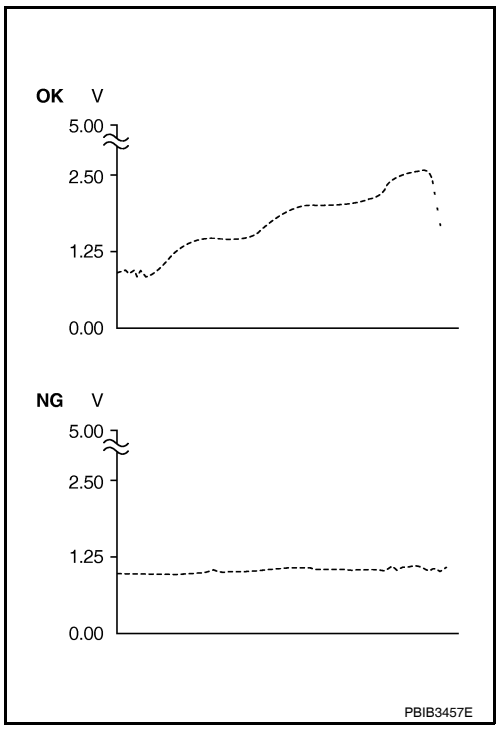
PROCEDURE FOR MALFUNCTION B

CAUTION:

Always drive vehicle at a safe speed.

With CONSULT-III

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
   If engine cannot be started, go to EC-1174, "Diagnosis Procedure".
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Check the voltage of “MAS A/F SE-B1” with “DATA MONITOR”.
5. Increases engine speed to about 4,000 rpm.
6. Monitor the linear voltage rise in response to engine speed increases.
   If NG, go to EC-1174, "Diagnosis Procedure".
   If OK, go to following step.



7. Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
TP SEN 1-B1	More than 1.5V
TP SEN 2-B1	More than 1.5V
Shift lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.

8. Check 1st trip DTC.
9. If 1st trip DTC is detected, go to EC-1174, "Diagnosis Procedure".

Overall Function Check

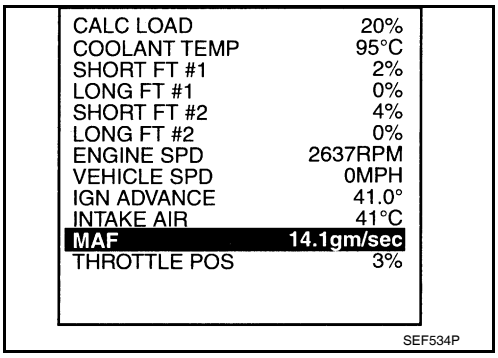
INFOID:0000000004500002

PROCEDURE FOR MALFUNCTION B

Use this procedure to check the overall function of the mass air flow sensor circuit. During this check, a 1st DTC might not be confirmed.

With GST

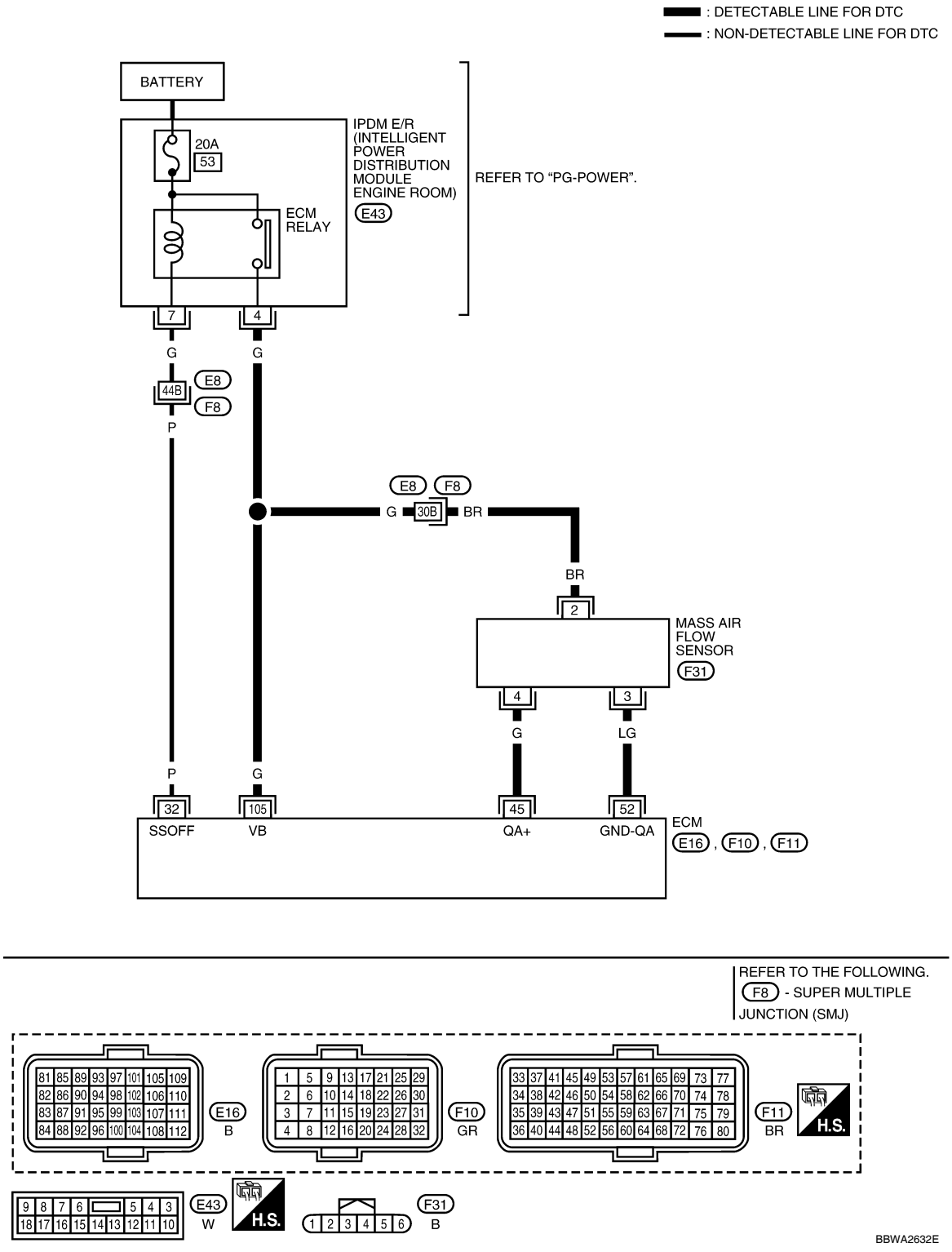
1. Start engine and warm it up to normal operating temperature.
2. Select Service $01 with GST.
3. Check the mass air flow sensor signal with Service $01.
4. Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
5. If NG, go to EC-1174, "Diagnosis Procedure".



Wiring Diagram

INFOID:0000000004500003

EC-MAFS-01



Specification data are reference values and are measured between each terminal 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.

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For 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)
45	G	Mass air flow sensor	**[Engine is running]** • **Warm-up condition** • Idle speed	0.8 - 1.1V
			[Engine is running] • **Warm-up condition** • Engine speed: 2,500 rpm	1.4 - 1.7V
52	LG	Sensor ground (Mass air flow sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:0000000004500004

1.INSPECTION START

Which malfunction (A or B) is duplicated?

A or B

A >> GO TO 3.
B >> GO TO 2.

2.CHECK INTAKE AIR LEAK

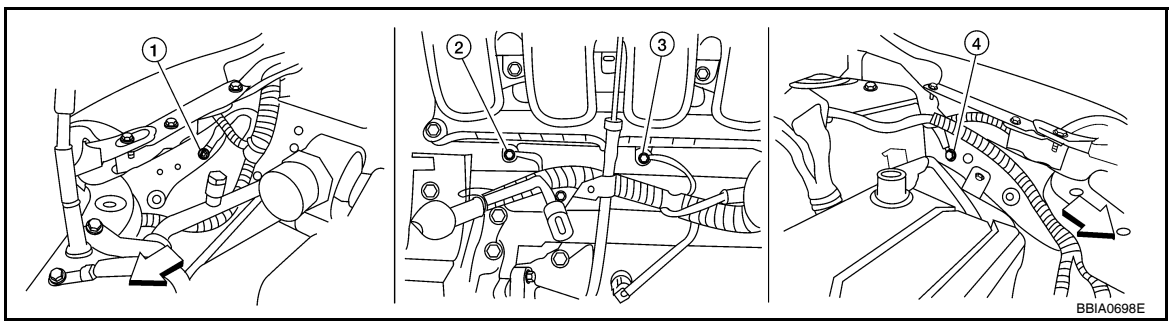
Check the following for connections.
- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

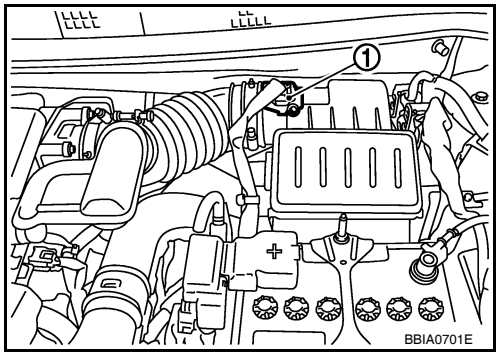
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 4.
NG >> Repair or replace ground connections.

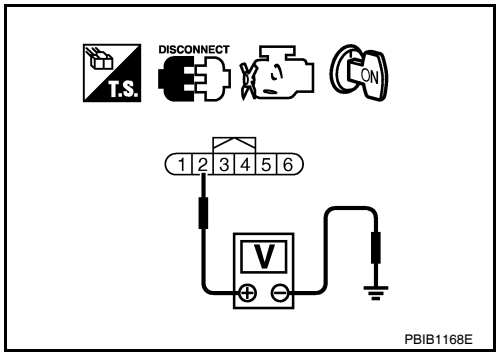
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between MAF sensor terminal 2 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between mass air flow sensor and IPDM E/R
- Harness for open or short between mass air flow sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 52. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAF sensor terminal 4 and ECM terminal 45. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short or short to power in harness or connectors.

8.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-1188, "Component Inspection".

OK or NG

OK >> GO TO 9.
NG >> Replace intake air temperature sensor.

9.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1350, "Component Inspection".

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.

10.CHECK MASS AIR FLOW SENSOR

Refer to EC-1176, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> Replace mass air flow sensor.

11.CHECK INTERMITTENT INCIDENT

Perform EC-1138.

>> **INSPECTION END**

Component Inspection

INFOID:0000000004500005

MASS AIR FLOW SENSOR

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.

Condition	MAS A/F SE-B1 (V)
Ignition switch ON (Engine stopped.)	Approx 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.1
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.7
Idle to about 4,000 rpm	0.8 - 1.1 to 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

5. If the voltage is out of specification, proceed the following.

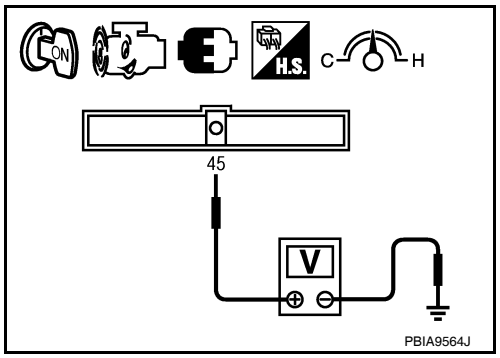
a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
If OK, go to next step.

6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

Without CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 45 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.1
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.7
Idle to about 4,000 rpm	0.8 - 1.1 to 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

4. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 and 3 again.
If OK, go to next step.

5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

Removal and Installation

INFOID:0000000004500006

MASS AIR FLOW SENSOR

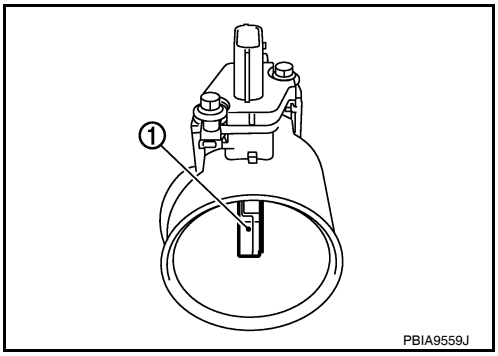
Refer to EM-139, "Removal and Installation".

DTC P0102, P0103 MAF SENSOR

Component Description

INFOID:0000000004501157

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.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004501158

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	• See EC-1130.		
CAL/LD VALUE	• Engine: After warming up • Shift lever: P or N (A/T, CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	• Engine: After warming up • Shift lever: P or N (A/T, CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	4.0 - 10.0 g·m/s

On Board Diagnosis Logic

INFOID:0000000004500009

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102 0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (Mass air flow sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
P0103 0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (Mass air flow sensor circuit is open or shorted.) • Mass air flow sensor

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DTC Confirmation Procedure

INFOID:0000000004500010

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P0102

1. Start engine and wait at least 5 seconds.
2. Check DTC.
3. If DTC is detected, go to EC-1181, "Diagnosis Procedure".

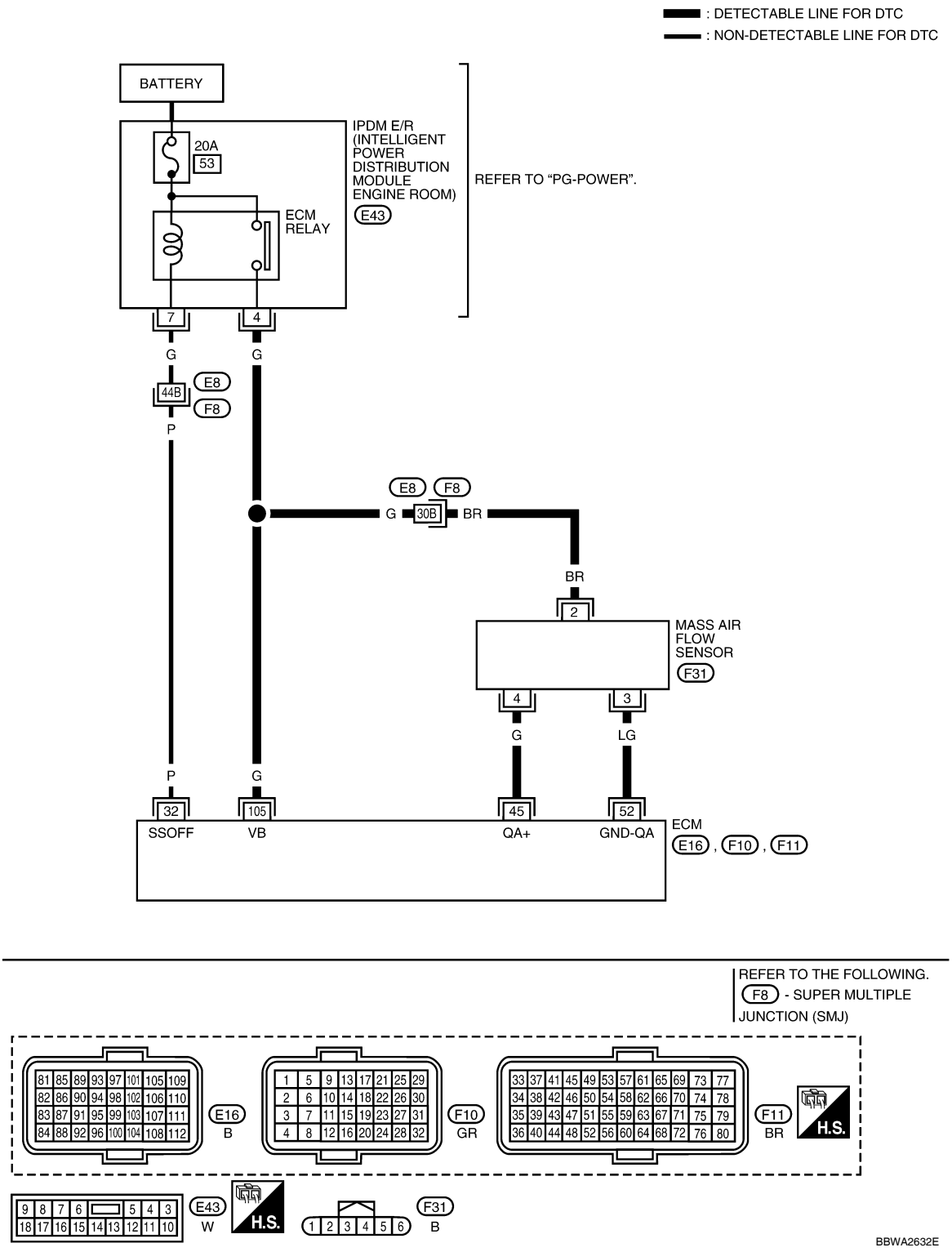
PROCEDURE FOR DTC P0103

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.
3. If DTC is detected, go to EC-1181, "Diagnosis Procedure".
   If DTC is not detected, go to next step.
4. Start engine and wait at least 5 seconds.
5. Check DTC.
6. If DTC is detected, go to EC-1181, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004501159

EC-MAFS-01



Specification data are reference values and are measured between each terminal 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.

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For 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)
45	G	Mass air flow sensor	**[Engine is running]** • **Warm-up condition** • Idle speed	0.8 - 1.1V
			[Engine is running] • **Warm-up condition** • Engine speed: 2,500 rpm	1.4 - 1.7V
52	LG	Sensor ground (Mass air flow sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:0000000004500012

1.INSPECTION START

Which malfunction (P0102 or P0103) is duplicated?

P0102 or P0103

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2.CHECK INTAKE SYSTEM

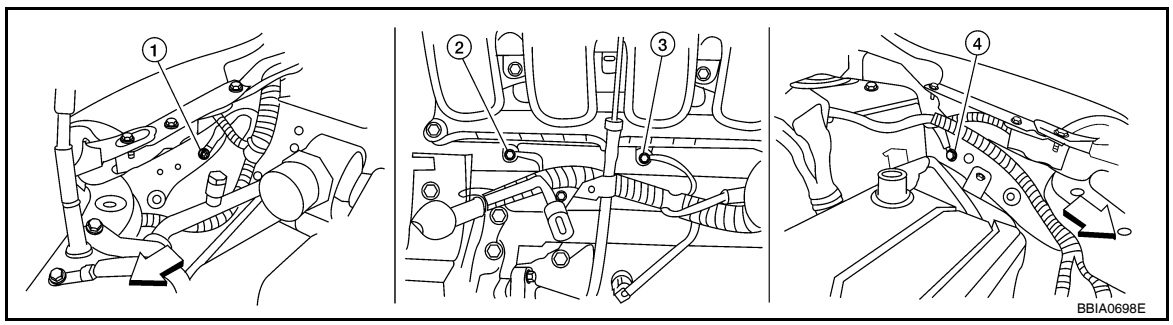
Check the following for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

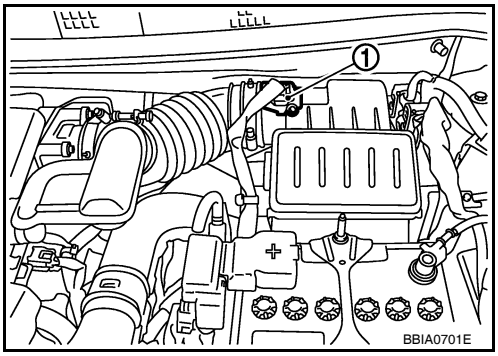
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 4.
NG >> Repair or replace ground connections.

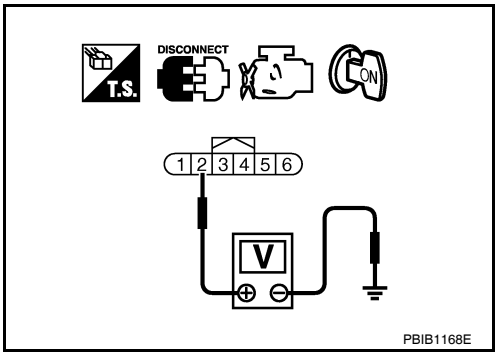
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between MAF sensor terminal 2 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 52. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAF sensor terminal 4 and ECM terminal 45. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MASS AIR FLOW SENSOR

Refer to EC-1183, "Component Inspection".

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

Component Inspection

INFOID:0000000004501160

MASS AIR FLOW SENSOR

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.

Condition	MAS A/F SE-B1 (V)
Ignition switch ON (Engine stopped.)	Approx 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.1
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.7
Idle to about 4,000 rpm	0.8 - 1.1 to 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

5. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

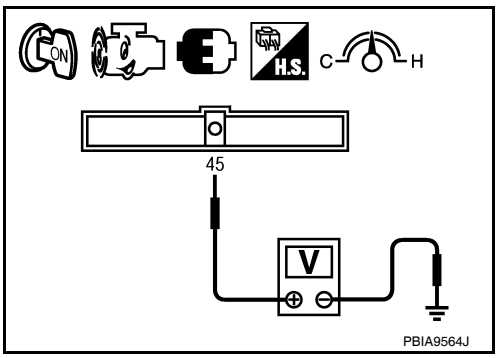
b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
   If OK, go to next step.

6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

Without CONSULT-III

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.

3. Check voltage between ECM terminal 45 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.8 - 1.1
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.7
Idle to about 4,000 rpm	0.8 - 1.1 to 2.4*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

4. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 and 3 again.
   If OK, go to next step.

5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

Removal and Installation

INFOID:0000000004501161

MASS AIR FLOW SENSOR

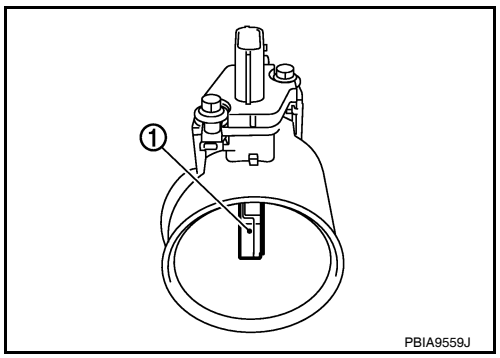
Refer to EM-139, "Removal and Installation".

DTC P0112, P0113 IAT SENSOR

Component Description

INFOID:0000000004500015

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.

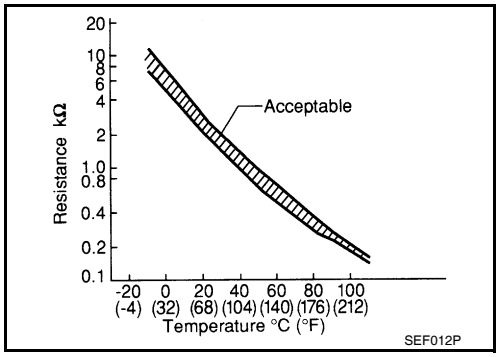


<Reference data>

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

*: This data is reference value and is measured between ECM terminal 46 (Intake air temperature sensor) and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.



On Board Diagnosis Logic

INFOID:0000000004500016

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112 0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (Intake air temperature sensor circuit is open or shorted.) • Intake air temperature sensor
P0113 0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

INFOID:0000000004500017

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

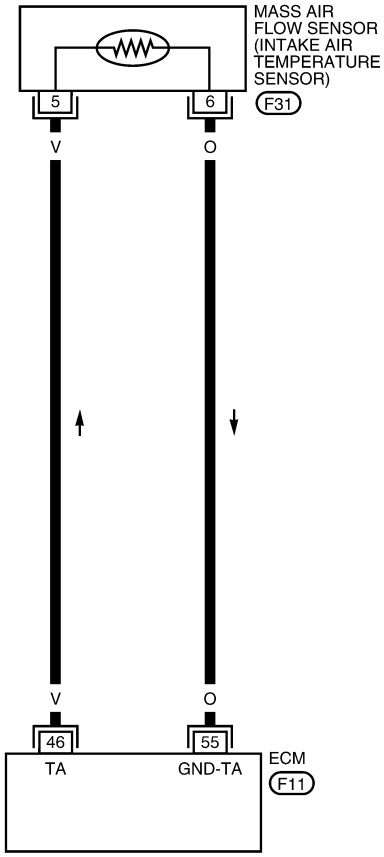
1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-1186, "Diagnosis Procedure".

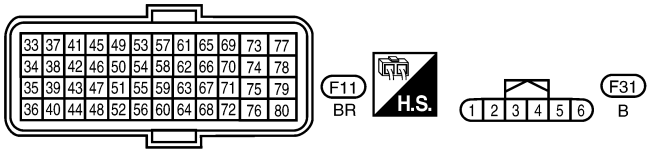
Wiring Diagram

INFOID:0000000004500018

EC-IATS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





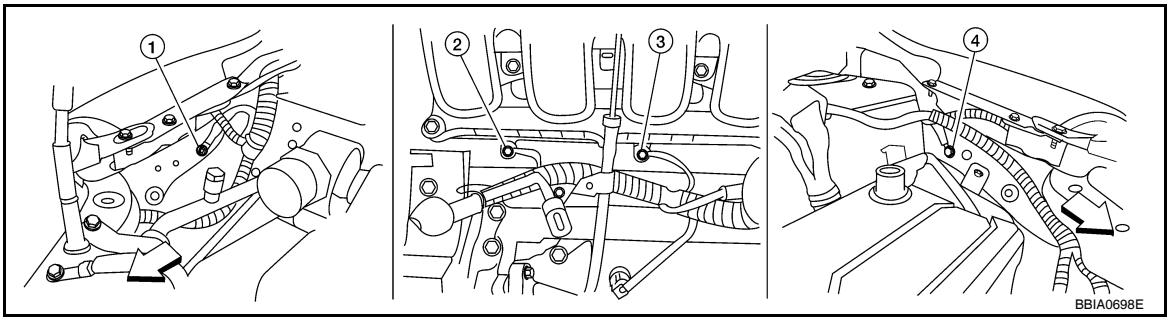
BBWA2633E

Diagnosis Procedure

INFOID:0000000004500019

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

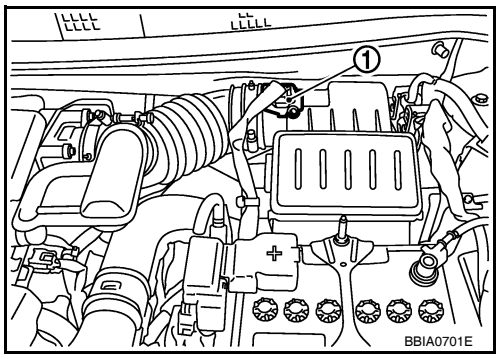
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

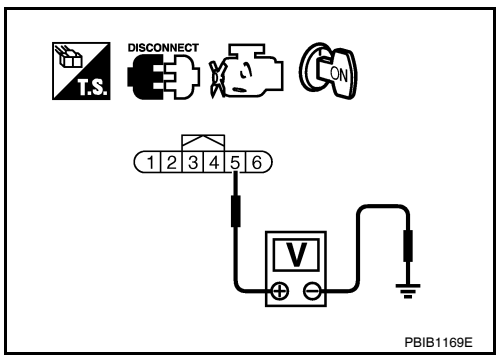
2.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (with intake air temperature sensor) (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between mass air flow sensor terminal 5 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor terminal 6 and ECM terminal 55. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-1188, "Component Inspection".

OK or NG

OK >> GO TO 5.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

Component Inspection

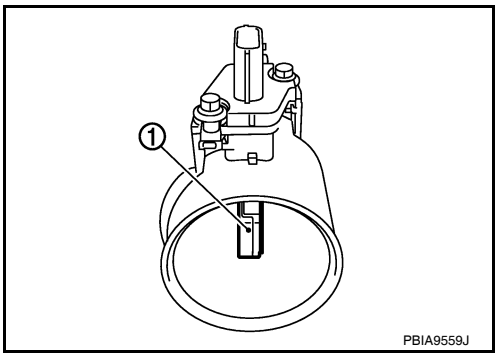
INFOID:0000000004500020

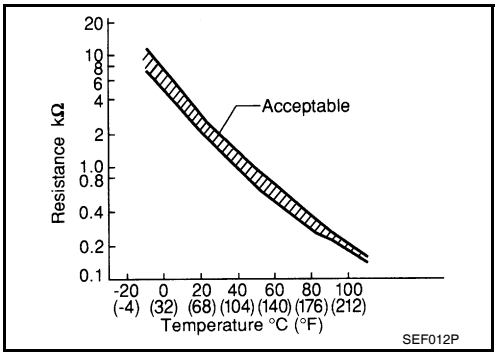
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor (1) terminals 5 and 6 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





Removal and Installation

INFOID:0000000004500021

MASS AIR FLOW SENSOR

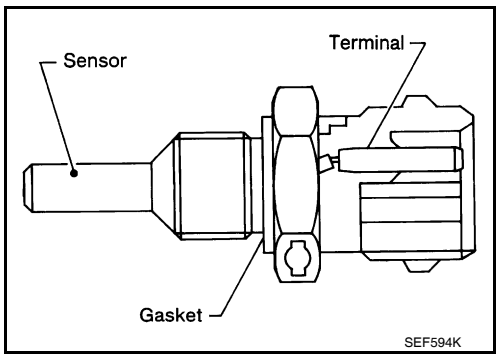
Refer to EM-139, "Removal and Installation".

DTC P0116 ECT SENSOR

Component Description

INFOID:0000000004500022

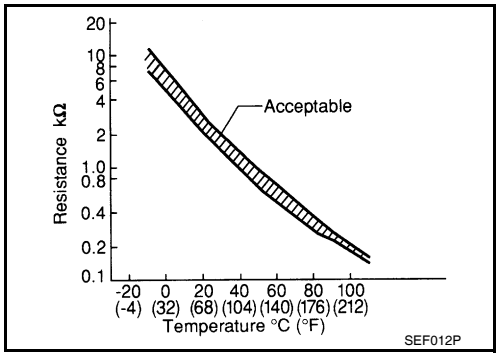
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The 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

*: This data is reference value and is measured between ECM terminal 38 (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.

On Board Diagnosis Logic

INFOID:0000000004477349

NOTE:
If DTC P0116 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117, P0118. Refer to EC-1193, "DTC Confirmation Procedure".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0116 0116	Engine coolant temperature sensor circuit range/ performance	Engine coolant temperature signal from engine coolant temperature sensor does not fluctuate, even when some time has passed after starting the engine with pre-warming up condition.	• Harness or connectors (High or low resistance in the circuit) • Engine coolant temperature sensor

DTC Confirmation Procedure

INFOID:0000000004477350

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, do not add fuel.

1. Start engine and warm it up to normal operating temperature.
2. Rev engine up to 2,000 rpm for more than10 minutes.
3. Move the vehicle to a cool place, then stop engine and turn ignition switch OFF.
4. Check resistance between “fuel level sensor unit and fuel pump” terminals 4 and 5.
5. Soak the vehicle until the resistance between “fuel level sensor unit and fuel pump” terminals 4 and 5 becomes 0.5 kΩ higher than the value measured before soaking.
   CAUTION:
   Never turn ignition switch ON during soaking time.

NOTE:
Soak time changes depending on ambient air temperature. It may take several hours.

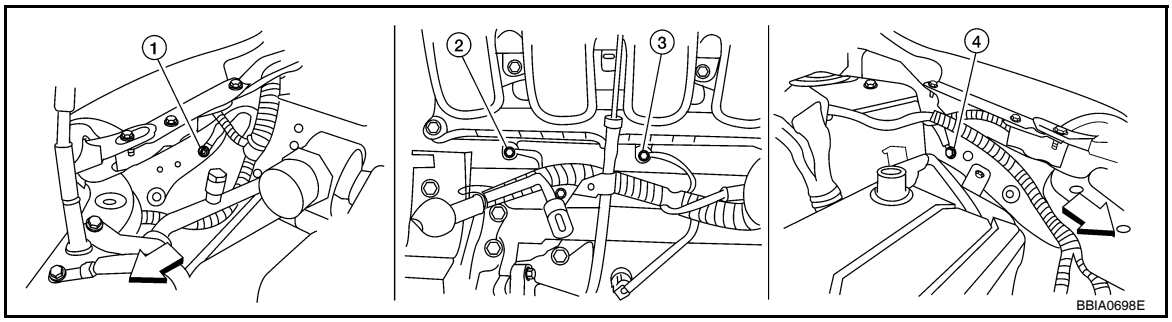
6. Start engine and let it idle for 5 minutes.
7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to EC-1190, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004477351

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1190, "Component Inspection".

OK or NG

OK >> GO TO 3.
NG >> Replace engine coolant temperature sensor.

3.CHECK INTERMITTENT INCIDENT

Refer to EC-1138.
Refer to EC-1194, "Wiring Diagram".

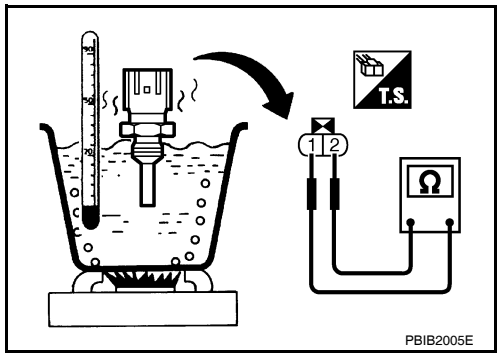
>> **INSPECTION END**

Component Inspection

INFOID:0000000004500027

ENGINE COOLANT TEMPERATURE SENSOR

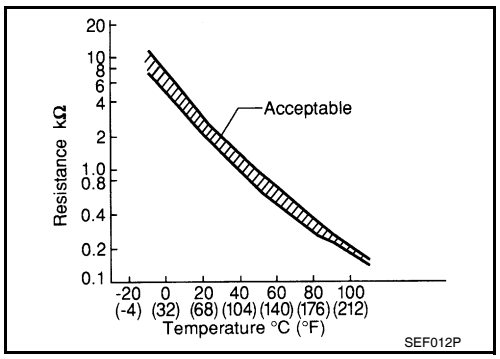
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

2. If NG, replace engine coolant temperature sensor.



Removal and Installation

INFOID:0000000004500028

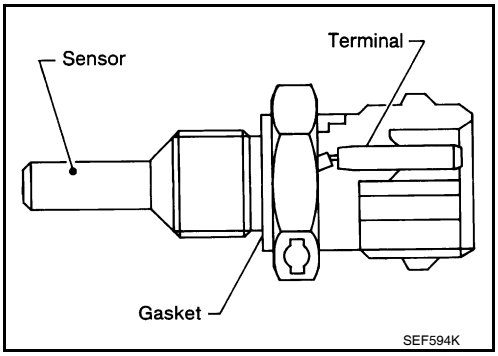
ENGINE COOLANT TEMPERATURE SENSOR
Refer to CO-47, "Component".

DTC P0117, P0118 ECT SENSOR

Component Description

INFOID:0000000004501092

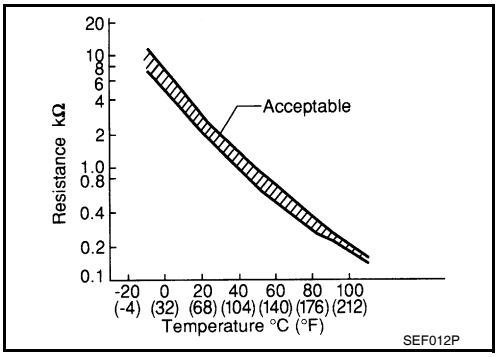
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The 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

*: This data is reference value and is measured between ECM terminal 38 (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.

On Board Diagnosis Logic

INFOID:0000000004500023

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble Diagnosis Name	DTC detecting condition	Possible Cause
P0117 0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (Engine coolant temperature sensor circuit is open or shorted.) • Engine coolant temperature sensor
P0118 0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

<table>
<tr><th>Detected items</th><th colspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><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>
</table>

DTC Confirmation Procedure

INFOID:0000000004500024

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-III

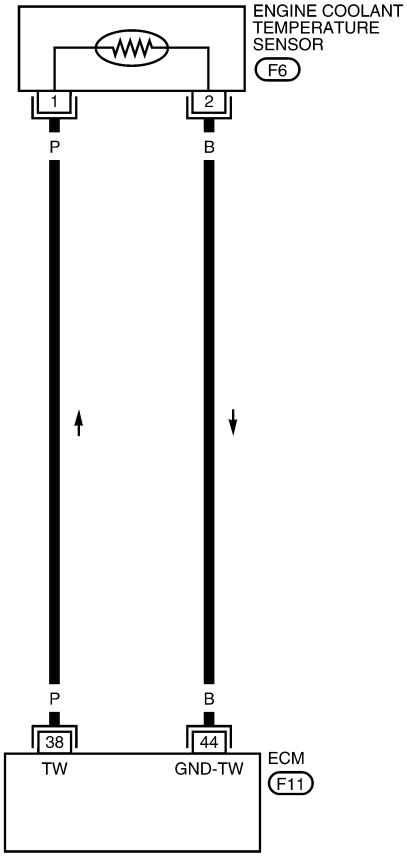
1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.
3. If DTC is detected, go to EC-1194, "Diagnosis Procedure".

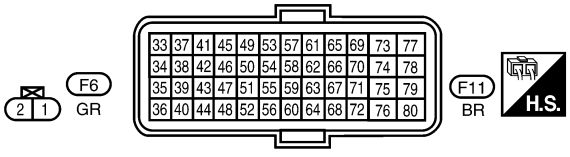
Wiring Diagram

INFOID:0000000004500025

EC-ECTS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





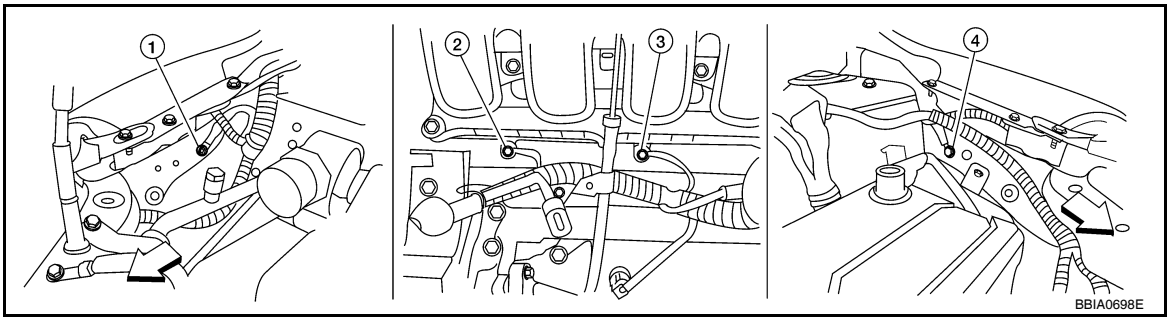
BBWA2634E

Diagnosis Procedure

INFOID:0000000004500026

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

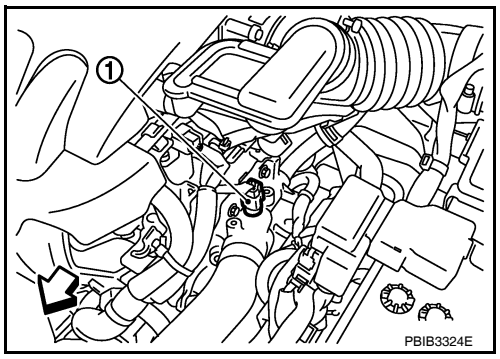
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor (1) harness connector.
- : Vehicle front
2. Turn ignition switch ON.

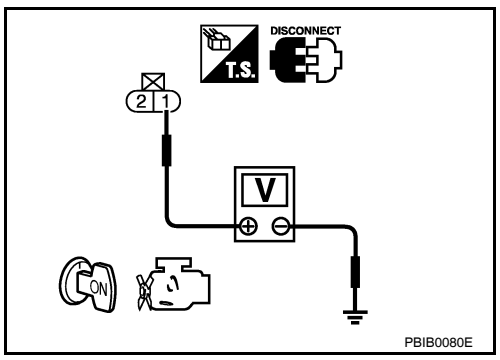


3. Check voltage between ECT sensor terminal 1 and ground with CONSULT-III or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 3.
NG >> 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 harness continuity between ECM terminal 44 and ECT sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1190, "Component Inspection".

OK or NG

OK >> GO TO 5.
NG >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

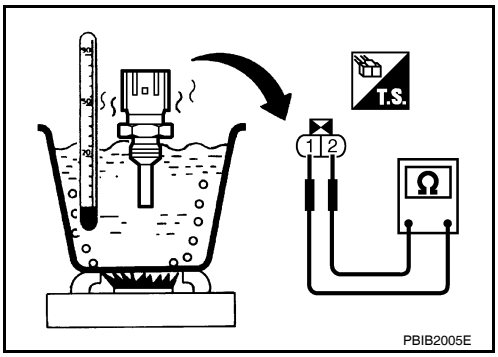
>> **INSPECTION END**

Component Inspection

INFOID:0000000004501094

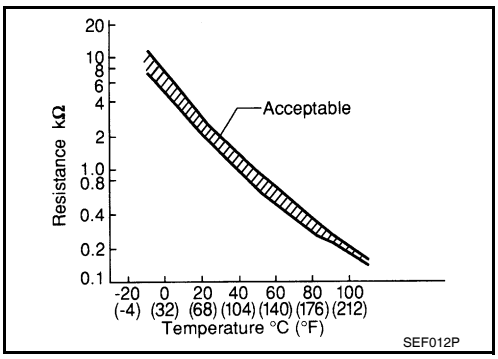
ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

INFOID:0000000004501095

ENGINE COOLANT TEMPERATURE SENSOR

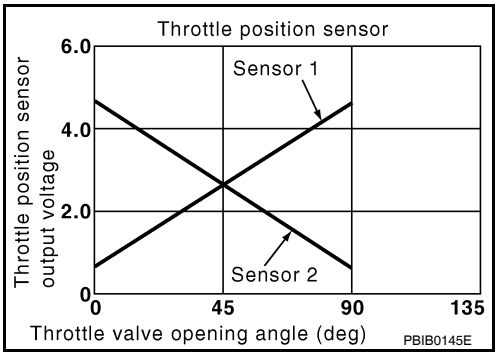
Refer to CO-47, "Component".

DTC P0122, P0123 TP SENSOR

Component Description

INFOID:0000000004500029

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.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004500030

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
TP SEN 1-B1 TP SEN 2-B1*	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T, CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

INFOID:0000000004500031

These self-diagnoses have the one trip detection logic.
NOTE:
If DTC P0122 or P0123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-1396.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122 0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	• Harness or connectors (TP sensor 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 2)
P0123 0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:0000000004500032

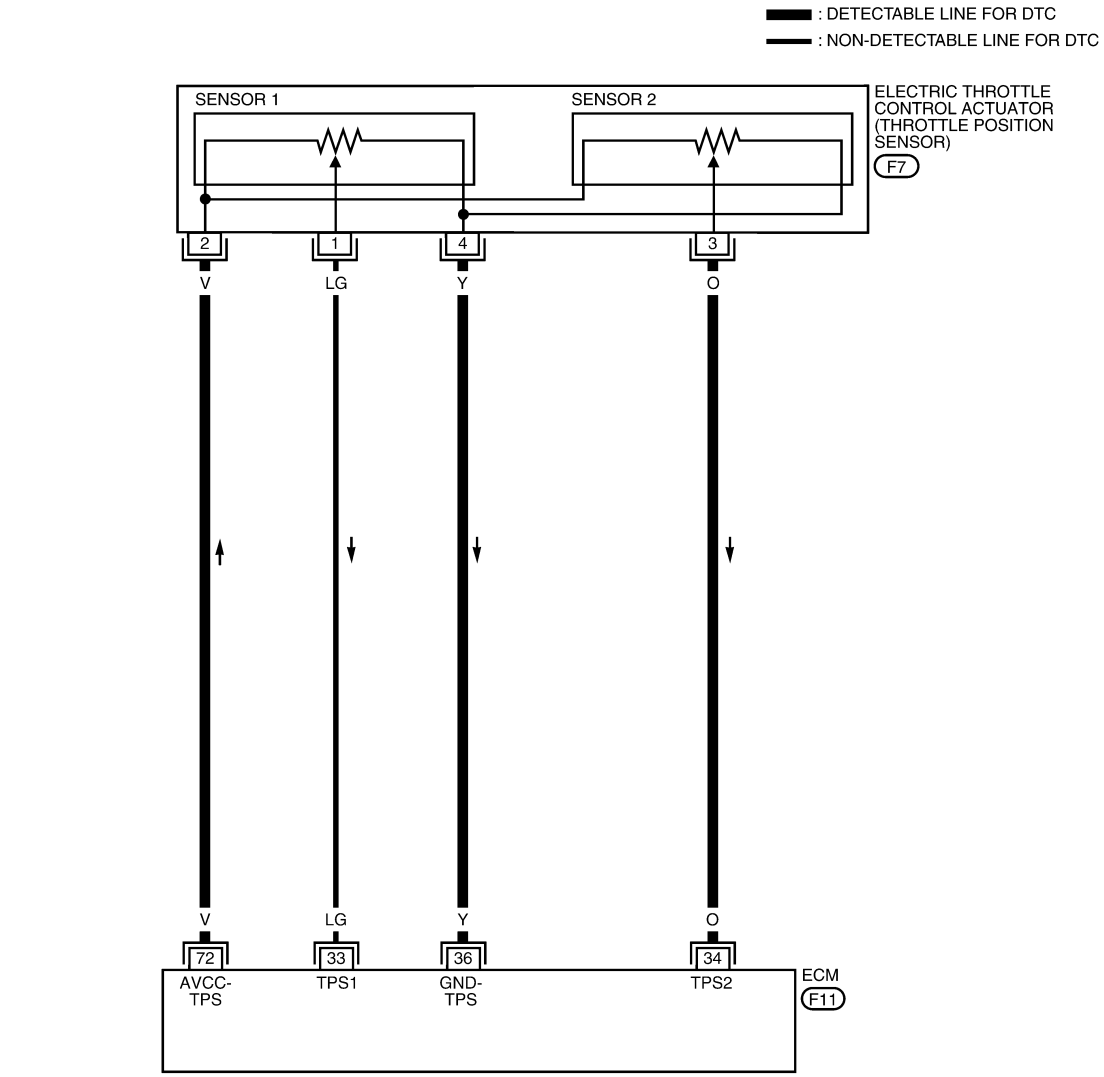
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

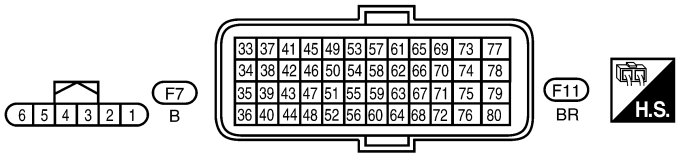
1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-1199, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004500033

EC-TPS2-01





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Specification data are reference values and are measured between each terminal 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.

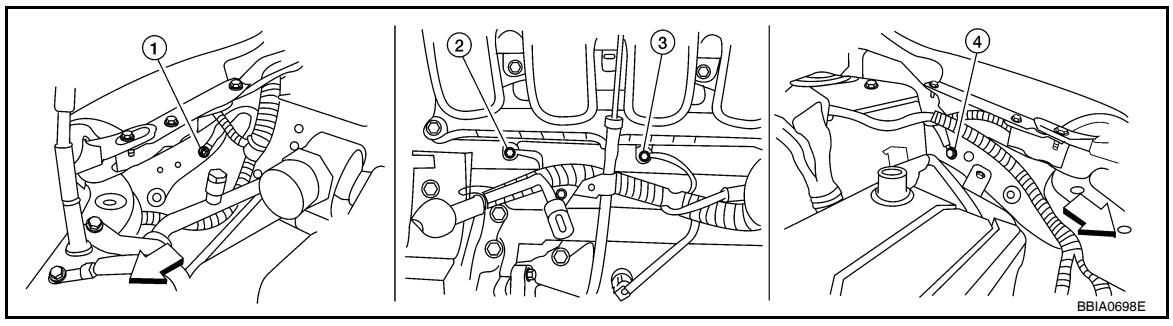
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	LG	Throttle position sensor 1	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
34	O	Throttle position sensor 2	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
36	Y	Sensor ground (Throttle position sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
72	V	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V

Diagnosis Procedure

INFOID:0000000004500034

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

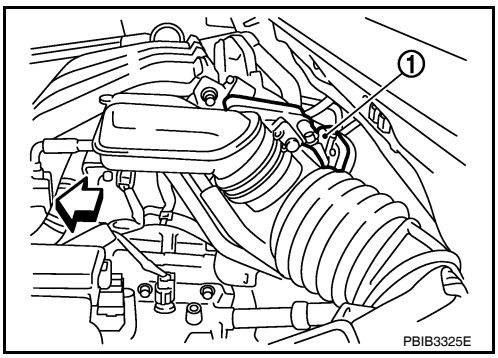
1. Body ground E24
2. Engine ground F9
3. Engine ground E16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator (1) harness connector.
- : Vehicle front
2. Turn ignition switch ON.

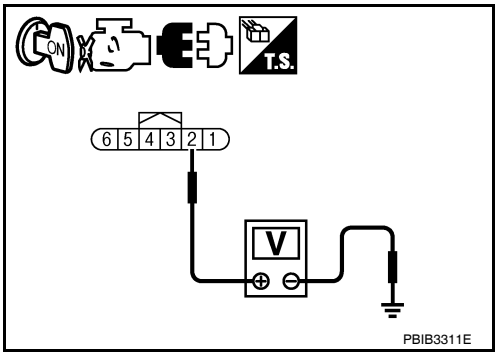


3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT-III or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 36. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 34 and electric throttle control actuator terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-1201, "Component Inspection".

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-1084, "Throttle Valve Closed Position Learning".
3. Perform EC-1084, "Idle Air Volume Learning".

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

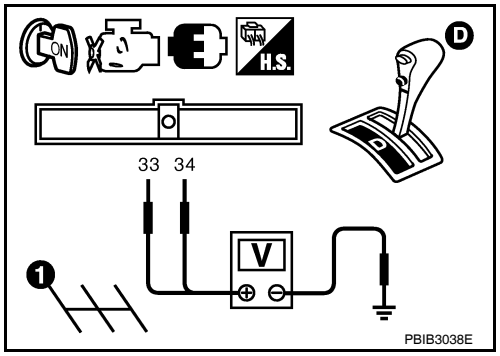
>> **INSPECTION END**

Component Inspection

INFOID:0000000004500035

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-1084, "Throttle Valve Closed Position Learning".
3. Turn ignition switch ON.
4. Set shift lever to D position (A/T, CVT) or 1st position (M/T).
5. Check voltage between ECM terminals 33 (TP sensor 1 signal), 34 (TP sensor 2 signal) and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
33 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
34 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-1084, "Throttle Valve Closed Position Learning".
8. Perform EC-1084, "Idle Air Volume Learning".

Removal and Installation

INFOID:0000000004500036

ELECTRIC THROTTLE CONTROL ACTUATOR

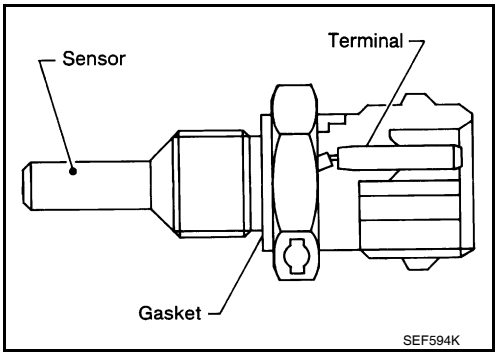
Refer to EM-141, "Removal and Installation".

DTC P0125 ECT SENSOR

Component Description

INFOID:0000000004501093

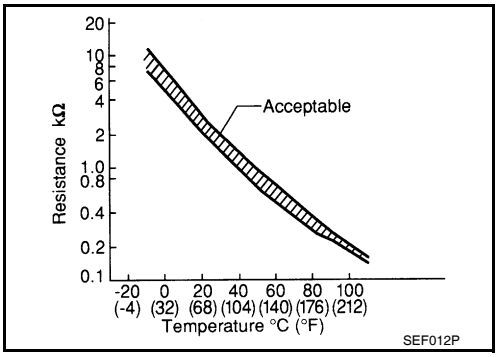
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The 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

*: This data is reference value and is measured between ECM terminal 38 (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.

On Board Diagnosis Logic

INFOID:0000000004500038

NOTE:

- If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to EC-1193, "DTC Confirmation Procedure".
- If DTC P0125 is displayed with P0116, first perform the trouble diagnosis for DTC P0116. Refer to EC-1202, "DTC Confirmation Procedure".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0125 0125	Insufficient engine coolant temperature for closed loop fuel control	• Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. • Engine coolant temperature is insufficient for closed loop fuel control.	• Harness or connectors (High resistance in the circuit) • Engine coolant temperature sensor • Thermostat

DTC Confirmation Procedure

INFOID:0000000004500039

CAUTION:

Be careful not to overheat engine.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-III

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-III.
3. Check that “COOLAN TEMP/S” is above 10°C (50°F).

If it is above 10°C (50°F), the test result will be OK.
If it is below 10°C (50°F), go to following step.

4. Start engine and run it for 65 minutes at idle speed.
   If "COOLAN TEMP/S" increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.
5. Check DTC.
6. If DTC is detected, go to EC-1203, "Diagnosis Procedure".

WITH GST

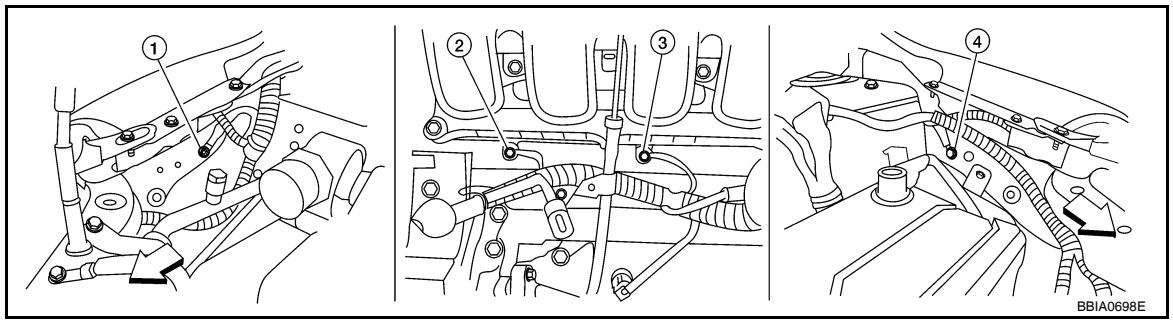
Follow the procedure "WITH CONSULT-III" above.

Diagnosis Procedure

INFOID:0000000004500040

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1204, "Component Inspection".

OK or NG

OK >> GO TO 3.
NG >> Replace engine coolant temperature sensor.

3.CHECK THERMOSTAT OPERATION

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace thermostat. Refer to CO-45, "Removal and Installation".

4.CHECK INTERMITTENT INCIDENT

Refer to EC-1138.
Refer to EC-1194, "Wiring Diagram".

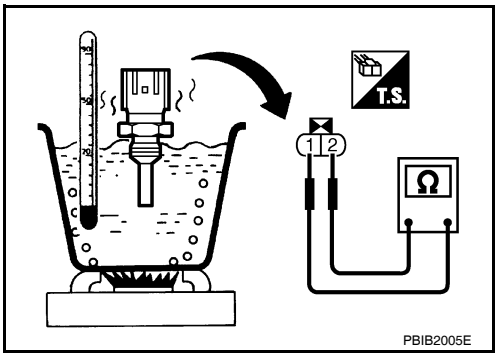
>> **INSPECTION END**

Component Inspection

INFOID:0000000004501098

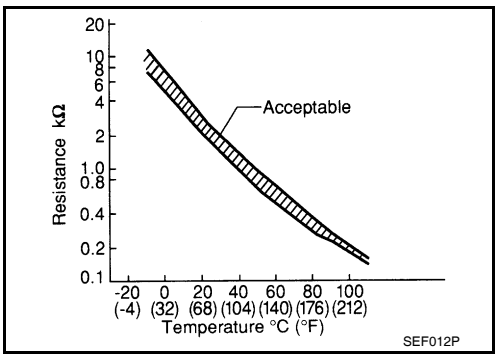
ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

INFOID:0000000004501099

ENGINE COOLANT TEMPERATURE SENSOR

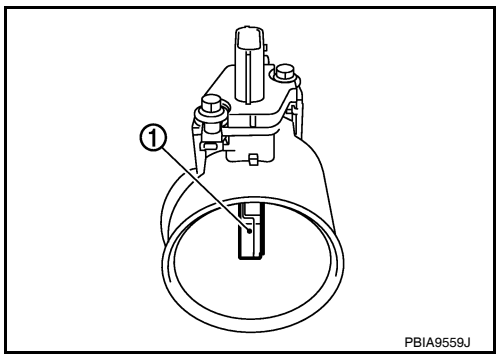
Refer to CO-47, "Component".

DTC P0127 IAT SENSOR

Component Description

INFOID:0000000004501162

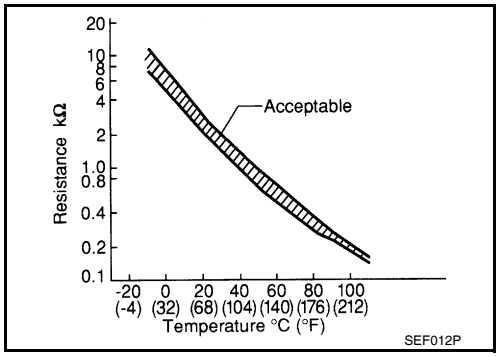
The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response 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

*: This data is reference value and is measured between ECM terminal 46 (Intake air temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

INFOID:0000000004500044

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0127 0127	Intake air temperature too high	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	• Harness or connectors (Intake temperature sensor circuit is open or shorted) • Intake air temperature sensor

DTC Confirmation Procedure

INFOID:0000000004500045

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-III

1. Wait until engine coolant temperature is less than 96°C (205°F)

a. Turn ignition switch ON.
b. Select “DATA MONITOR” mode with CONSULT-III.
c. Check the engine coolant temperature.
d. If the engine coolant temperature is not less than 96°C (205°F), turn ignition switch OFF and cool down engine.
   • Perform the following steps before engine coolant temperature is above 96°C (205°F).

2. Turn ignition switch ON.
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Start engine.
5. Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.
6. Check 1st trip DTC.
7. If 1st trip DTC is detected, go to EC-1206, "Diagnosis Procedure".

WITH GST

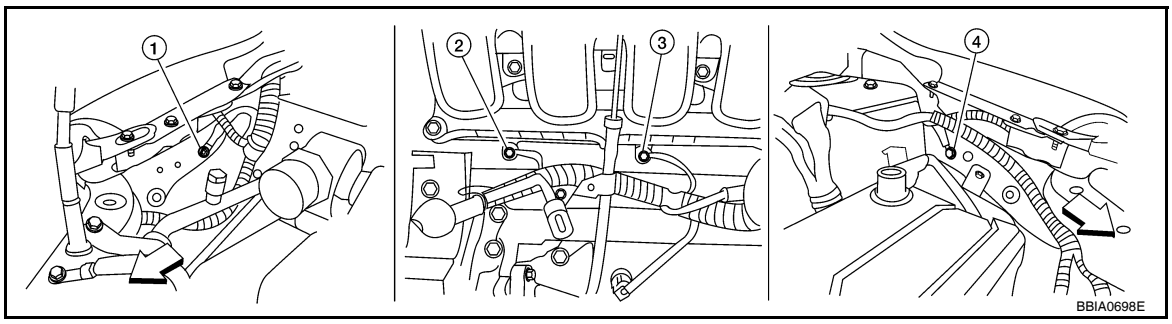
Follow the procedure “With CONSULT-III” above.

Diagnosis Procedure

INFOID:0000000004500046

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-1206, "Component Inspection".

OK or NG

OK >> GO TO 3.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

3.CHECK INTERMITTENT INCIDENT

Refer to EC-1138.
Refer to EC-1186, "Wiring Diagram".

>> **INSPECTION END**

Component Inspection

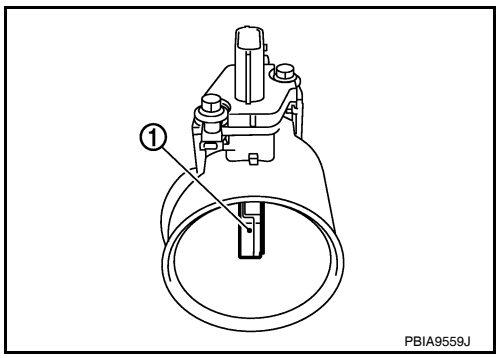
INFOID:0000000004501163

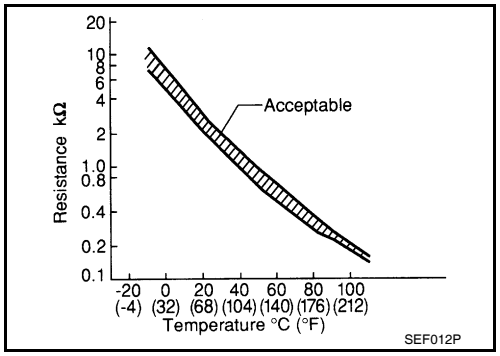
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor (1) terminals 5 and 6 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





Removal and Installation

INFOID:0000000004501164

MASS AIR FLOW SENSOR

Refer to EM-139, "Removal and Installation".

DTC P0128 THERMOSTAT FUNCTION

On Board Diagnosis Logic

INFOID:0000000004500049

NOTE:
If DTC P0128 is displayed with DTC P0300, P0301, P0302, P0303 or P0304, first perform the trouble diagnosis for DTC P0300, P0301, P0302, P0303, P0304. Refer to EC-1283, "DTC Confirmation Procedure".
Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough. This is due to a leak in the seal or the thermostat stuck open.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0128 0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	• Thermostat • Leakage from sealing portion of thermostat • Engine coolant temperature sensor

DTC Confirmation Procedure

INFOID:0000000004500050

WITH CONSULT-III

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
- **For best results, perform at ambient temperature of –10°C (14°F) or higher.**
- **For best results, perform at engine coolant temperature of –10°C (14°F) to 53°C (127°F).**
- **Before performing the following procedure, do not fill with the fuel.**

1. Turn A/C switch OFF.
2. Turn blower fan switch OFF.
3. Turn ignition switch ON.
4. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-III.
5. Check the indication of “COOLAN TEMP/S”.
   If it is below 53°C (127°F), go to following step.
   If it is above 53°C (127°F), cool down the engine to less than 53°C (127°F). Then go to next steps.
6. Start engine.
7. Drive vehicle for 10 consecutive minutes under the following conditions.

VHCL SPEED SE	More than 56 km/h (35 MPH)

   If “COOLAN TEMP/S” increases to more than 75°C (167°F) within 10 minutes, turn ignition switch OFF because the test result will be OK.
8. Check 1st trip DTC.
9. If 1st trip DTC is detected, go to EC-1208, "Diagnosis Procedure".

WITH GST

Follow the procedure “With CONSULT-III” above.

Diagnosis Procedure

INFOID:0000000004500051

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1209, "Component Inspection".

OK or NG

OK >> GO TO 2.
NG >> Replace engine coolant temperature sensor.

2.CHECK THERMOSTAT

Refer to CO-45, "Removal and Installation".

OK or NG

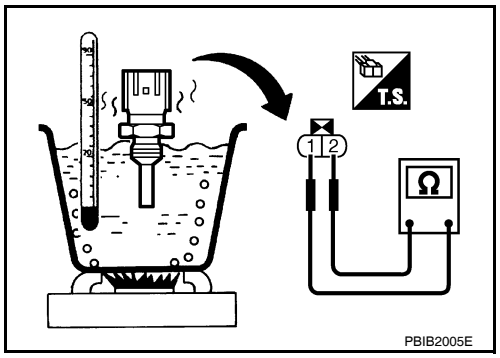
OK >> **INSPECTION END**
NG >> Replace thermostat.

Component Inspection

INFOID:0000000004500052

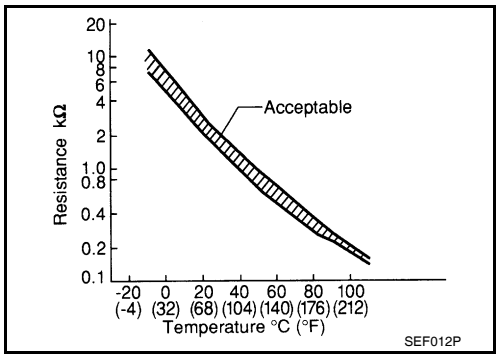
ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

INFOID:0000000004500053

ENGINE COOLANT TEMPERATURE SENSOR

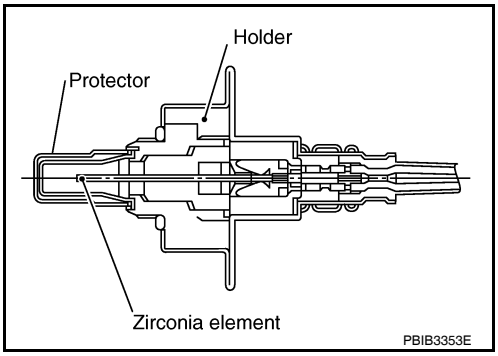
Refer to CO-47, "Component".

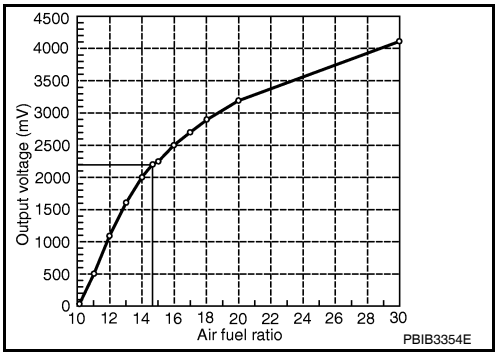
DTC P0130 A/F SENSOR 1

Component Description

INFOID:0000000004500054

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 = 1, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide 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).





CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004500055

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2V

On Board Diagnosis Logic

INFOID:0000000004500056

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible Cause
P0130 0130	Air fuel ratio (A/F) sensor 1 circuit	A)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in the range other than approx. 2.2V.	• Harness or connectors [Air fuel ratio (A/F) sensor 1 circuit is open or shorted.] • Air fuel ratio (A/F) sensor 1
		B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2V.	

DTC Confirmation Procedure

INFOID:0000000004500057

Perform PROCEDURE FOR MALFUNCTION A first.
If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

PROCEDURE FOR MALFUNCTION A

1. Start engine and warm it up to normal operating temperature.

2. Let engine idle for 2 minutes.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-1213, "Diagnosis Procedure".

PROCEDURE FOR MALFUNCTION B

CAUTION:
Always drive vehicle at a safe speed.

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode with CONSULT-III.
3. Check “A/F SEN1 (B1)” indication.
   If the indication is constantly approx. 2.2V and does not fluctuates, go to EC-1213, "Diagnosis Procedure".
   If the indication fluctuates around 2.2V, go to next step.
4. Select “A/F SEN1 (B1) P1276” (for DTC P0130) of “A/F SEN1” in “DTC WORK SUPPORT” mode with CONSULT-III.
5. Touch “START”.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen.

ENG SPEED	1,000 - 3,200 rpm (A/T, CVT) 1,350 - 3,200 rpm (M/T)
VHCL SPEED SE	More than 64 km/h (40 MPH)
B/FUEL SCHDL	1.0 - 8.0 msec
Shift lever	D position with OD OFF (A/T) D position (CVT) 5th position (M/T)

   If “TESTING” is not displayed after 20 seconds, retry from step 2.
7. Release accelerator pedal fully.
   NOTE:
   Never apply brake during releasing the accelerator pedal.
8. Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, retry from step 6.
9. Make sure that “OK” is displayed after touching “SELF-DIAG RESULT”.
   If “NG” is displayed, go to EC-1213, "Diagnosis Procedure".

Overall Function Check

INFOID:0000000004500058

PROCEDURE MALFUNCTION B

Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

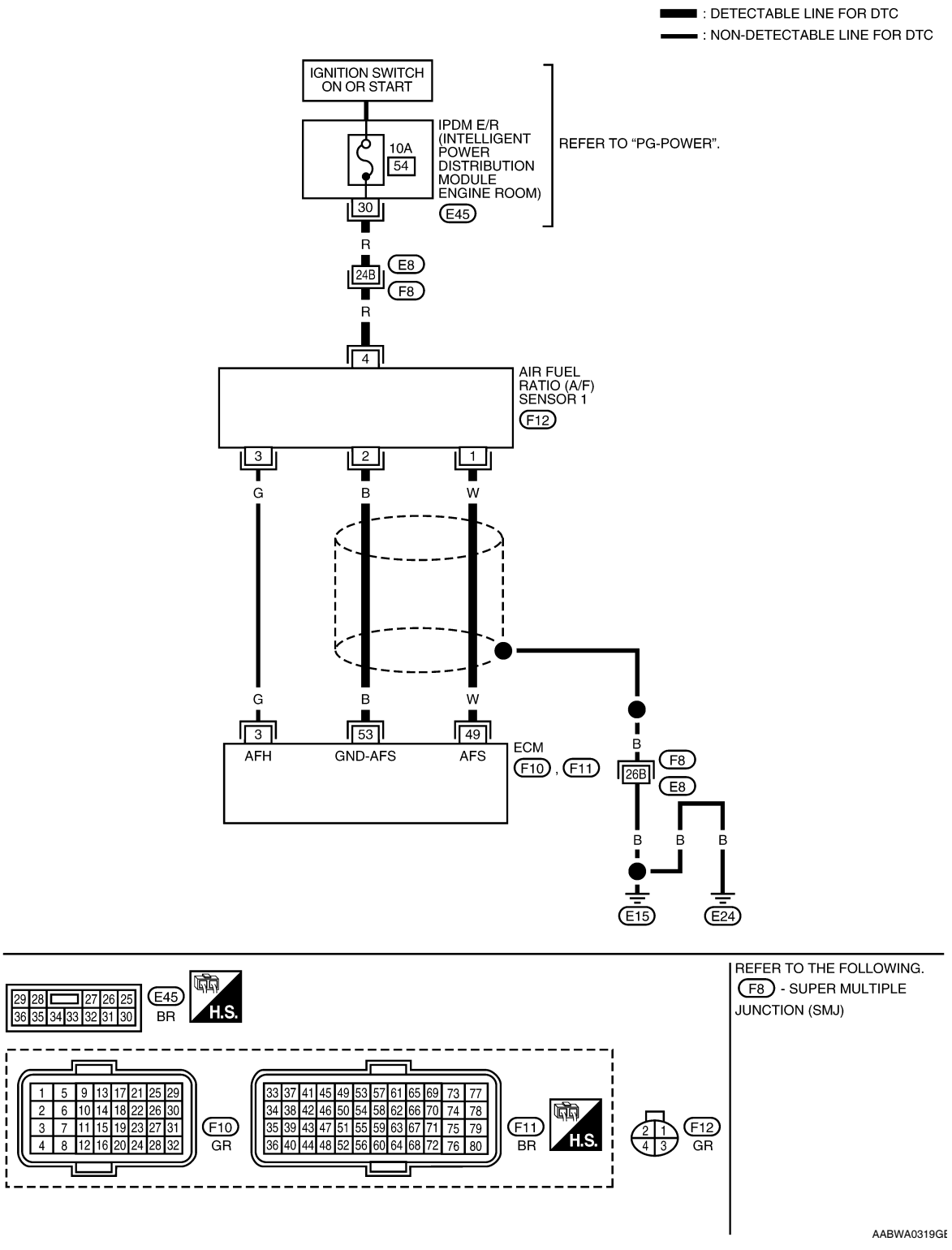
With GST

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
3. Set shift lever to D position with OD ON (A/T), D position (CVT) or 5th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).
   NOTE:
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 and 3 for five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 and 3 for five times.
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no 1st trip DTC is displayed.
   If the 1st trip DTC is displayed, go to EC-1213, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004500059

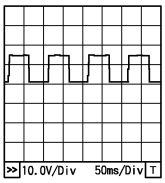
EC-A/F-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V  PBIA8148J
49	W	A/F sensor 1	**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	**[Ignition switch: ON]**	Approximately 2.2V

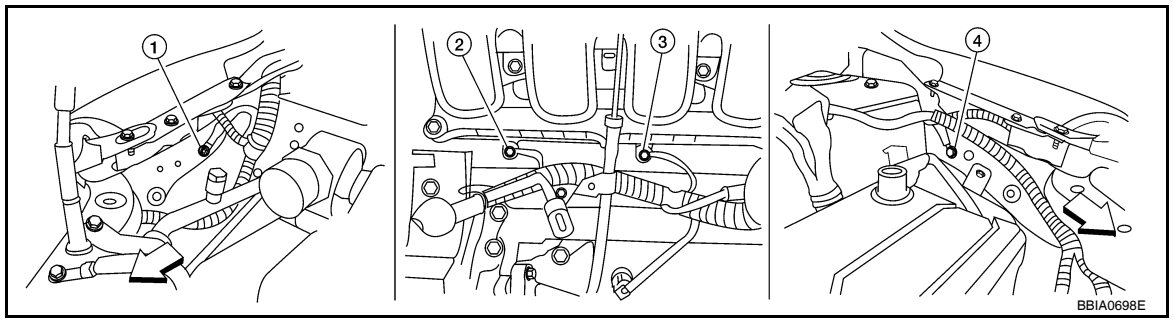
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004500060

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
Refer to EC-1144, "Ground Inspection".



: Vehicle front

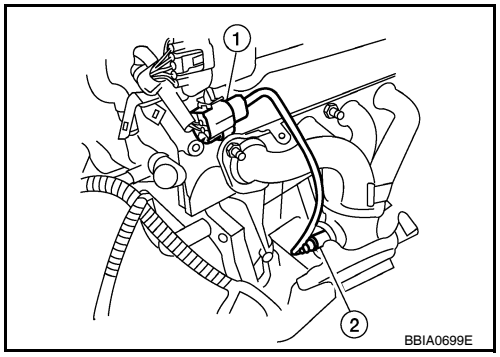
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

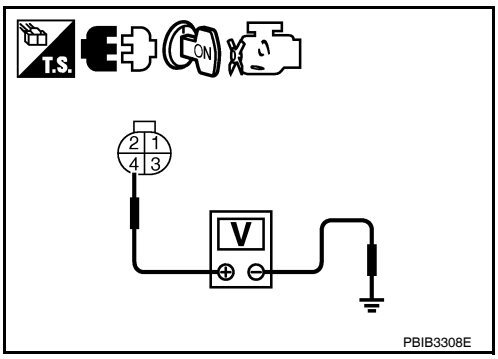
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect A/F sensor 1 harness connector (1).
2. Turn ignition switch ON.



3. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

4. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform EC-1138.

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:
- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

>> **INSPECTION END**

Removal and Installation

INFOID:0000000004501128

AIR FUEL RATIO SENSOR HEATER

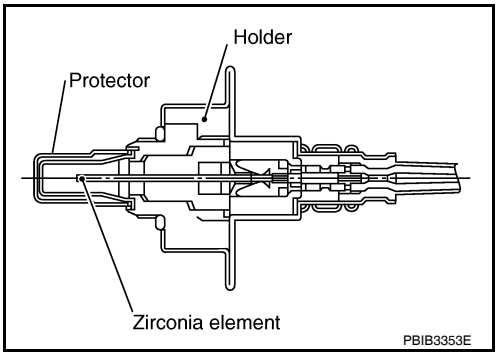
Refer to EM-144, "Removal and Installation".

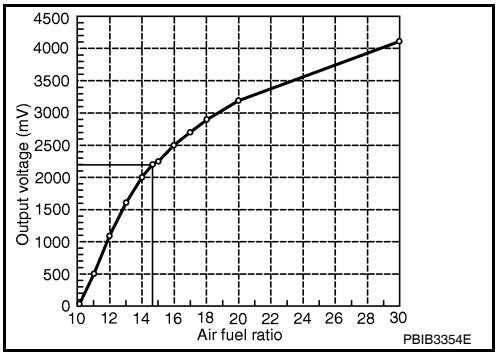
DTC P0131 A/F SENSOR 1

Component Description

INFOID:0000000004501132

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 = 1, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide 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).





CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004501133

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2V

On Board Diagnosis Logic

INFOID:0000000004500064

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately low.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0131 0131	Air fuel ratio (A/F) sensor 1 circuit low voltage	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0V.	• Harness or connectors [Air fuel ratio (A/F) sensor circuit is open or shorted.] • Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

INFOID:0000000004500065

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode with CONSULT-III.
3. Check “A/F SEN1 (B1)” indication.
   If the indication is constantly approx. 0V, go to EC-1219, "Diagnosis Procedure".

If the indication is not constantly approx. 0V, go to next step.
4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
6. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 MPH)
B/FUEL SCHDL	1.5 - 9.0 msec
Shift lever	Suitable position

NOTE:
- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.**

7. Check 1st trip DTC.
8. If 1st trip DTC is displayed, go to EC-1219, "Diagnosis Procedure".

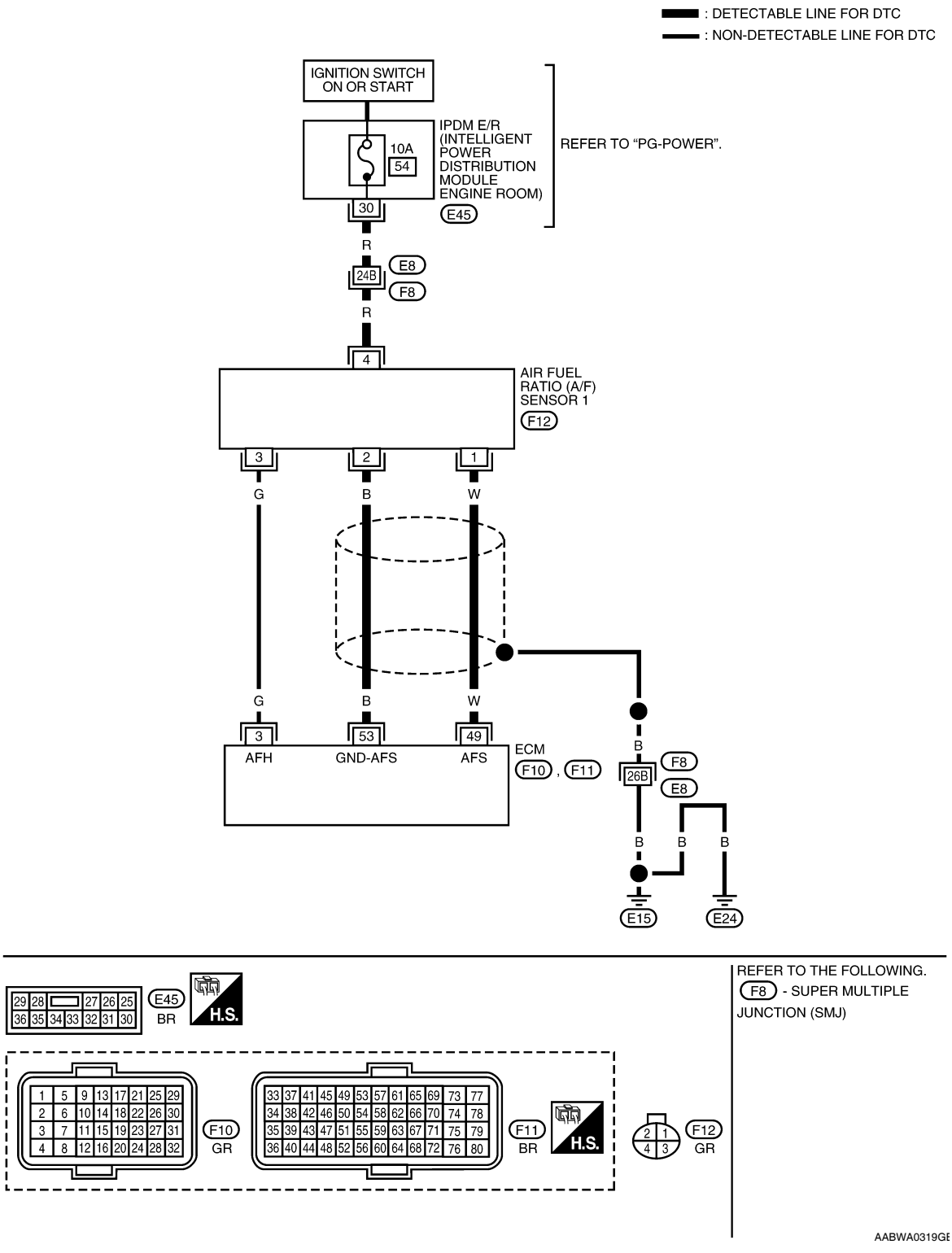
WITH GST

Follow the procedure “WITH CONSULT-III” above.

Wiring Diagram

INFOID:0000000004501139

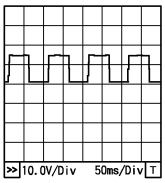
EC-A/F-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V  PBIA8148J
49	W	A/F sensor 1	**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	**[Ignition switch: ON]**	Approximately 2.2V

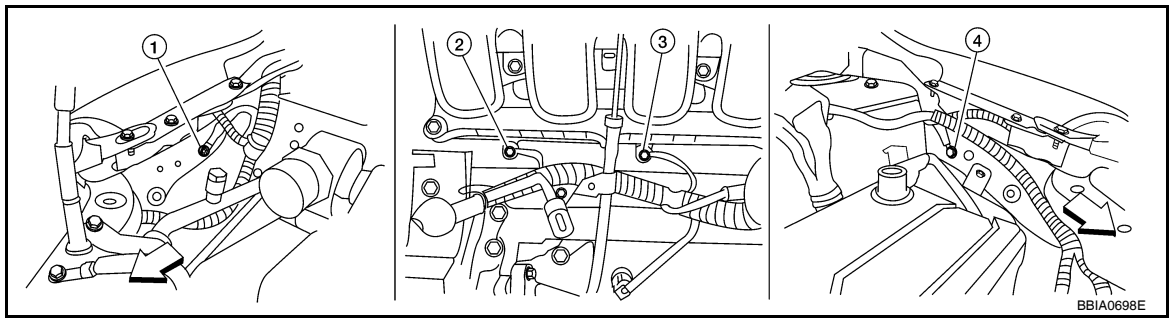
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004500067

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
Refer to EC-1144, "Ground Inspection".



: Vehicle front

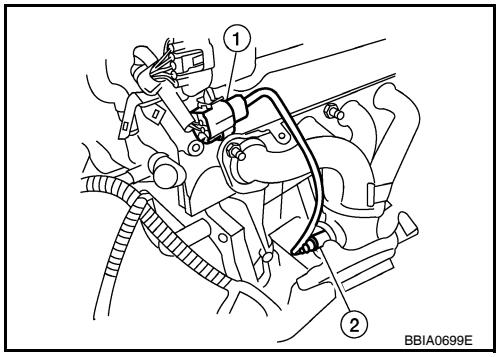
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

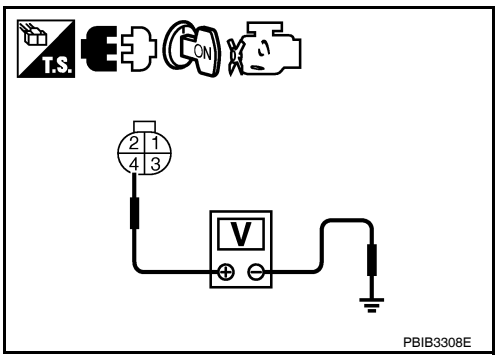
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect A/F sensor 1 harness connector (1).
2. Turn ignition switch ON.



3. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

4. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform EC-1138.

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:
- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

>> **INSPECTION END**

Removal and Installation

INFOID:0000000004501129

AIR FUEL RATIO SENSOR HEATER

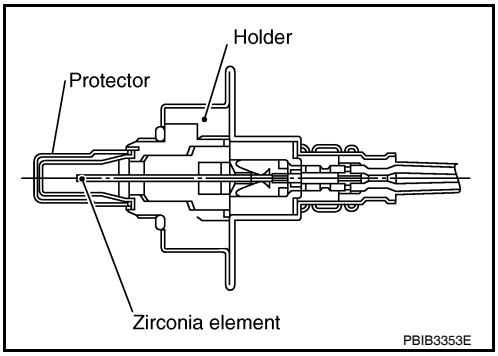
Refer to EM-144, "Removal and Installation".

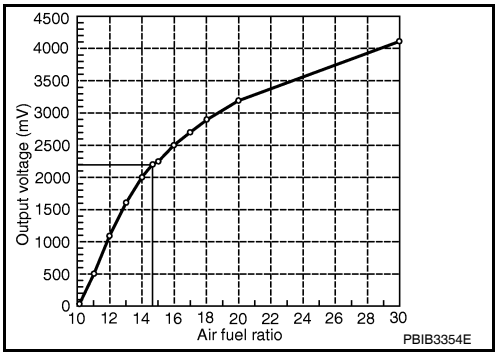
DTC P0132 A/F SENSOR 1

Component Description

INFOID:0000000004501134

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 = 1, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide 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).





CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004501135

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2V

On Board Diagnosis Logic

INFOID:0000000004500071

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately high.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132 0132	Air fuel ratio (A/F) sensor 1 circuit high voltage	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5V.	• Harness or connectors [Air fuel ratio (A/F) sensor circuit is open or shorted.] • Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

INFOID:0000000004500072

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode with CONSULT-III.
3. Check “A/F SEN1 (B1)” indication.
   If the indication is constantly approx. 5V, go to EC-1225, "Diagnosis Procedure".

If the indication is not constantly approx. 5V, go to next step.
4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
6. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 MPH)
B/FUEL SCHDL	1.5 - 9.0 msec
Shift lever	Suitable position

NOTE:
- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.**

7. Check 1st trip DTC.
8. If 1st trip DTC is displayed, go to EC-1225, "Diagnosis Procedure".

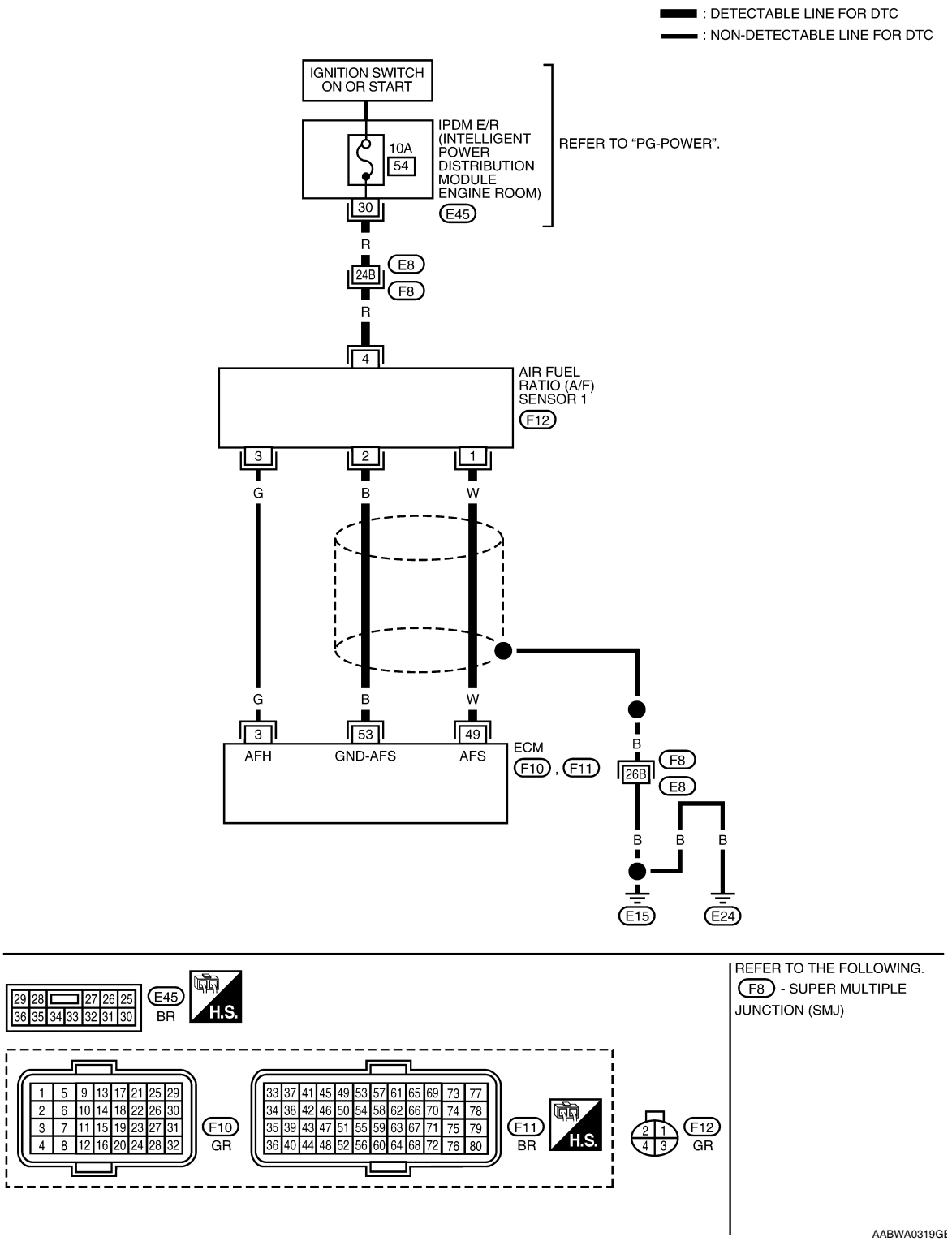
WITH GST

Follow the procedure “WITH CONSULT-III” above.

Wiring Diagram

INFOID:0000000004501140

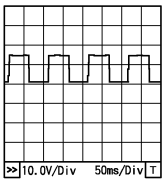
EC-A/F-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V  PBIA8148J
49	W	A/F sensor 1	**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	**[Ignition switch: ON]**	Approximately 2.2V

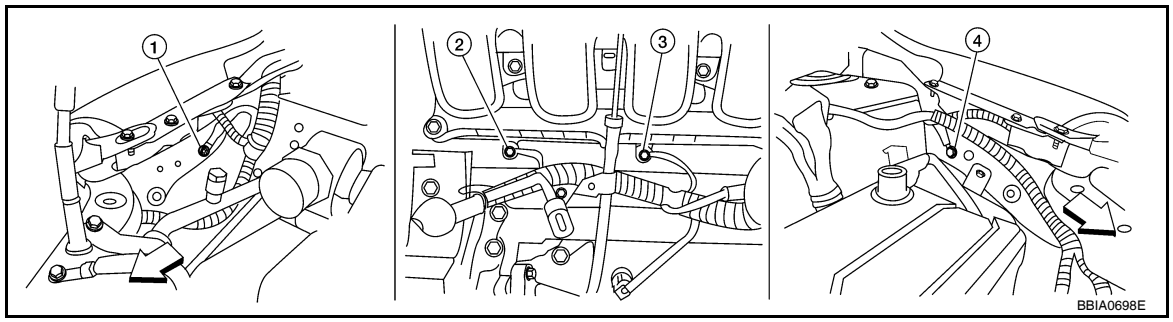
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004500074

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
Refer to EC-1144, "Ground Inspection".



: Vehicle front

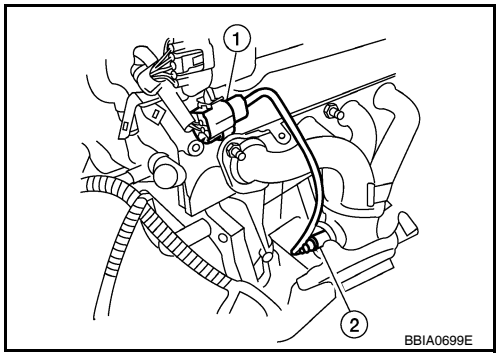
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

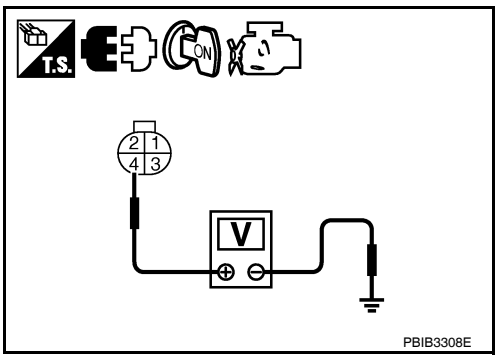
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect A/F sensor 1 harness connector (1).
2. Turn ignition switch ON.



3. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

4. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform EC-1138.

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:
- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

>> **INSPECTION END**

Removal and Installation

INFOID:0000000004501130

AIR FUEL RATIO SENSOR HEATER

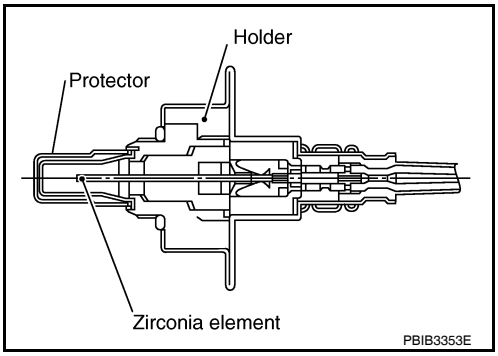
Refer to EM-144, "Removal and Installation".

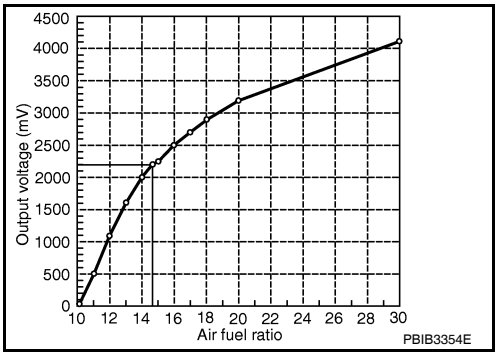
DTC P0133 A/F SENSOR 1

Component Description

INFOID:0000000004501136

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 = 1, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide 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).





CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004501137

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2V

On Board Diagnosis Logic

INFOID:0000000004500078

To judge the malfunction of air fuel ratio (A/F) sensor 1, this diagnosis measures response time of the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the air fuel ratio (A/F) sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F sensor 1 signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0133 0133	Air fuel ratio (A/F) sensor 1 circuit slow response	The response of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time.	• Harness or connectors [Air fuel ratio (A/F) sensor circuit is open or shorted.] • Air fuel ratio (A/F) sensor 1 • Air fuel ratio (A/F) sensor heater 1 • Fuel pressure • Fuel injector • Intake air leaks • Exhaust gas leaks • PCV • Mass air flow sensor

DTC Confirmation Procedure

INFOID:0000000004500079

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
4. Let engine idle for 1 minute.
5. Select “A/F SEN1(B1) P1278/P1279” of “A/F SEN1” in “DTC WORK SUPPORT” mode with CONSULT-III.
6. Touch “START”.
   If “COMPLETED” appears on CONSULT-III screen, go to step 10.
   If “COMPLETED” does not appear on CONSULT-III screen, go to the following step.
7. After perform the following procedure, “TESTING” will be displayed on the CONSULT-III screen.

a. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.

b. Fully release accelerator pedal and then let engine idle for about 10 seconds.
   If “TESTING” is not displayed after 10 seconds, refer to EC-1130.

8. Wait for about 20 seconds at idle under the condition that “TESTING” is displayed on the CONSULT-III screen.
9. Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, refer to EC-1130.
10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULT”.
    If “NG” is displayed, go to EC-1231, "Diagnosis Procedure".

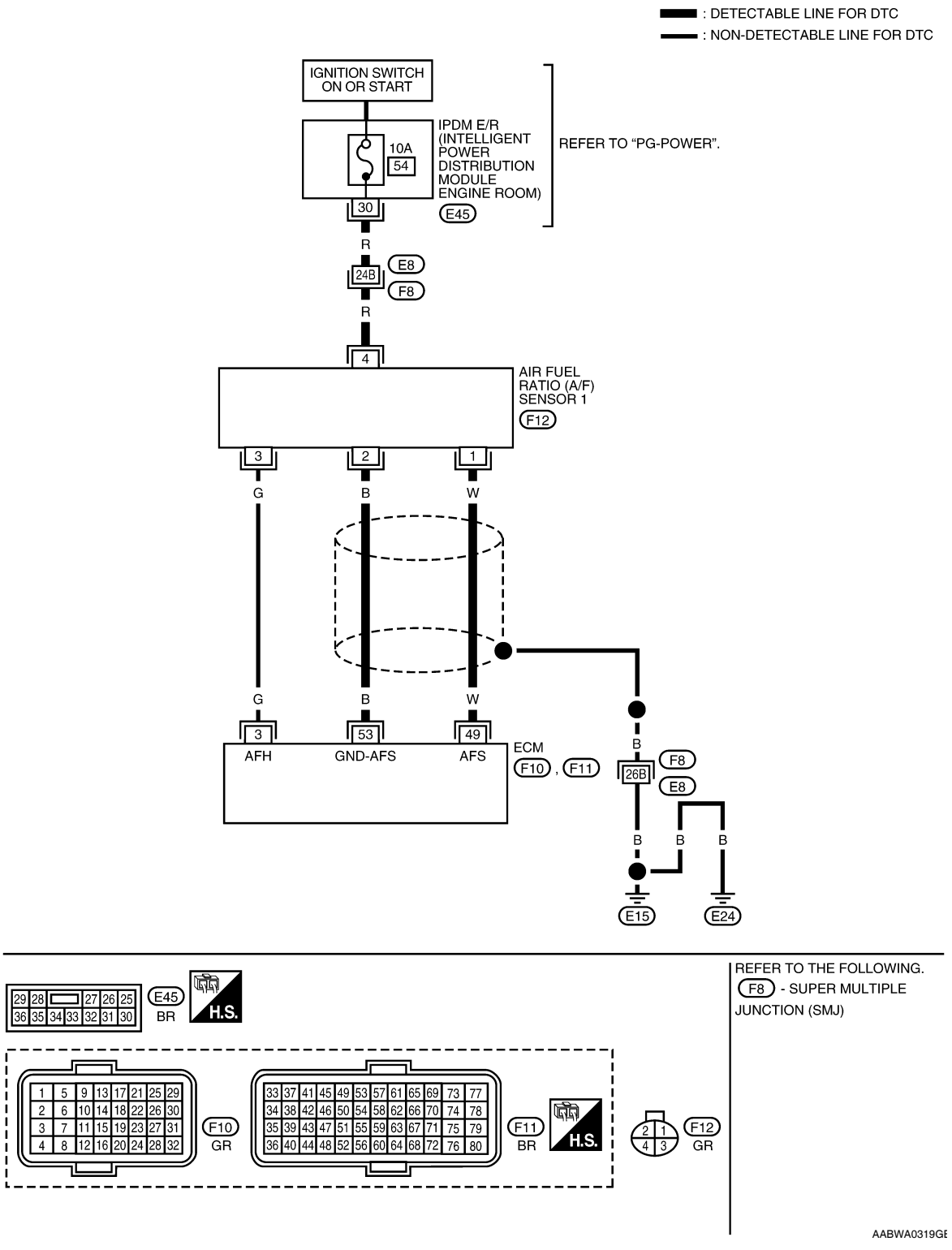
WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Select Service $01 with GST.
3. Calculate the total value of “Short term fuel trim” and “Long term fuel trim” indications.
   Make sure that the total percentage should be within ±15%.
   If OK, go to the following step.
   If NG, check the following.
   - Intake air leaks
   - Exhaust gas leaks
   - Incorrect fuel pressure
   - Lack of fuel
   - Fuel injector
   - Incorrect PCV hose connection
   - PCV valve
   - Mass air flow sensor
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
6. Let engine idle for 1 minute.
7. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
8. Fully release accelerator pedal and then let engine idle for about 1 minute.
9. Select Service $07 with GST.
   If 1st trip DTC is detected, go to EC-1231, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004501143

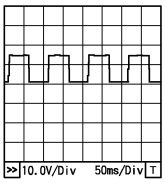
EC-A/F-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V  PBIA8148J
49	W	A/F sensor 1	**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	**[Ignition switch: ON]**	Approximately 2.2V

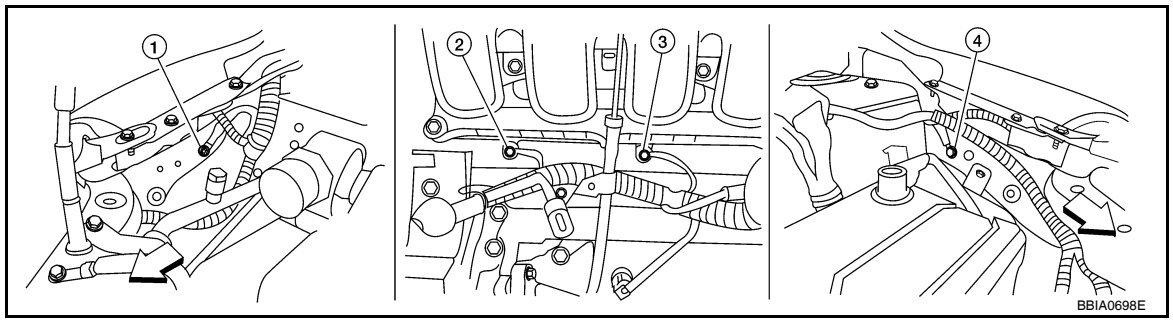
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004500081

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine screw on the body.
Refer to EC-1144, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

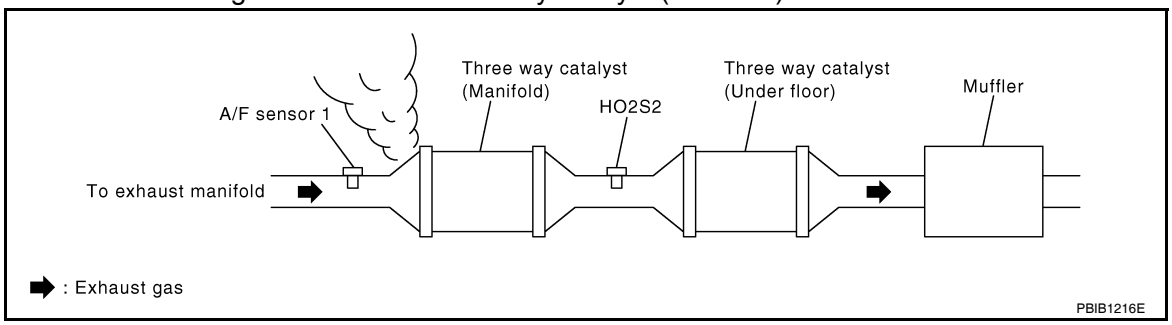
Loosen and retighten the air fuel ratio (A/F) sensor 1. Refer to EM-144, "Removal and Installation".

>> GO TO 3.

3.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.

2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

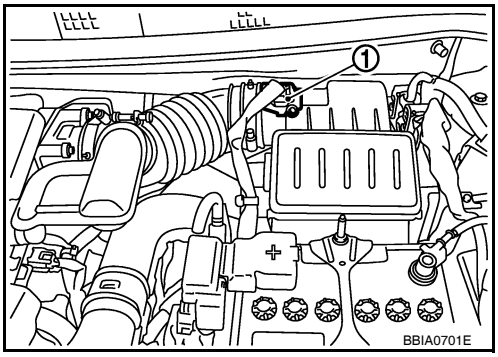
5. CLEAR THE SELF-LEARNING DATA

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching “CLEAR” or “START”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

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 (1) 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 DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-1052, "Emission-related Diagnostic Information".
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?



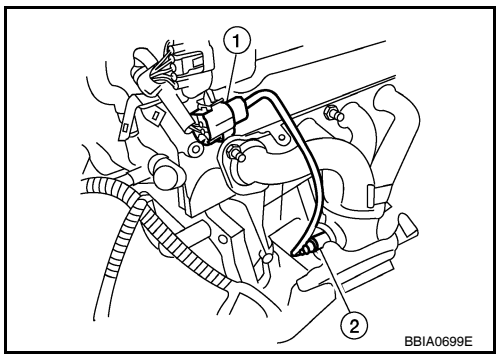
Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0172. Refer to EC-1258or EC-1264.
No >> GO TO 6.

6. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect A/F sensor 1 harness connector (1).
- Air fuel ratio (A/F) sensor (2)
3. Turn ignition switch ON.

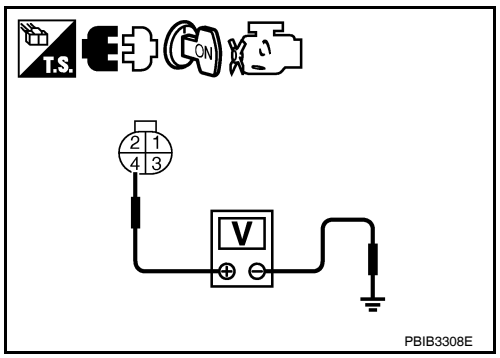


4. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.



7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

4. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to EC-1158, "Component Inspection".

OK or NG

OK >> GO TO 10.
NG >> GO TO 13.

10. CHECK MASS AIR FLOW SENSOR

Refer to EC-1176, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> Replace mass air flow sensor.

11. CHECK PCV VALVE

Refer to EC-1048, "Component Inspection".

OK or NG

OK >> GO TO 12.
NG >> Repair or replace PCV valve.

12. CHECK INTERMITTENT INCIDENT

Perform EC-1138.

OK or NG

OK >> GO TO 13.
NG >> Repair or replace.

13. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

>> **INSPECTION END**

Removal and Installation

INFOID:0000000004501131

AIR FUEL RATIO SENSOR HEATER

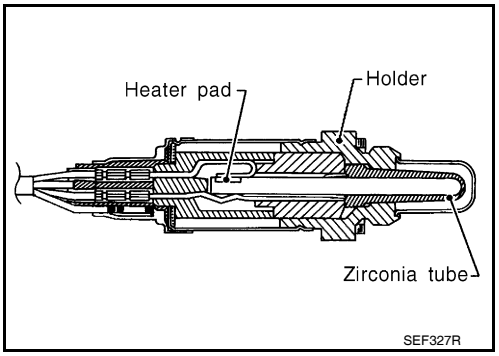
Refer to EM-144, "Removal and Installation".

DTC P0137 HO2S2

Component Description

INFOID:0000000004500083

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air/fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004500084

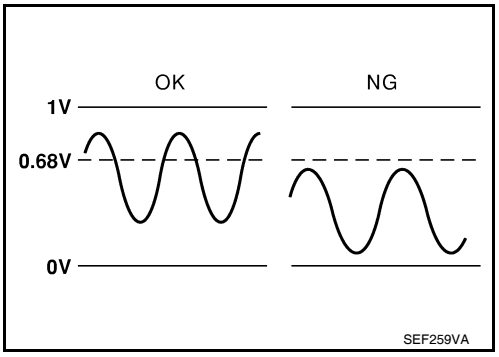
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1)	• 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 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)		LEAN ←→ RICH

On Board Diagnosis Logic

INFOID:0000000004500085

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 before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0137 0137	Heated oxygen sensor 2 circuit low voltage	The maximum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (Heated oxygen sensor 2 circuit open or shorted.) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks

DTC Confirmation Procedure

INFOID:0000000004500086

NOTE:
If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-III

TESTING CONDITION:
For the best results, perform DTC WORK SUPPORT at a temperature of 0 to 30°C (32 to 86°F).

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
7. Open engine hood.
8. Select “HO2S2 (B1) P1147” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-III.
9. Following the instruction of CONSULT-III.
   NOTE:
   It will take at most 10 minutes until “COMPLETED” is displayed.
10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
    If “NG” is displayed, refer to EC-1238, "Diagnosis Procedure".
    If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
b. Return to step 1.

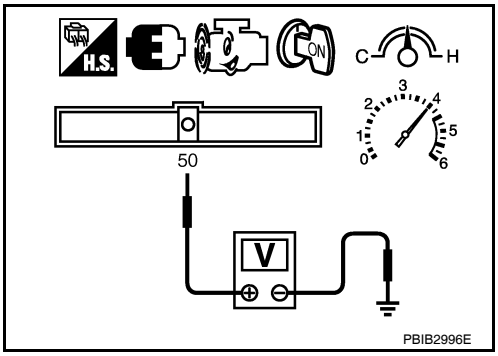
Overall Function Check

INFOID:0000000004500087

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to 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 1 minute.
5. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.

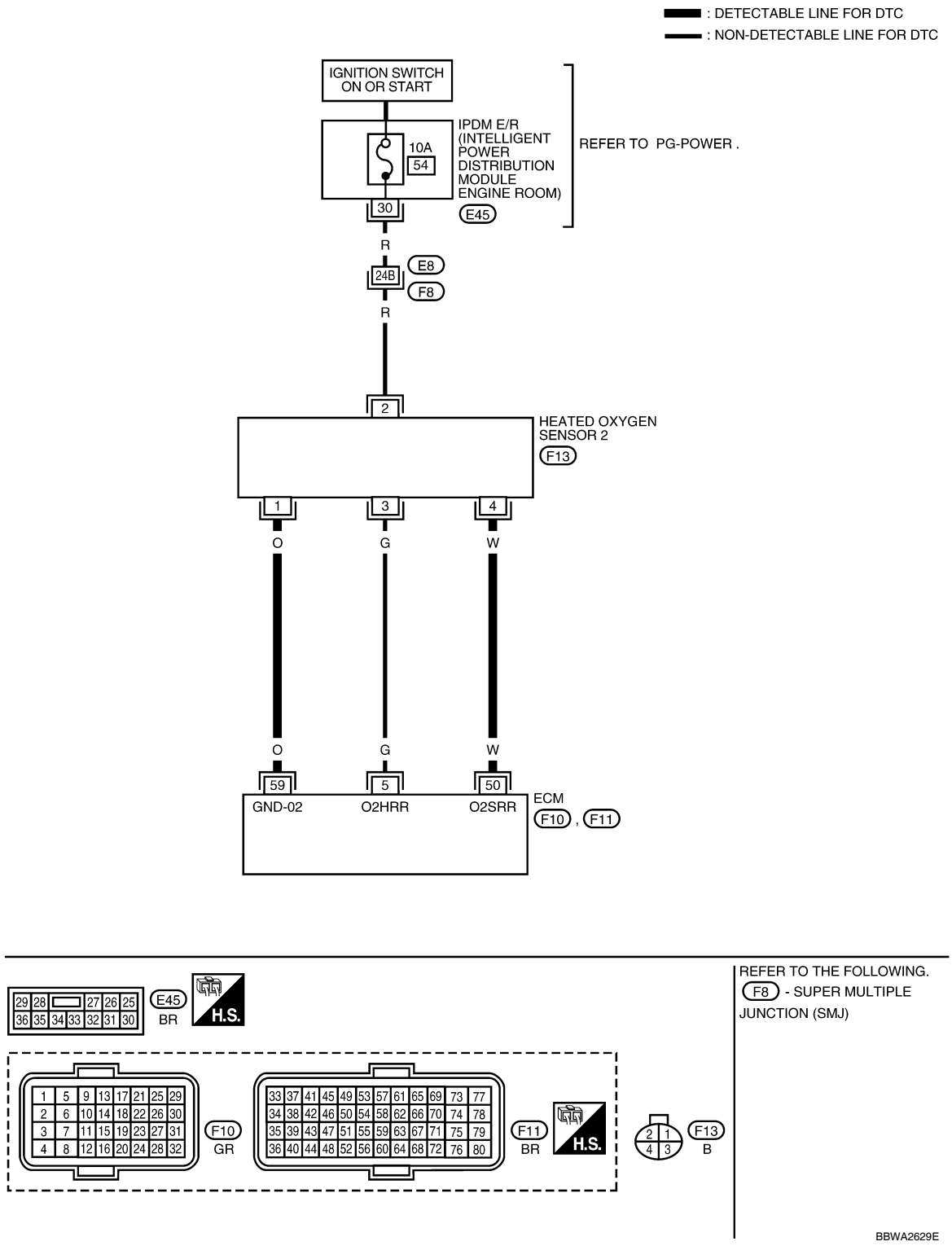


7. Keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with OD OFF (A/T), D position (CVT) or 3rd gear position (M/T).
   The voltage should be above 0.68V at least once during this procedure.
8. If NG, go to EC-1238, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004500088

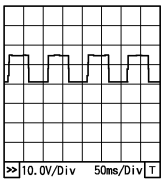
EC-HO2S2-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	G	Heated oxygen sensor 2 heater	**[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.	Approximately 10V  PBIA8148J
			[Ignition switch: ON] • Engine stopped **[Engine is running]** • Engine speed: Above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
50	W	Heated oxygen sensor 2	**[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 - Approximately 1.0V
59	O	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

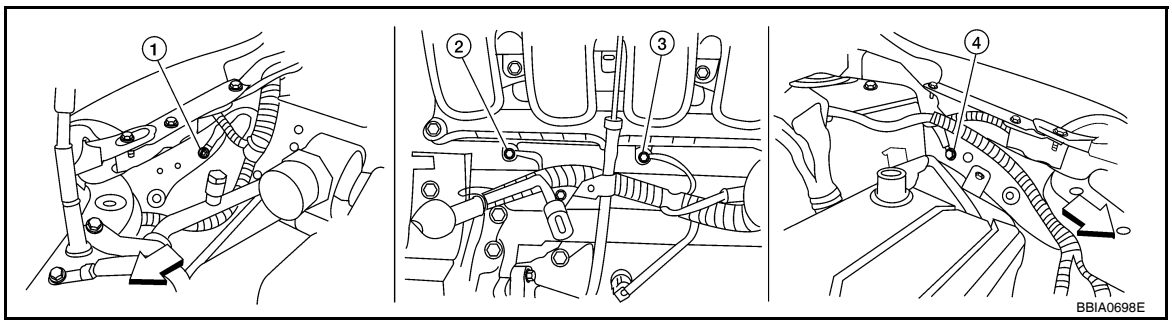
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004500089

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

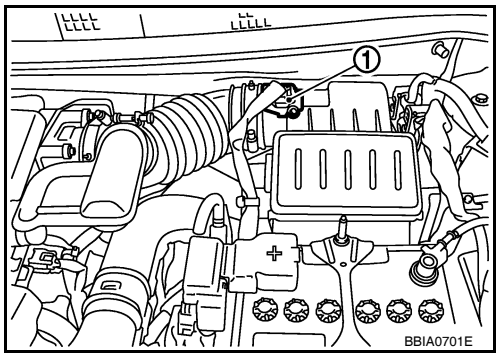
2.CLEAR THE SELF-LEARNING DATA

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor (1) 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 DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-1052, "Emission-related Diagnostic Information".
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-1258.
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

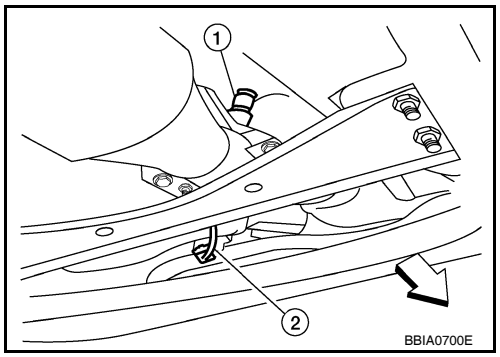
1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector (2).

- : Vehicle front
- Heated oxygen sensor 2 (1)

3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 59 and HO2S2 terminal 1.
   Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and HO2S2 terminal 4.
   Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 50 or HO2S2 terminal 4 and ground.
   Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-1240, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6.CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

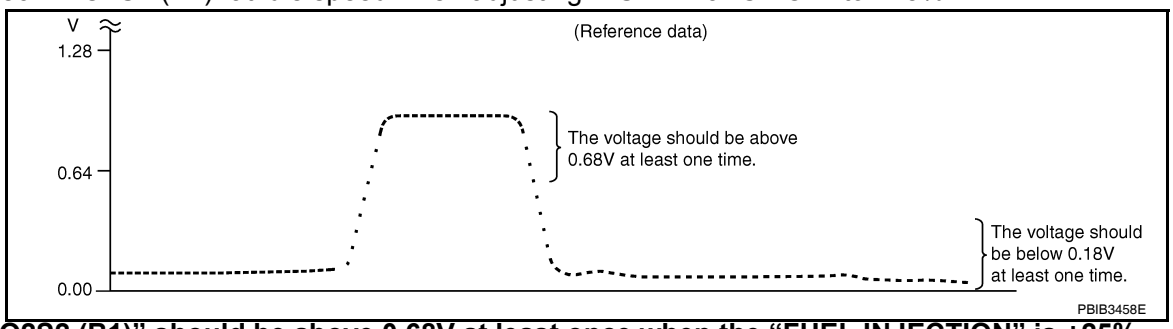
Component Inspection

INFOID:0000000004500090

HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



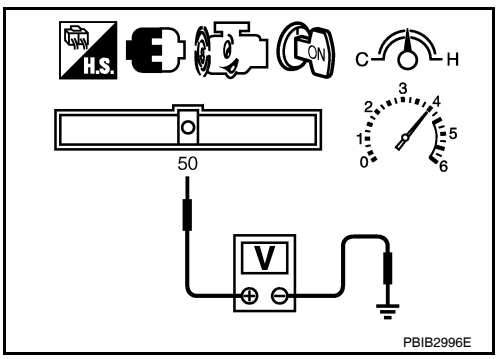
“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.18V at least once when the “FUEL INJECTION” is −25%.

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

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. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V and below 0.18V at least once during this procedure.
   If the voltage can be confirmed at step 6, step 7 is not necessary.



7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with OD OFF (A/T), D position (CVT) or 3rd gear position (M/T).
   The voltage should be above 0.68 and below 0.18V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

INFOID:0000000004501146

HEATED OXYGEN SENSOR 2

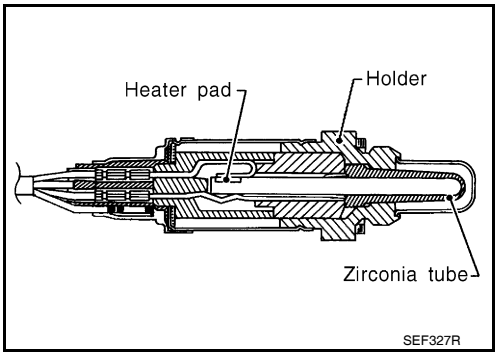
Refer to EM-144, "Removal and Installation".

DTC P0138 HO2S2

Component Description

INFOID:0000000004501149

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air/fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004501150

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1)	• 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 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)		LEAN ←→ RICH

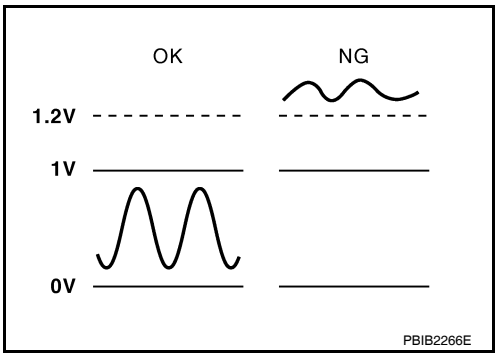
On Board Diagnosis Logic

INFOID:0000000004500094

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 before the three way catalyst (manifold) causes the longer switching time.

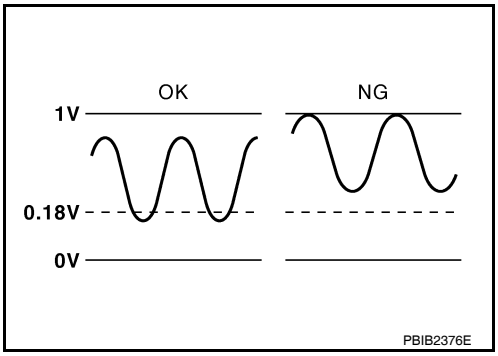
MALFUNCTION A

To judge the malfunctions of rear heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



MALFUNCTION B

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0138 0138	Heated oxygen sensor 2 circuit high voltage	A)	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (Heated oxygen sensor 2 circuit is open or shorted.) • Heated oxygen sensor 2
		B)	The minimum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (Heated oxygen sensor circuit is open or shorted.) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector

DTC Confirmation Procedure

INFOID:0000000004500095

Perform PROCEDURE FOR MALFUNCION A first.
If DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 2 minutes.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to EC-1246, "Diagnosis Procedure".

PROCEDURE FOR MALFUNCTION B

With CONSULT-III

TESTING CONDITION:
For the best results, perform DTC WORK SUPPORT at a temperature of 0 to 30°C (32 to 86°F).

1. Turn ignition switch ON and select “DATA MONITOR ” mode with CONSULT-III
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
7. Open engine hood.
8. Select “HO2S2 (B1) P1146” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-III.
9. Following the instruction of CONSULT-III.
   NOTE:
   It will take at most 10 minutes until “COMPLETED” is displayed.
10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
    If “NG” is displayed, refer to EC-1246, "Diagnosis Procedure".
    If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
b. Return to step 1.

Overall Function Check

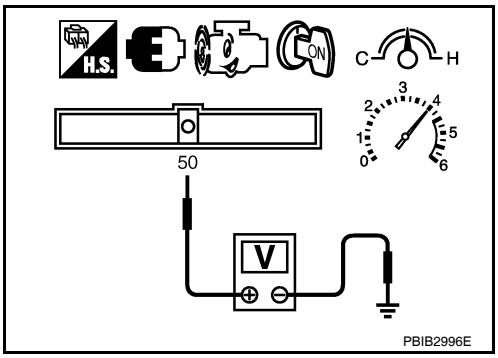
INFOID:0000000004500096

PROCEDURE FOR MALFUNCTION B

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

With GST

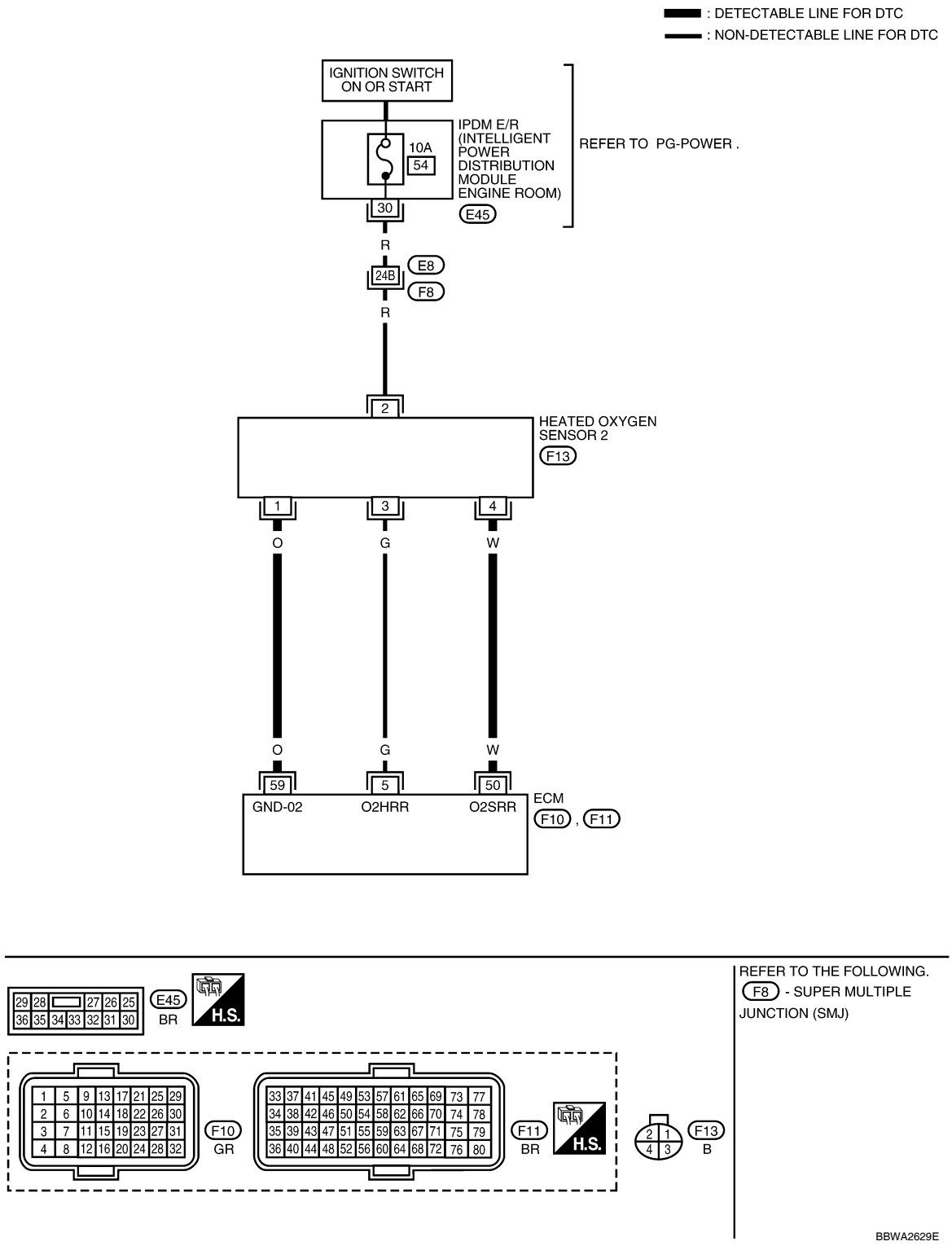
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle 1 minute.
5. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.18V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with OD OFF (A/T), D position (CVT) or 3rd gear position (M/T).
   The voltage should be below 0.18V at least once during this procedure.
8. If NG, go to EC-1246, "Diagnosis Procedure".



Wiring Diagram

INFOID:0000000004501153

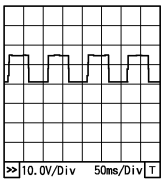
EC-HO2S2-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	G	Heated oxygen sensor 2 heater	**[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.	Approximately 10V  PBIA8148J
			[Ignition switch: ON] • Engine stopped **[Engine is running]** • Engine speed: Above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
50	W	Heated oxygen sensor 2	**[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 - Approximately 1.0V
59	O	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

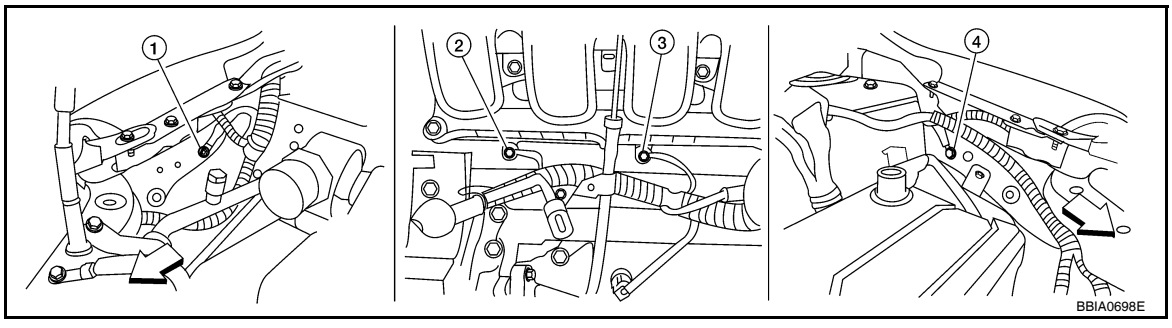
Diagnosis Procedure

INFOID:0000000004500098

PROCEDURE FOR MALFUNCTION A

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

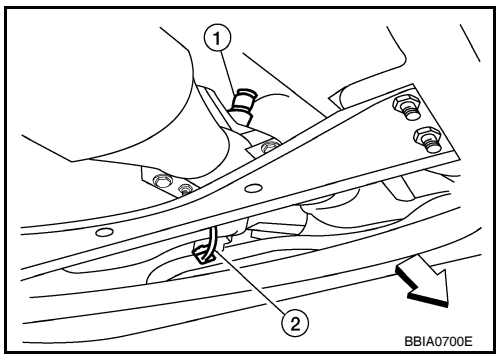
1. body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 harness connector (2).
- : Vehicle front
- Heated oxygen sensor 2 (1)
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 59 and HO2S2 terminal 1. Refer to Wiring Diagram.



Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and HO2S2 terminal 4. Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 50 or HO2S2 terminal 4 and ground. Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-1249, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6.CHECK INTERMITTENT INCIDENT

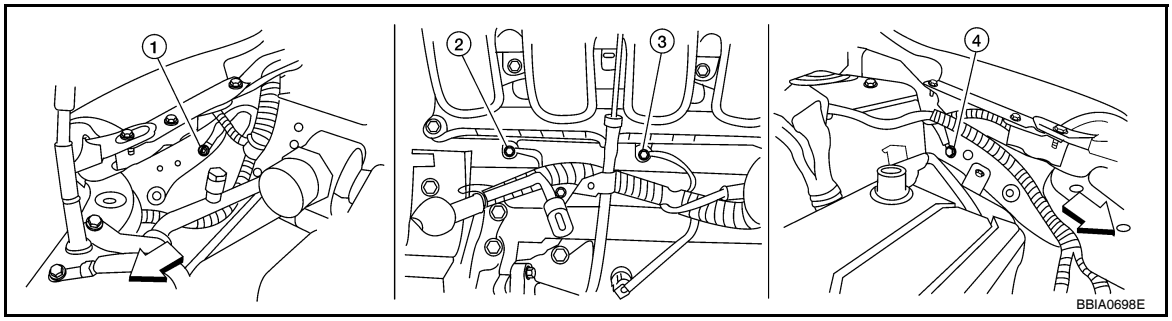
Refer to EC-1138.

>> **INSPECTION END**

PROCEDURE FOR MALFUNCTION B

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine screw on the body. Refer to EC-1144, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

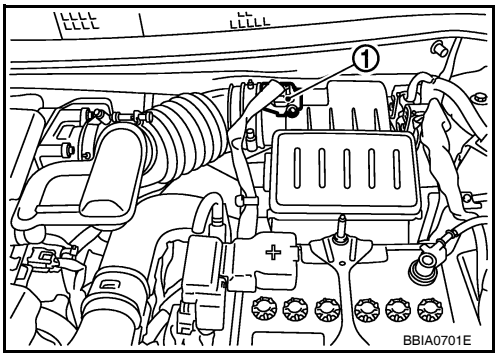
2. CLEAR THE SELF-LEARNING DATA

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor (1) 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-1052, "Emission-related Diagnostic Information".
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



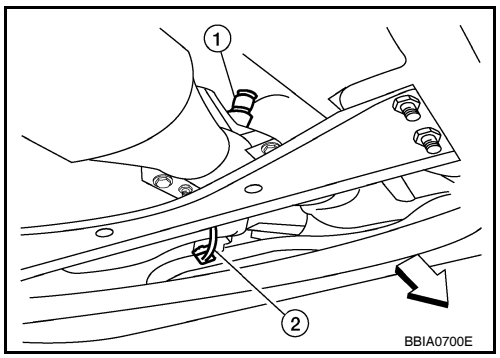
Yes or No

Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-1264.
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect heated oxygen sensor 2 harness connector (2).
- : Vehicle front
- Heated oxygen sensor 2 (1)
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 59 and HO2S2 terminal 1. Refer to Wiring Diagram.



Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and HO2S2 terminal 4. Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 50 or HO2S2 terminal 4 and ground. Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-1249, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

Component Inspection

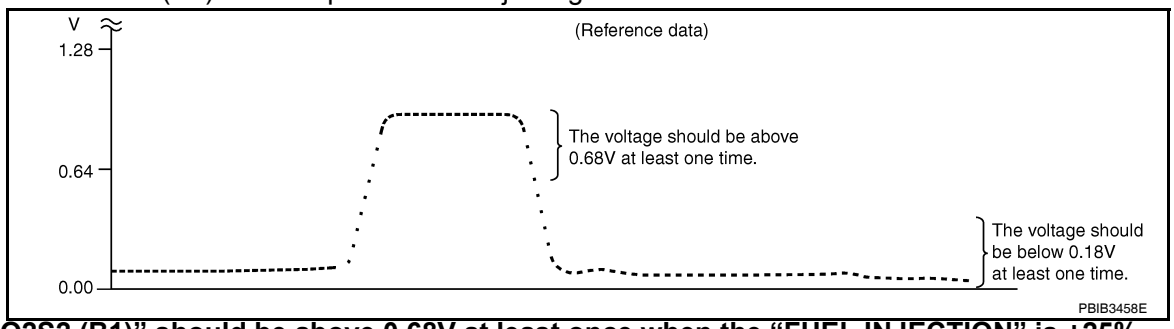
INFOID:0000000004501155

HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.

6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.

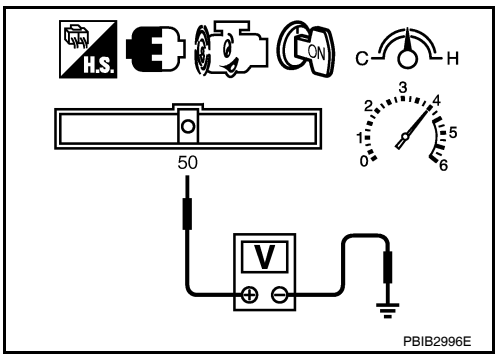


“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.18V at least once when the “FUEL INJECTION” is −25%.

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

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. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V and below 0.18V at least once during this procedure.
   If the voltage can be confirmed at step 6, step 7 is not necessary.



7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with OD OFF (A/T), D position (CVT) or 3rd gear position (M/T).
   The voltage should be above 0.68 and below 0.18V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

INFOID:0000000004501147

HEATED OXYGEN SENSOR 2

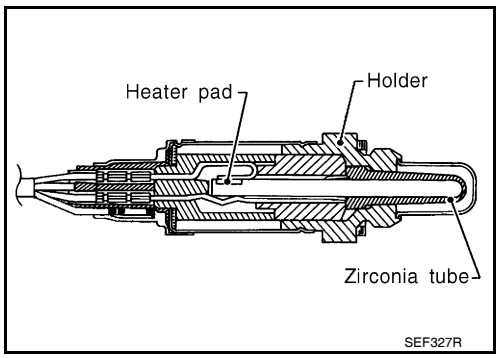
Refer to EM-144, "Removal and Installation".

DTC P0139 HO2S2

Component Description

INFOID:0000000004501151

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air/fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004501152

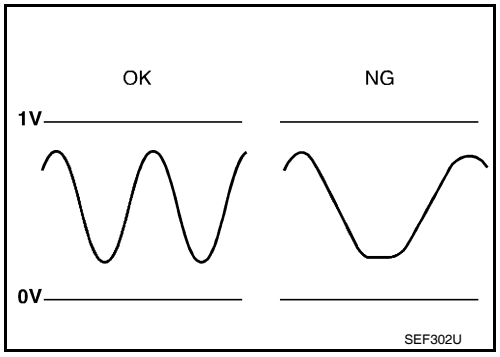
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1)	• 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 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)		LEAN ←→ RICH

On Board Diagnosis Logic

INFOID:0000000004500103

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 before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139 0139	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond between rich and lean than the specified time.	• Harness or connectors (Heated oxygen sensor circuit is open or shorted.) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks

DTC Confirmation Procedure

INFOID:0000000004500104

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-III

TESTING CONDITION:
For better results, perform “DTC WORK SUPPORT” at a temperature of 0 to 30 °C (32 to 86 °F).

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
7. Select “HO2S2 (B1) P0139” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-III.
8. Following the instruction of CONSULT-III.
   NOTE:
   It will take at most 10 minutes until “COMPLETED” is displayed.
9. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-1254, "Diagnosis Procedure".
   If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).

b. Return to step 1.

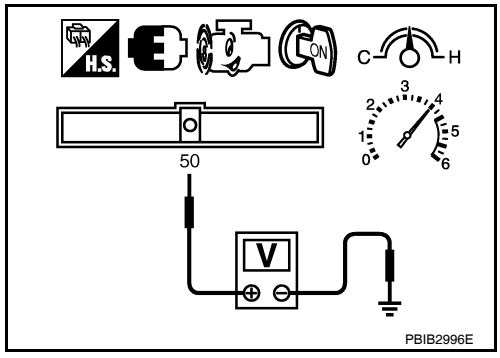
Overall Function Check

INFOID:0000000004500105

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

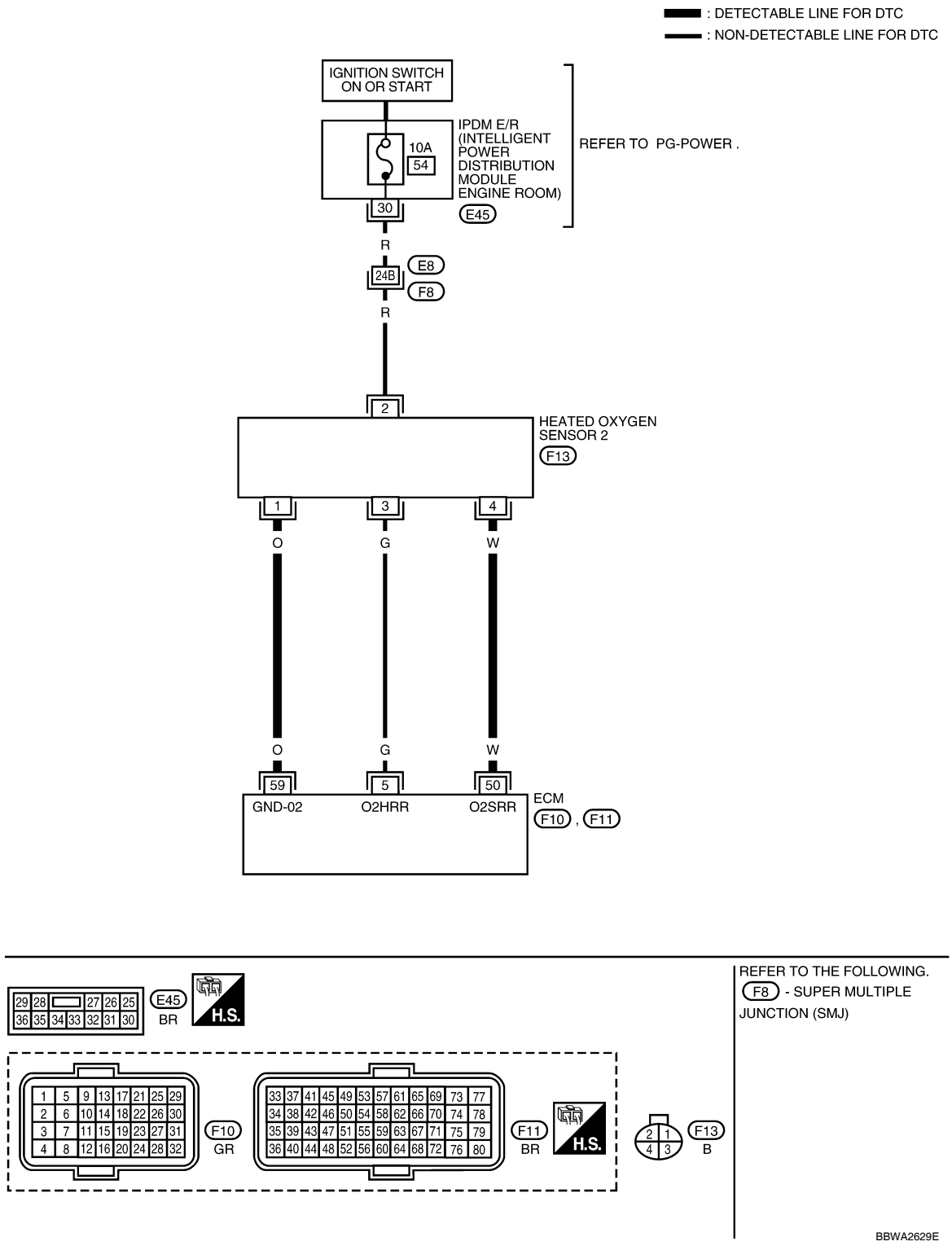
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   A change of voltage should be more than 0.8V for 1 second during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with OD OFF (A/T), D position (CVT) or 3rd gear position (M/T).
   A change of voltage should be more than 0.8V for 1 second during this procedure.
8. If NG, go to EC-1254, "Diagnosis Procedure".



Wiring Diagram

INFOID:0000000004501154

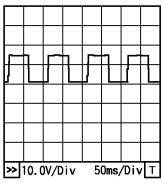
EC-HO2S2-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
5	G	Heated oxygen sensor 2 heater	**[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.	Approximately 10V  PBIA8148J
			[Ignition switch: ON] • Engine stopped **[Engine is running]** • Engine speed: Above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
50	W	Heated oxygen sensor 2	**[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 - Approximately 1.0V
59	O	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

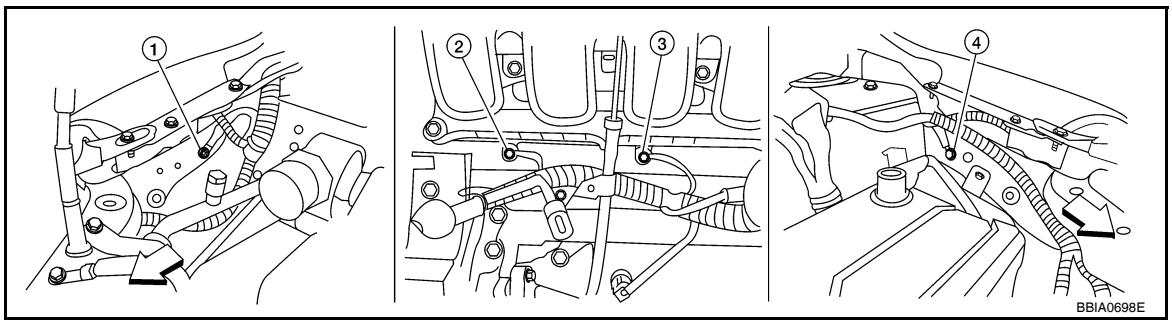
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004500107

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

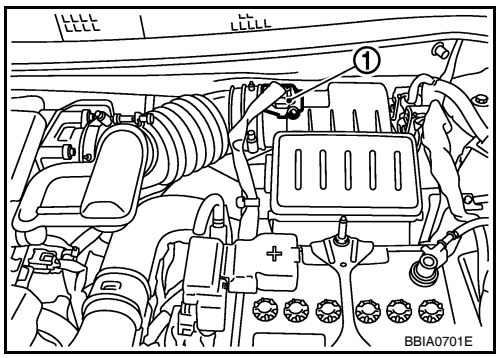
2.CLEAR THE SELF-LEARNING DATA

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected?
   Is it difficult to start engine?

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor (1) 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-1052, "Emission-related Diagnostic Information".
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-1258 or EC-1264.
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

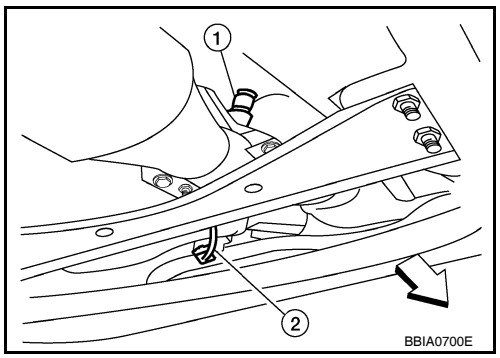
1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector (2).

- : Vehicle front
- Heated oxygen sensor 2 (1)

3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S2 terminal 1 and ECM terminal 59. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 4 and ECM terminal 50. Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 50 or HO2S2 terminal 4 and ground. Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-1256, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

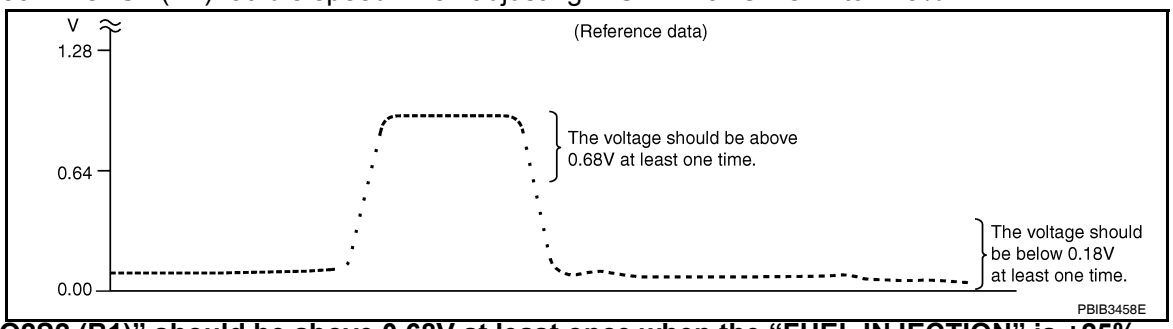
Component Inspection

INFOID:0000000004501156

HEATED OXYGEN SENSOR 2

With CONSULT-III

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-III.
6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



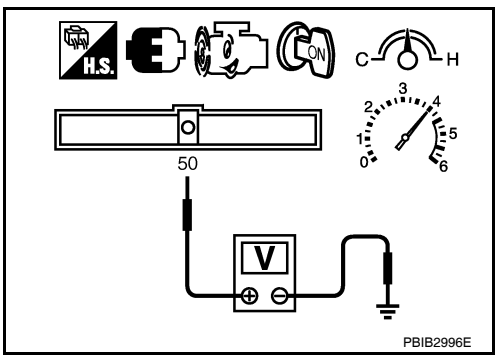
“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.18V at least once when the “FUEL INJECTION” is −25%.

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 J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

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. Set voltmeter probes between ECM terminal 50 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V and below 0.18V at least once during this procedure.
   If the voltage can be confirmed at step 6, step 7 is not necessary.



7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with OD OFF (A/T), D position (CVT) or 3rd gear position (M/T).
   The voltage should be above 0.68 and below 0.18V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

INFOID:0000000004501148

HEATED OXYGEN SENSOR 2

Refer to EM-144, "Removal and Installation".

DTC P0171 FUEL INJECTION SYSTEM FUNCTION

On Board Diagnosis Logic

INFOID:0000000004500110

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the air fuel ratio (A/F) sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171 0171	Fuel injection system too lean	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	• Intake air leaks • Air fuel ratio (A/F) sensor 1 • Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor • Incorrect PCV hose connection

DTC Confirmation Procedure

INFOID:0000000004500111

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Start engine.
   If it is difficult to start engine, the fuel injection system has a malfunction.
   Perform the following procedure is advised.

a. Crank engine while depressing accelerator pedal.
   NOTE:
   When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

b. If engine starts, go to EC-1261, "Diagnosis Procedure".
   If engine does not start, check exhaust and intake air leak visually.

6. Keep engine at idle for at least 5 minutes.
7. Check 1st trip DTC.
   The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to EC-1261, "Diagnosis Procedure".
   NOTE:
   If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine.
c. Maintain the following conditions for at least 10 consecutive minutes.
   Hold the accelerator pedal as steady as possible.

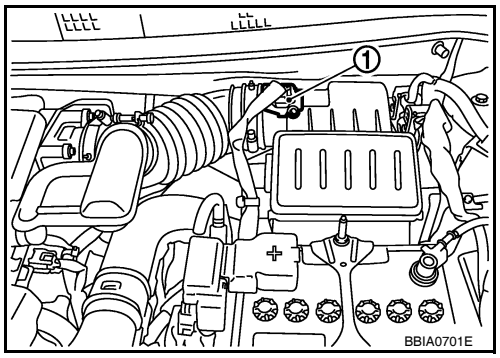
VHCL SPEED SE	50 – 120 km/h (31 – 75 MPH)

CAUTION:
Always drive vehicle at a safe speed.

d. Check 1st trip DTC.
e. If 1st trip DTC is detected, go to EC-1261, "Diagnosis Procedure".

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor (1) harness connector.
4. Restart engine and let idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor (1) harness connector.
6. Select Service $03 with GST. Make sure DTC P0102 is detected.
7. Select Service $04 with GST and erase the DTC P0102.
8. Start engine.
   If it is difficult to start engine, the fuel injection system has a malfunction.
   Perform the following procedure is advised.



a. Crank engine while depressing accelerator pedal.
   NOTE:
   When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.
b. If engine starts, go to EC-1261, "Diagnosis Procedure".
   If engine does not start, check exhaust and intake air leak visually.

9. Keep engine at idle for at least 5 minutes.
10. Check 1st trip DTC.
    The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to EC-1261, "Diagnosis Procedure".
    NOTE:
    If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine.
c. Maintain the following conditions for at least 10 consecutive minutes.
   Hold the accelerator pedal as steady as possible.

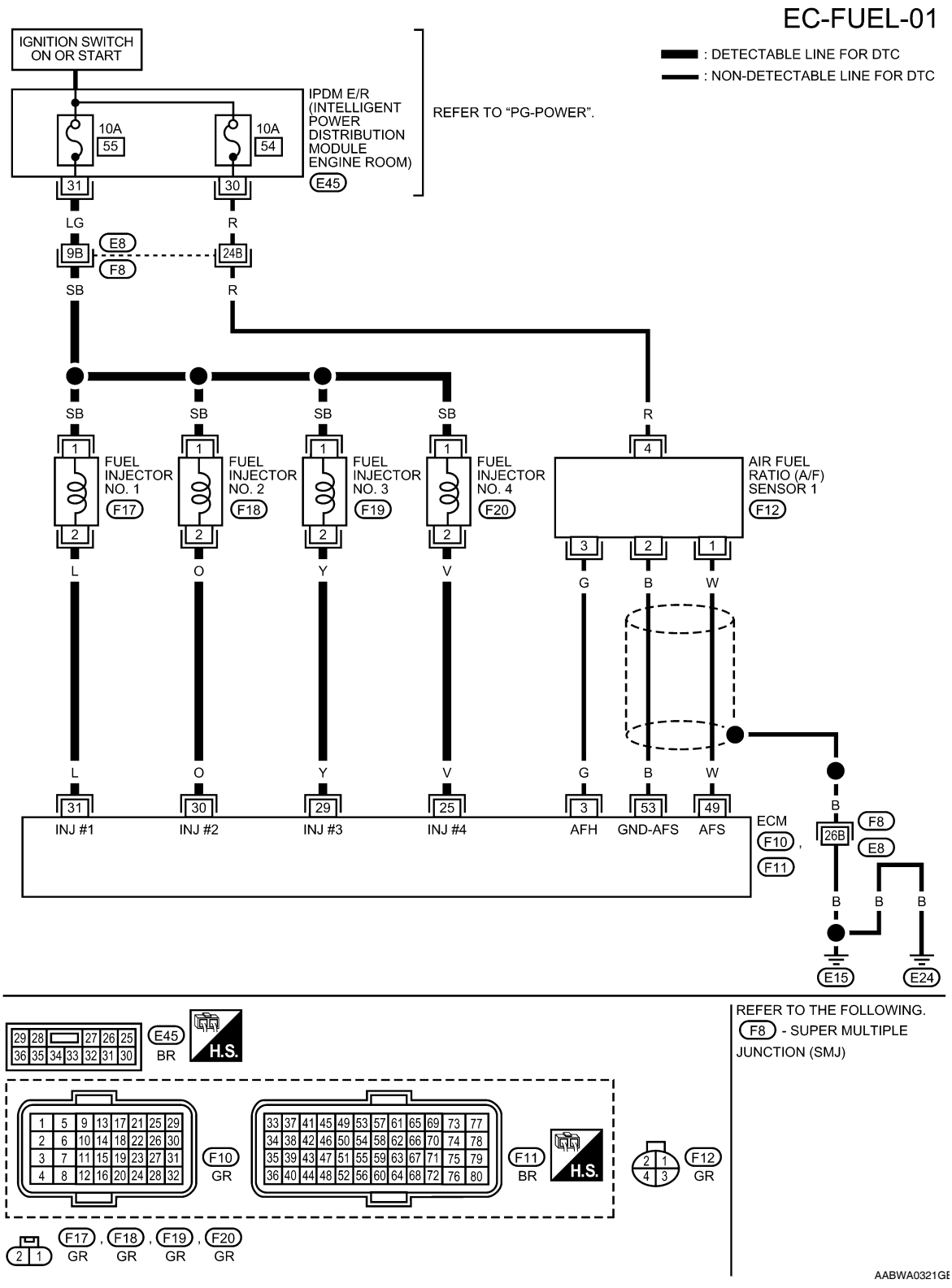
VHCL SPEED SE	50 – 120 km/h (31 – 75 MPH)

CAUTION:
Always drive vehicle at a safe speed.

d. Check 1st trip DTC.
e. If 1st trip DTC is detected, go to EC-1261, "Diagnosis Procedure".

Wiring Diagram

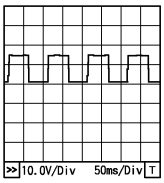
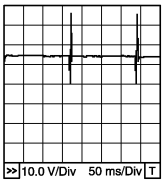
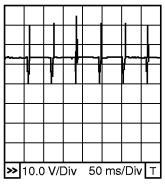
INFOID:0000000004500112



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V  PBIA8148J
25 29 30 31	V Y O L	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 2 Fuel injector No. 1	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)  PBIB0529E
			[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  PBIA4943J
49	W	A/F sensor 1	**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	**[Ignition switch: ON]**	Approximately 2.2V

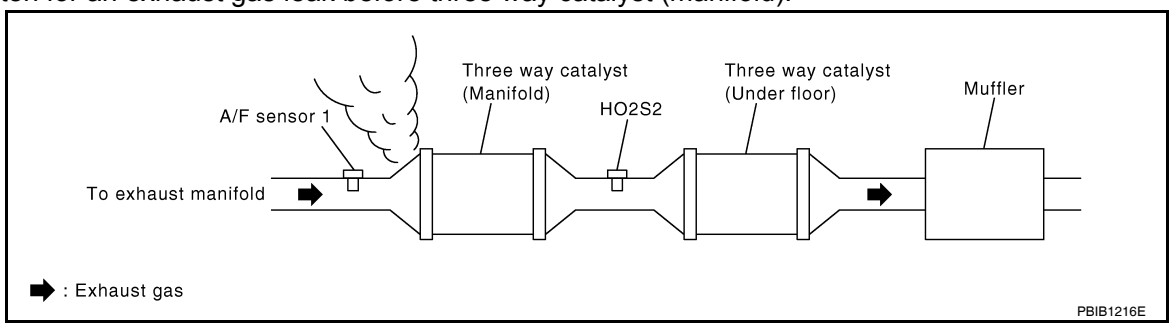
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004500113

1. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



PBIB1216E

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

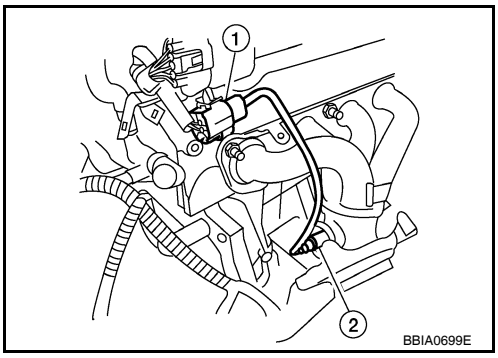
1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK AIR FUEL RATIO (A/F) SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect air fuel ratio (A/F) sensor 1 harness connector (1).
- Air fuel ratio (A/F) sensor 1 (2)
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.



A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

5. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-1086, "Fuel Pressure Check".
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-1086, "Fuel Pressure Check".

At idling: Approximately 350 kPa (3.57 kg/cm^2, 51 psi)

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Fuel pump and circuit (Refer to EC-1513.)
- Fuel pressure regulator (Refer to EC-1086, "Fuel Pressure Check".)
- Fuel lines (Refer to FL-4.)
- Fuel filter for clogging

>> Repair or replace.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-III.

at idling : 1.0 - 4.0 g·m/sec
at 2,500 rpm : 2.0 - 10.0 g·m/sec

With GST

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check mass air flow sensor signal in Service $01 with GST.

at idling : 1.0 - 4.0 g·m/sec
at 2,500 rpm : 2.0 - 10.0 g·m/sec

OK or NG

OK >> GO TO 7.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-1170.

7. CHECK FUNCTION OF FUEL INJECTORS

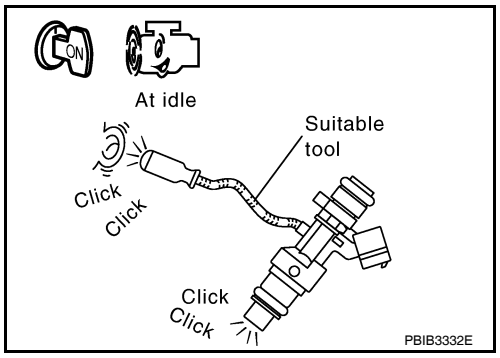
With CONSULT-III

1. Let engine idle.
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.



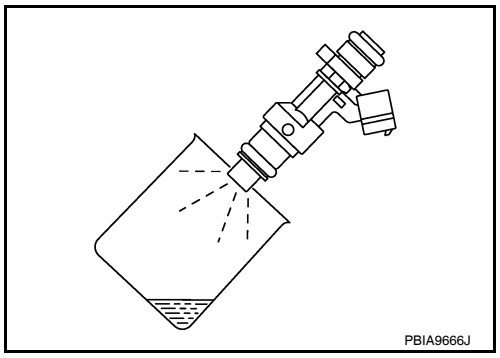
OK or NG

OK >> GO TO 8.
NG >> Perform trouble diagnosis for EC-1508.

8. CHECK FUEL INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch OFF.
3. Reconnect all harness connectors disconnected.
4. Remove fuel tube assembly. Refer to EM-156.
   Keep fuel hose and all fuel injector connected to fuel tube.
   The fuel injector harness connectors should remain connected.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each fuel injector.
7. Crank engine for about 3 seconds. Make sure that fuel sprays out from fuel injectors.

Fuel should be sprayed evenly for each fuel injector.



OK or NG

OK >> GO TO 9.
NG >> Replace fuel injectors from which fuel does not spray out. Always replace O-ring with new ones.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

DTC P0172 FUEL INJECTION SYSTEM FUNCTION

On Board Diagnosis Logic

INFOID:0000000004500114

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the air fuel ratio (A/F) sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios. In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172 0172	Fuel injection system too rich	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• Air fuel ratio (A/F) sensor 1 • Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor

DTC Confirmation Procedure

INFOID:0000000004500115

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Start engine.
   If it is difficult to start engine, the fuel injection system has a malfunction.
   Perform the following procedure is advised.

a. Crank engine while depressing accelerator pedal.
   NOTE:
   When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

b. If engine starts, go to EC-1267, "Diagnosis Procedure".
   If engine does not start, remove ignition plugs and check for fouling, etc.

6. Keep engine at idle for at least 5 minutes.
7. Check 1st trip DTC.
   The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to EC-1267, "Diagnosis Procedure".
   NOTE:
   If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine.
c. Maintain the following conditions for at least 10 consecutive minutes.
   Hold the accelerator pedal as steady as possible.

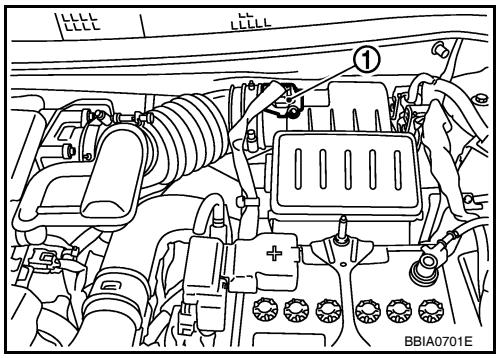
VHCL SPEED SE	50 – 120 km/h (31 – 75 MPH)

CAUTION:
Always drive vehicle at a safe speed.

d. Check 1st trip DTC.
e. If 1st trip DTC is detected, go to EC-1267, "Diagnosis Procedure".

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor (1) harness connector.
4. Restart engine and let idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select Service $03 with GST. Make sure DTC P0102 is detected.
7. Select Service $04 with GST and erase the DTC P0102.
8. Start engine.
   If it is difficult to start engine, the fuel injection system has a malfunction.
   Perform the following procedure is advised.



a. Crank engine while depressing accelerator pedal.
   NOTE:
   When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.
b. If engine starts, go to EC-1267, "Diagnosis Procedure".
   If engine does not start, remove ignition plugs and check for fouling, etc.

9. Keep engine at idle for at least 5 minutes.
10. Check 1st trip DTC.
    The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to EC-1267, "Diagnosis Procedure".
    NOTE:
    If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine.
c. Maintain the following conditions for at least 10 consecutive minutes.
   Hold the accelerator pedal as steady as possible.

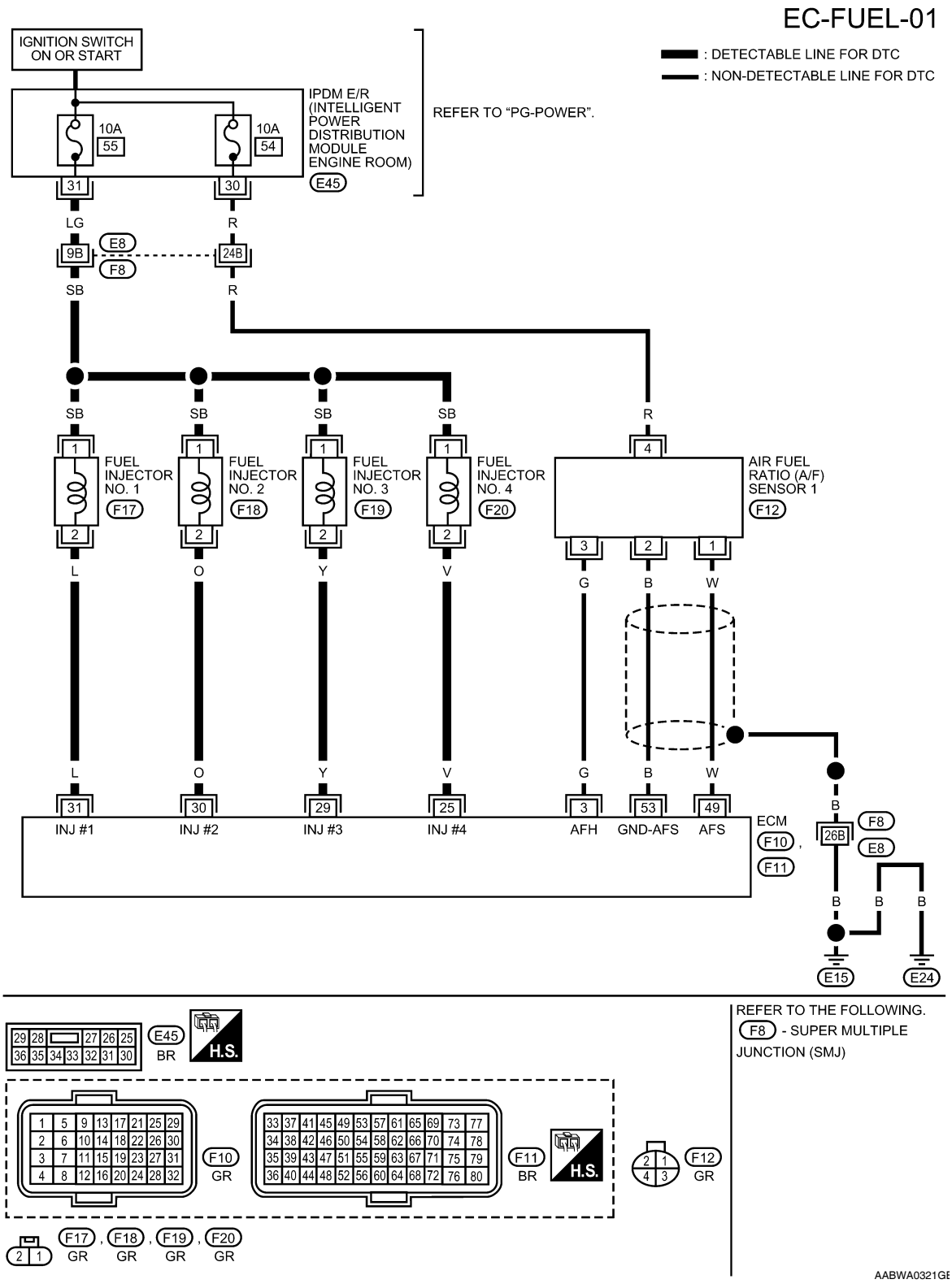
VHCL SPEED SE	50 – 120 km/h (31 – 75 MPH)

CAUTION:
Always drive vehicle at a safe speed.

d. Check 1st trip DTC.
e. If 1st trip DTC is detected, go to EC-1267, "Diagnosis Procedure".

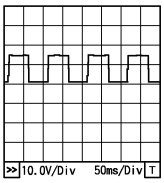
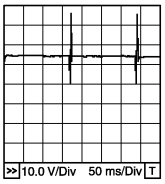
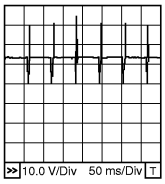
Wiring Diagram

INFOID:0000000004501178



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V  PBIA8148J
25 29 30 31	V Y O L	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 2 Fuel injector No. 1	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)  PBIB0529E
			[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  PBIA4943J
49	W	A/F sensor 1	**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	**[Ignition switch: ON]**	Approximately 2.2V

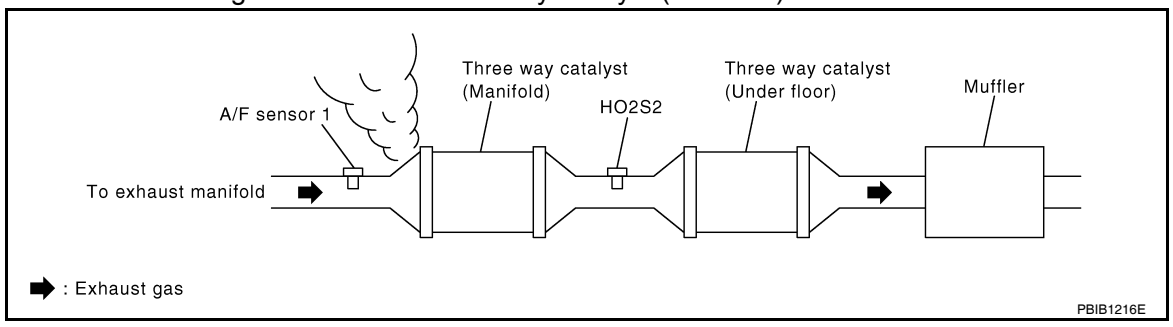
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004500117

1.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



PBIB1216E

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK FOR INTAKE AIR LEAK

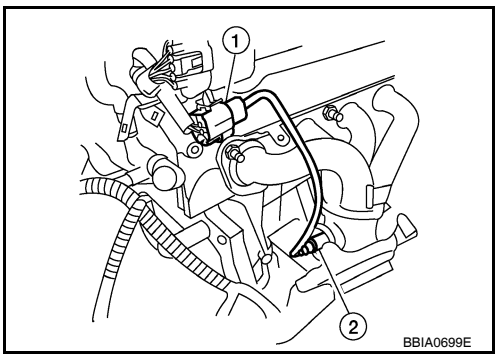
Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK AIR FUEL RATIO (A/F) SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect air fuel ratio (A/F) sensor 1 harness connector (1).
- Air fuel ratio (A/F) sensor 1 (2)
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.



A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

5. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-1086, "Fuel Pressure Check".
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-1086, "Fuel Pressure Check".

At idling: Approximately 350 kPa (3.57 kg/cm2, 51 psi)

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Fuel pump and circuit (Refer to EC-1513.)
- Fuel pressure regulator (Refer to EC-1086, "Fuel Pressure Check".)

>> Repair or replace.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-III.

at idling : 1.0 - 4.0 g·m/sec
at 2,500 rpm : 2.0 - 10.0 g·m/sec

With GST

1. Install all removed parts.
2. Start engine and warm it up to normal operating temperature.
3. Check mass air flow sensor signal in Service $01 with GST.

at idling : 1.0 - 4.0 g·m/sec
at 2,500 rpm : 2.0 - 10.0 g·m/sec

OK or NG

OK >> GO TO 7.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-1170.

7. CHECK FUNCTION OF FUEL INJECTORS

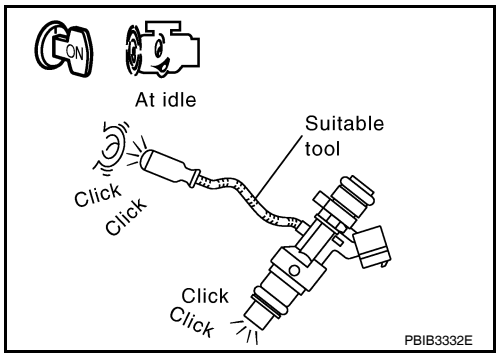
With CONSULT-III

1. Let engine idle.
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.



OK or NG

OK >> GO TO 8.
NG >> Perform trouble diagnosis for EC-1508.

8. CHECK FUEL INJECTOR

1. Remove fuel injector assembly. Refer to EM-156.
   Keep fuel hose and all fuel injector connected to fuel tube.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Reconnect all harness connectors disconnected.
4. Disconnect all injector harness connectors.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each fuel injector.
7. Crank engine for about 3 seconds.
   Make sure fuel does not drip from fuel injector.

OK or NG

OK (Does not drip.)>>GO TO 9.
NG (Drips.)>>Replace the fuel injectors from which fuel is dripping. Always replace O-ring with new one.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

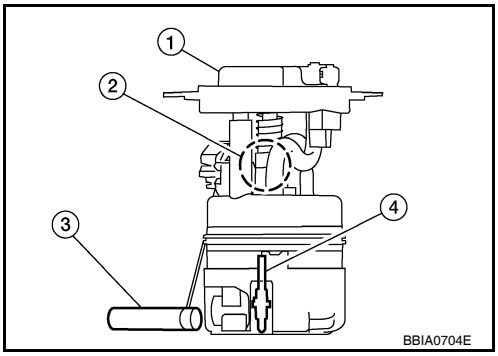
DTC P0181 FTT SENSOR

Component Description

INFOID:0000000004500118

The fuel tank temperature sensor (4) is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

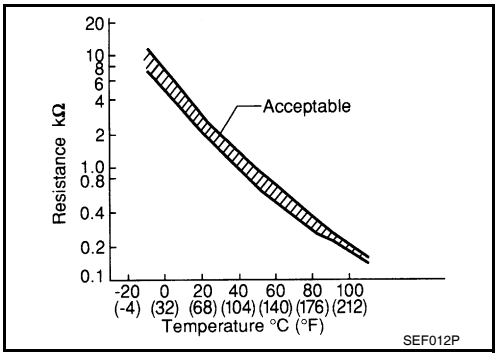
- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel level sensor (3)



<Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: This data is reference values and is measured between ECM terminal 43 (Fuel tank temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result damage the ECM's transistor. Use ground other than ECM, such as ground.

On Board Diagnosis Logic

INFOID:0000000004500119

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0181 0181	Fuel tank temperature sensor circuit range/performance	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	• Harness or connectors (Fuel tank temperature sensor circuit is open or shorted) • Fuel tank temperature sensor

DTC Confirmation Procedure

INFOID:0000000004500120

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-III

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check 1st trip DTC.
   If 1st trip DTC is detected, go to EC-1271, "Diagnosis Procedure".
   If 1st trip DTC is not detected, go to following step.
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Check “COOLAN TEMP/S” value.
   If the “COOLAN TEMP/S” is less than 60°C (140°F), the result will be OK.
   If the “COOLAN TEMP/S” is above 60°C (140°F), go to the following step.
5. Cool engine down until “COOLAN TEMP/S” signal is less than 60°C (140°F).
6. Wait at least 10 seconds.
7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to EC-1271, "Diagnosis Procedure".

WITH GST

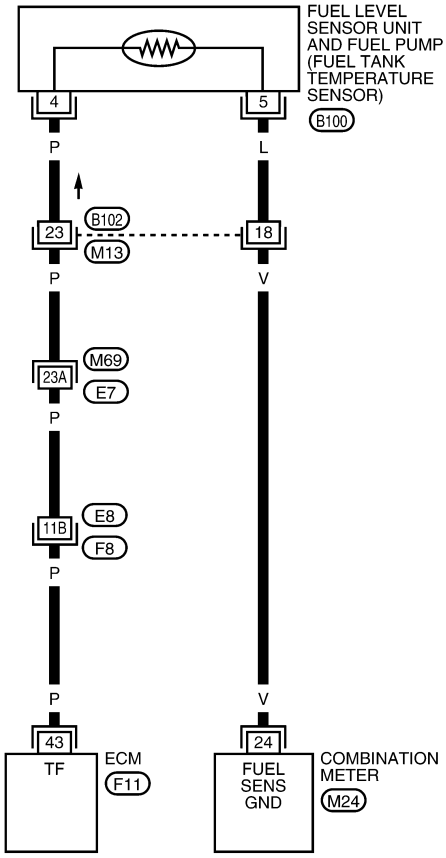
Follow the procedure “WITH CONSULT-III” above.

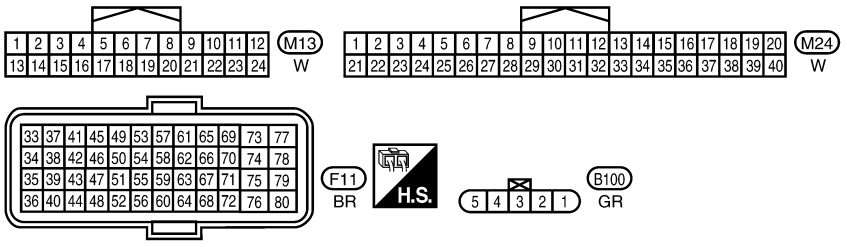
Wiring Diagram

INFOID:0000000004500121

EC-FTTS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





REFER TO THE FOLLOWING.
M69 , F8 - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2636E

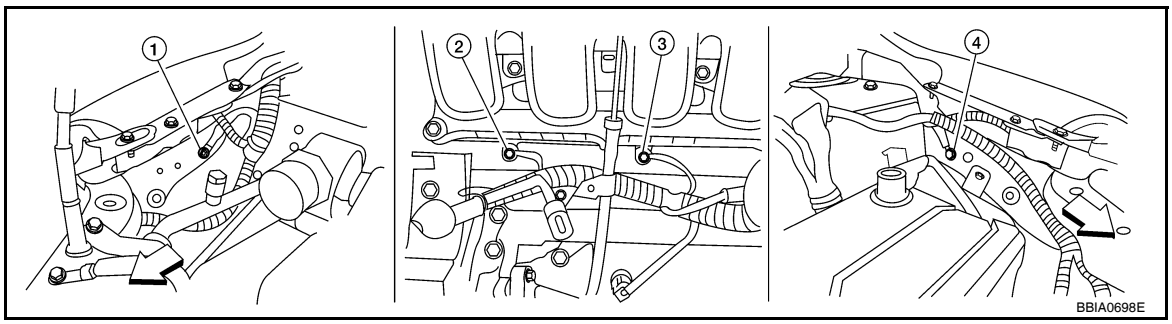
Diagnosis Procedure

INFOID:0000000004500122

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.

2. Loosen and retighten ground screw on the body.
Refer to EC-1144, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

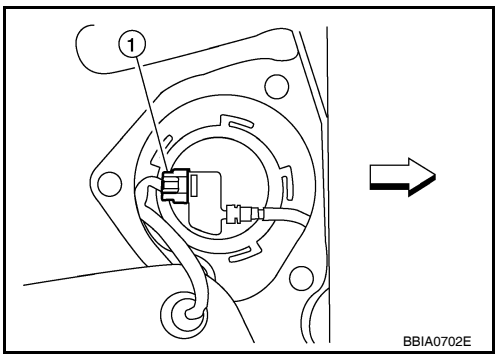
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector (1).

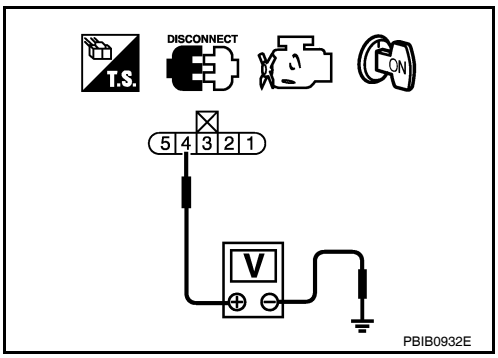
- : Vehicle front

3. Turn ignition switch ON.



4. Check voltage between “fuel level sensor unit and fuel pump” terminal 4 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between ECM and “fuel level sensor unit and fuel pump”

>> Repair open circuit or short to ground or short to power in harness or connector.

4.CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Disconnect combination meter harness connector.
3. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 5 and combination meter terminal 24. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B102, M13
- Harness for open or short between “fuel level sensor unit and fuel pump” and ground.

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to, EC-1273, "Component Inspection".

OK or NG

OK >> GO TO 7.
NG >> Replace “fuel level sensor unit and fuel pump”.

7. CHECK INTERMITTENT INCIDENT

Perform EC-1138.

>> **INSPECTION END**

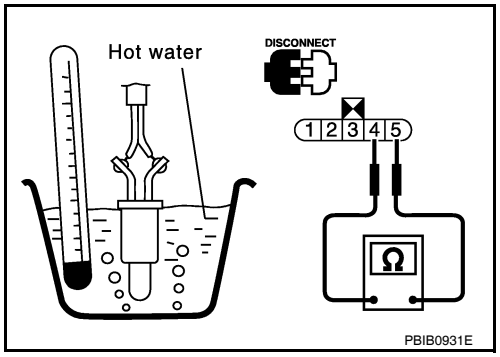
Component Inspection

INFOID:0000000004500123

FUEL TANK TEMPERATURE SENSOR

1. Check resistance between “fuel level sensor unit and fuel pump” terminal 4 and 5 by heating with hot water as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90



2. If NG, replace “fuel level sensor unit and fuel pump”.

Removal and Installation

INFOID:0000000004500124

FUEL TANK TEMPERATURE SENSOR

Refer to FL-5, "Removal and Installation".

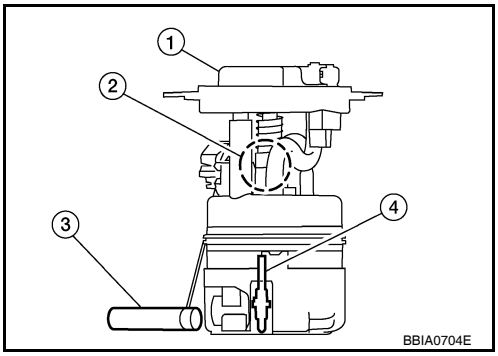
DTC P0182, P0183 FTT SENSOR

Component Description

INFOID:0000000004501179

The fuel tank temperature sensor (4) is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.

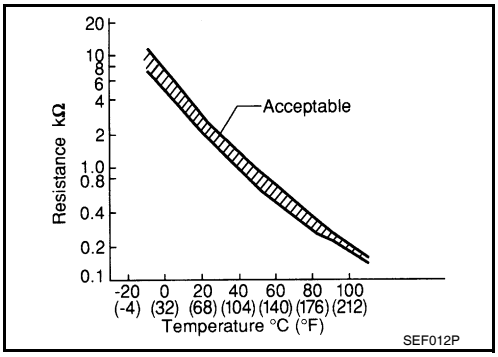
- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel level sensor (3)



<Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: This data is reference values and is measured between ECM terminal 43 (Fuel tank temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result damage the ECM's transistor. Use ground other than ECM, such as ground.

On Board Diagnosis Logic

INFOID:0000000004500126

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0182 0182	Fuel tank temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (Fuel tank temperature sensor circuit is open or shorted.) • Fuel tank temperature sensor
P0183 0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

INFOID:0000000004500127

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

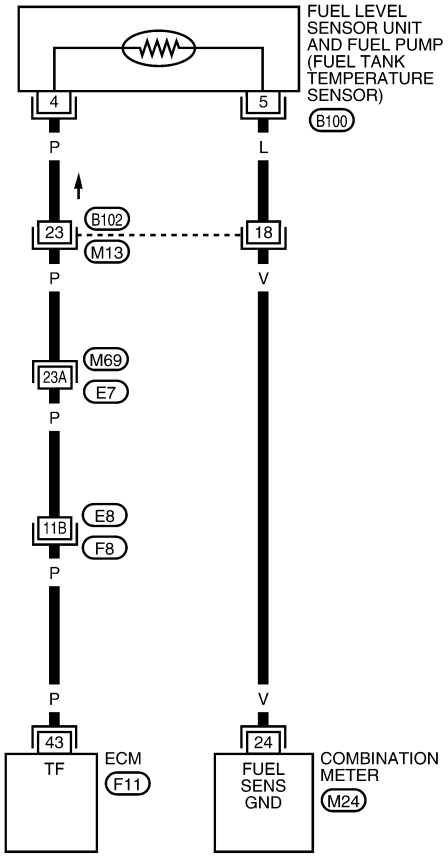
1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-1275, "Diagnosis Procedure".

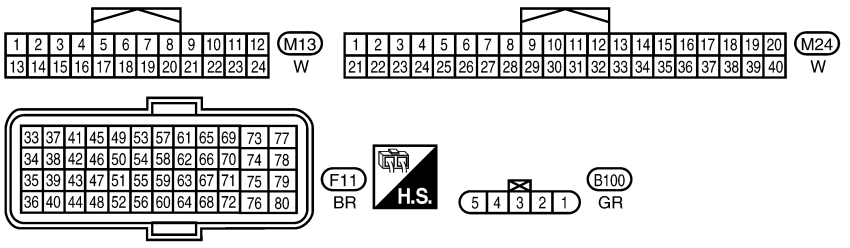
Wiring Diagram

INFOID:0000000004501180

EC-FTTS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





REFER TO THE FOLLOWING.
M69 , F8 - SUPER MULTIPLE JUNCTION (SMJ)

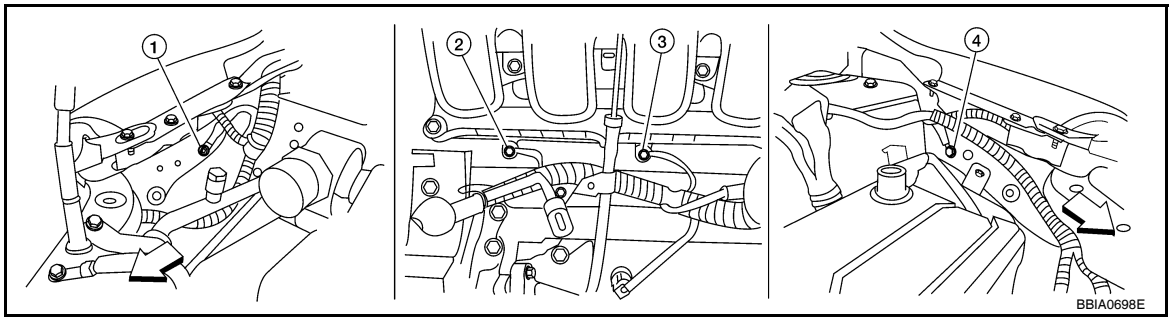
BBWA2636E

Diagnosis Procedure

INFOID:0000000004501181

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

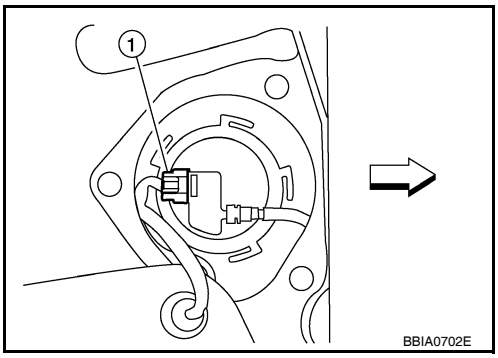
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector (1).

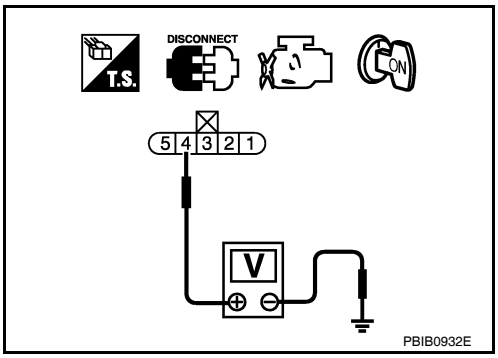
- : Vehicle front

3. Turn ignition switch ON.



4. Check voltage between “fuel level sensor unit and fuel pump” terminal 4 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between ECM and “fuel level sensor unit and fuel pump”

>> Repair open circuit or short to ground or short to power in harness or connector.

4.CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect combination meter harness connector.

3. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 5 and combination meter terminal 24. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors B102, M13
- Harness for open or short between “fuel level sensor unit and fuel pump” and ground.

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to, EC-1277, "Component Inspection".

OK or NG

OK >> GO TO 7.
NG >> Replace “fuel level sensor unit and fuel pump”.

7. CHECK INTERMITTENT INCIDENT

Perform EC-1138.

>> **INSPECTION END**

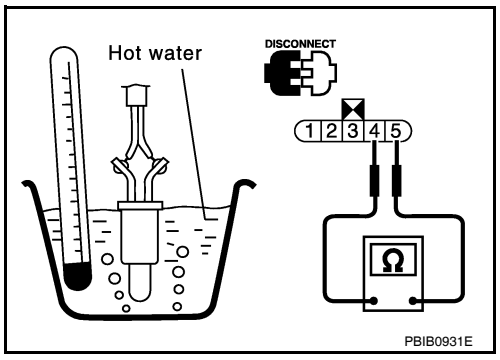
Component Inspection

INFOID:0000000004501182

FUEL TANK TEMPERATURE SENSOR

1. Check resistance between “fuel level sensor unit and fuel pump” terminal 4 and 5 by heating with hot water as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90



2. If NG, replace “fuel level sensor unit and fuel pump”.

Removal and Installation

INFOID:0000000004501183

FUEL TANK TEMPERATURE SENSOR

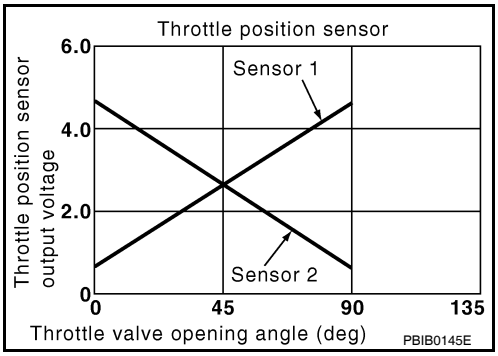
Refer to FL-5, "Removal and Installation".

DTC P0222, P0223 TP SENSOR

Component Description

INFOID:0000000004501170

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.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004501171

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
TP SEN 1-B1 TP SEN 2-B1*	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T, CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

INFOID:0000000004500134

These self-diagnoses have the one trip detection logic.
NOTE:
If DTC P0222 or P0223 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-1396.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222 0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	• Harness or connectors (TP sensor 1 circuit is open or shorted.) (APP sensor 2 circuit is shorted.) • Electric throttle control actuator (TP sensor 1) • Accelerator pedal position sensor (APP sensor 2)
P0223 0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:0000000004500135

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

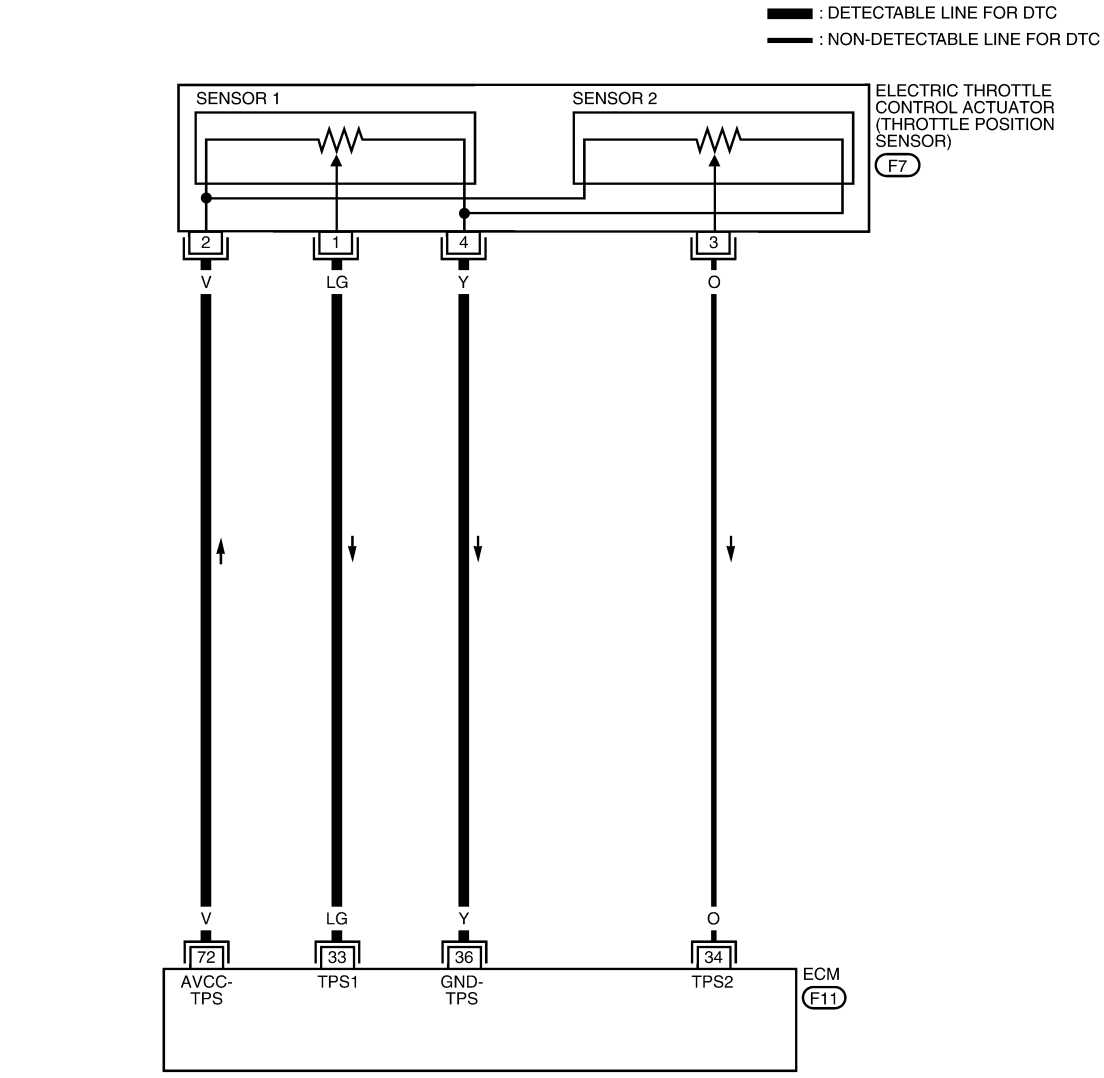
1. Start engine and let it idle for 1 second.

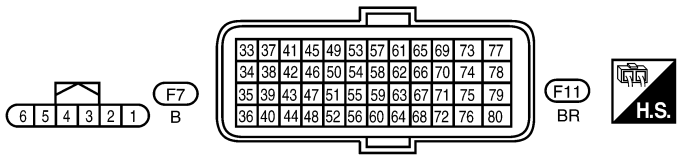
2. Check DTC.
3. If DTC is detected, go to EC-1280, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004500136

EC-TPS1-01





BBWA2655E

Specification data are reference values and are measured between each terminal 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.

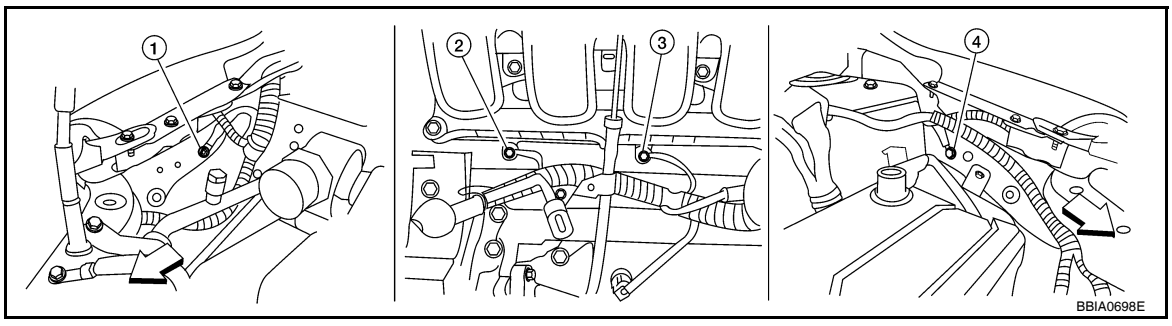
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	LG	Throttle position sensor 1	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
34	O	Throttle position sensor 2	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
36	Y	Sensor ground (Throttle position sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
72	V	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V

Diagnosis Procedure

INFOID:0000000004500137

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

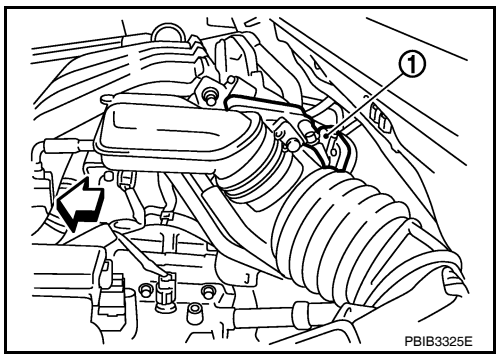
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator (1) harness connector.
- : Vehicle front
2. Turn ignition switch ON.

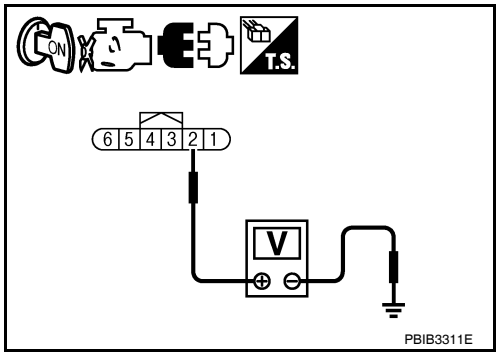


3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT-III or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness 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 harness continuity between ECM terminal 36 and electric throttle control actuator terminal 4. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 33 and electric throttle control actuator terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-1282, "Component Inspection".

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-1084, "Throttle Valve Closed Position Learning".
3. Perform EC-1084, "Idle Air Volume Learning".

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

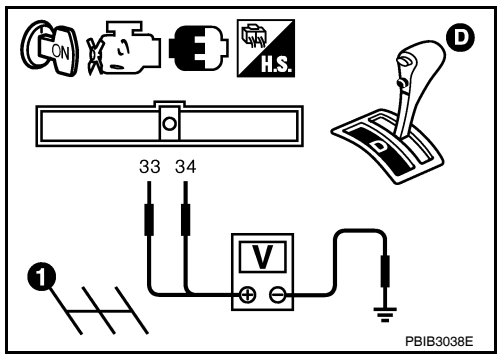
>> **INSPECTION END**

Component Inspection

INFOID:0000000004501172

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-1084, "Throttle Valve Closed Position Learning".
3. Turn ignition switch ON.
4. Set shift lever to D position (A/T, CVT) or 1st position (M/T).
5. Check voltage between ECM terminals 33 (TP sensor 1 signal), 34 (TP sensor 2 signal) and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
33 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
34 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-1084, "Throttle Valve Closed Position Learning".
8. Perform EC-1084, "Idle Air Volume Learning".

Removal and Installation

INFOID:0000000004501173

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-141, "Removal and Installation".

DTC P0300 - P0304 MULTIPLE CYLINDER MISFIRE, NO. 1 - 4 CYLINDER MISFIRE

On Board Diagnosis Logic

INFOID:0000000004500140

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the 1st trip, when a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor (POS) signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
   If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300 0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • Fuel injector circuit is open or shorted • Fuel injector • Intake air leak • The ignition signal circuit is open or shorted • Lack of fuel • Drive plate or flywheel • Air fuel ratio (A/F) sensor 1 • Incorrect PCV hose connection
P0301 0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302 0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303 0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304 0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	

DTC Confirmation Procedure

INFOID:0000000004500141

CAUTION:
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for about 15 minutes.
4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to EC-1284, "Diagnosis Procedure".
   NOTE:
   If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to table below.

Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following condition should be satisfied at the same time:

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Basic fuel schedule	Basic fuel schedule in the freeze frame data × (1 ± 0.1)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F)
	When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F)

The time to driving varies according to the engine speed in the freeze frame data.
Refer to the following table.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

Diagnosis Procedure

INFOID:0000000004500142

1.CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.
3. Check PCV hose connection.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

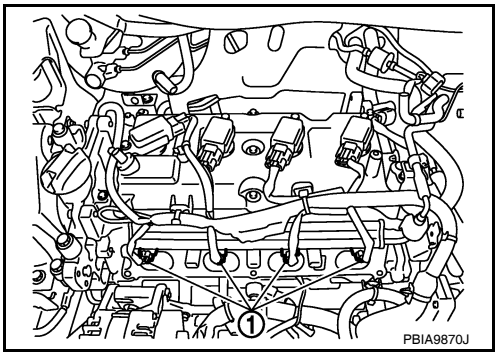
3.PERFORM POWER BALANCE TEST

With CONSULT-III

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

Without CONSULT-III

When disconnecting each fuel injector (1) harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?



Yes or No

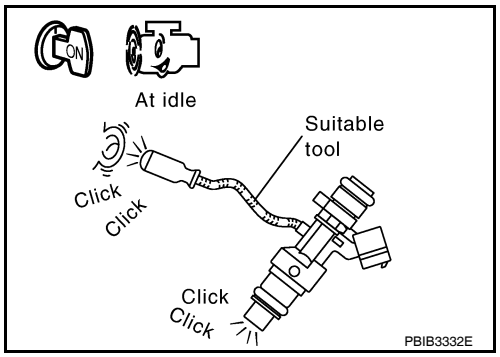
Yes >> GO TO 4.
No >> GO TO 9.

4. CHECK FUEL INJECTOR

Does each fuel injector make an operating sound at idle?

Yes or No

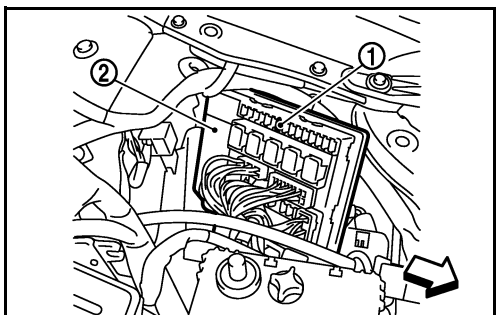
Yes >> GO TO 5.
No >> Check fuel injector(s) and circuit(s). Refer to EC-1508.



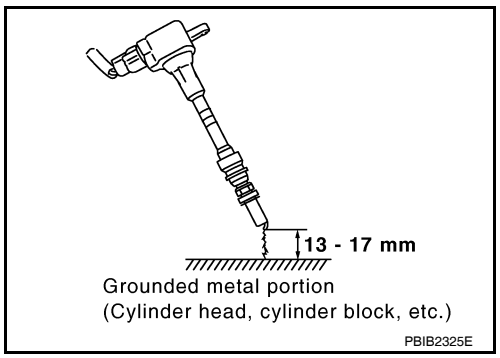
5. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.
- : Vehicle front
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.



CAUTION:
- **Do not approach to the spark plug and the ignition coil within 50cm. 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.

OK or NG

OK >> GO TO 9.
NG >> GO TO 6.

6. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.

3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

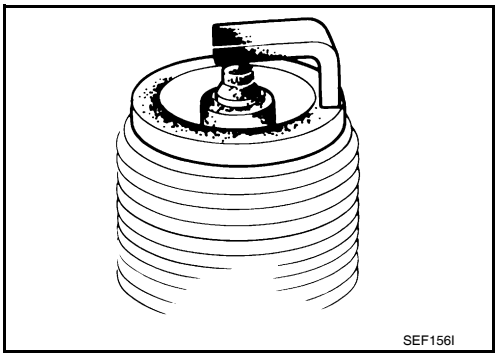
Spark should be generated.

OK or NG

OK >> GO TO 7.
NG >> Check ignition coil, power transistor and their circuits. Refer to EC-1518.

7.CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.



OK or NG

OK >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-227, "Standard and Limit".
NG >> 1. Repair or clean spark plug.
2. GO TO 8.

8.CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

OK or NG

OK >> **INSPECTION END**
NG >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-227, "Standard and Limit".

9.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-185, "On-Vehicle Service".

OK or NG

OK >> GO TO 10.
NG >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

10.CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to EC-1086, "Fuel Pressure Check".
3. Install fuel pressure gauge and check fuel pressure. Refer to EC-1086, "Fuel Pressure Check".

At idling: Approximately 350 kPa (3.57 kg/cm^2, 51 psi)

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11.DETECT MALFUNCTIONING PART

Check the following.
- Fuel pump and circuit (Refer to EC-1513.)
- Fuel pressure regulator (Refer to EC-1086, "Fuel Pressure Check".)
- Fuel lines (Refer to FL-4, "Checking Fuel Line".)
- Fuel filter for clogging

>> Repair or replace.

12. CHECK IGNITION TIMING

Check the following items. Refer to EC-1078, "Basic Inspection".

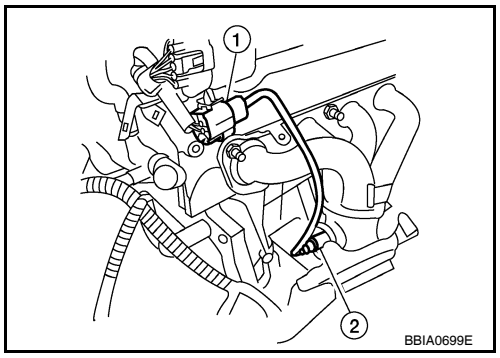
Items	Specifications
Target idle speed	A/T: 700 ± 50 rpm (in P or N position)
	CVT: 700 ± 50 rpm (in P or N position)
	M/T: 700 ± 50 rpm (in Neutral position)
Ignition timing	A/T: 13 ± 5° BTDC (in P or N position)
	CVT: 13 ± 5° BTDC (in Neutral position)
	M/T: 13 ± 5° BTDC (in Neutral position)

OK or NG

OK >> GO TO 13.
NG >> Follow the EC-1078, "Basic Inspection".

13. CHECK AIR FUEL RATIO (A/F) SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect air fuel ratio (A/F) sensor 1 harness connector (1).
- Air fuel ratio (A/F) sensor 1 (2)
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.



A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

5. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK >> GO TO 14.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to EC-1158, "Component Inspection".

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

15. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

>> **INSPECTION END**

16. CHECK MASS AIR FLOW SENSOR

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Check mass air flow sensor signal in “DATA MONITOR” mode with CONSULT-III.

at idling : 1.0 - 4.0 g·m/sec
at 2,500 rpm : 2.0 - 10.0 g·m/sec

With GST

1. Start engine and warm it up to normal operating temperature.
2. Check mass air flow sensor signal in Service $01 with GST.

at idling : 1.0 - 4.0 g·m/sec
at 2,500 rpm : 2.0 - 10.0 g·m/sec

OK or NG

OK >> GO TO 17.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-1170.

17. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in EC-1095, "Symptom Matrix Chart".

OK or NG

OK >> GO TO 18.
NG >> Repair or replace.

18. ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-1052, "Emission-related Diagnostic Information".

>> GO TO 19.

19. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

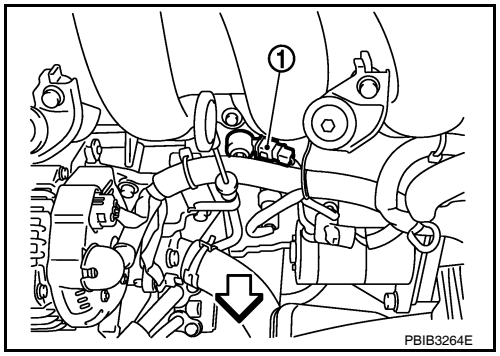
DTC P0327, P0328 KS

Component Description

INFOID:0000000004500143

The knock sensor (1) 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.

• : Vehicle front



On Board Diagnosis Logic

INFOID:0000000004500144

The MIL will not light up for these self-diagnoses.

DTC No.	Trouble Diagnosis Name	DTC Detected Condition	Possible Cause
P0327 0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (Knock sensor circuit is open or shorted.) • Knock sensor
P0328 0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

INFOID:0000000004500145

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

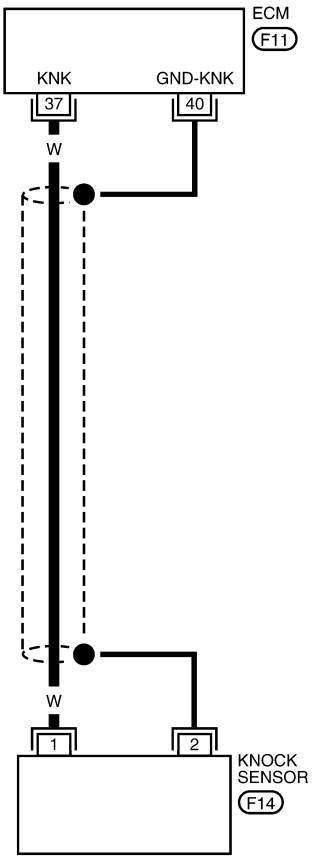
1. Start engine and run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-1291, "Diagnosis Procedure".

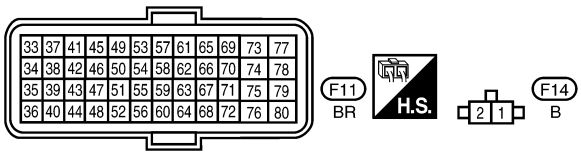
Wiring Diagram

INFOID:0000000004500146

EC-KS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





BBWA2637E

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
37	W	Knock sensor	**[Engine is running]** • Idle speed	Approximately 2.5V
40	—	Sensor ground (Knock sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:0000000004500147

1.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminal 37 and ground. Refer to Wiring Diagram.
   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

   Resistance: Approximately 532 - 588kΩ [at 20°C (68°F)]

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 2.

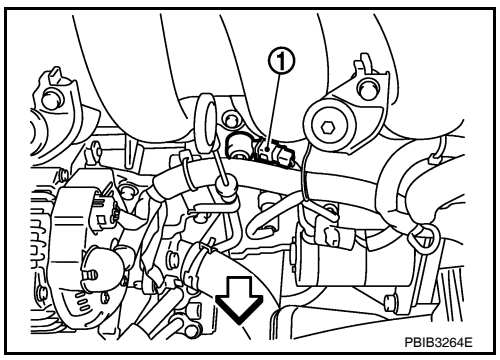
2.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-II

1. Disconnect knock sensor (1) harness connector.

- : Vehicle front

2. Check harness continuity between ECM terminal 37 and knock sensor terminal 1. Refer to Wiring Diagram.

   Continuity should exist.



3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK KNOCK SENSOR

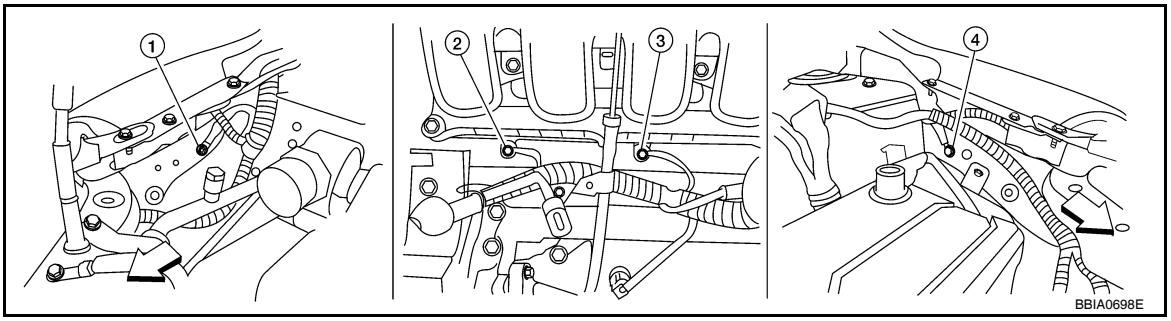
Refer to EC-1292, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace knock sensor.

4.CHECK GROUND CONNECTIONS

Loosen and retighten ground screws on the body.
Refer to EC-1144, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 5.
NG >> Repair or replace ground connections.

5. CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Reconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 40 and knock sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

Component Inspection

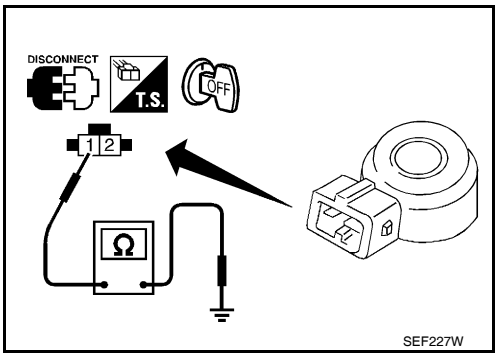
INFOID:0000000004500148

KNOCK SENSOR

1. Check resistance between knock sensor terminal 1 and ground.
   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

   Resistance: Approximately 532 - 588kΩ [at 20°C (68°F)]

   CAUTION:
   Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.
2. If NG, replace knock sensor.



Removal and Installation

INFOID:0000000004500149

KNOCK SENSOR

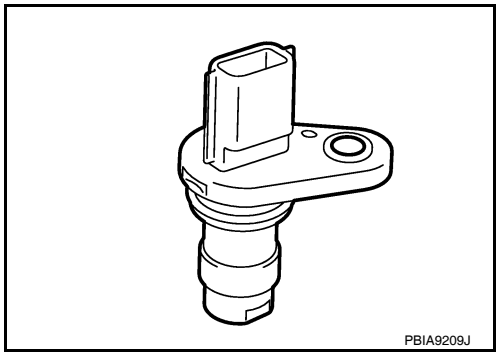
Refer to EM-199, "Component".

DTC P0335 CKP SENSOR (POS)

Component Description

INFOID:0000000004500150

The crankshaft position sensor (POS) is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution. The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes. The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
ECM receives the signals as shown in the figure.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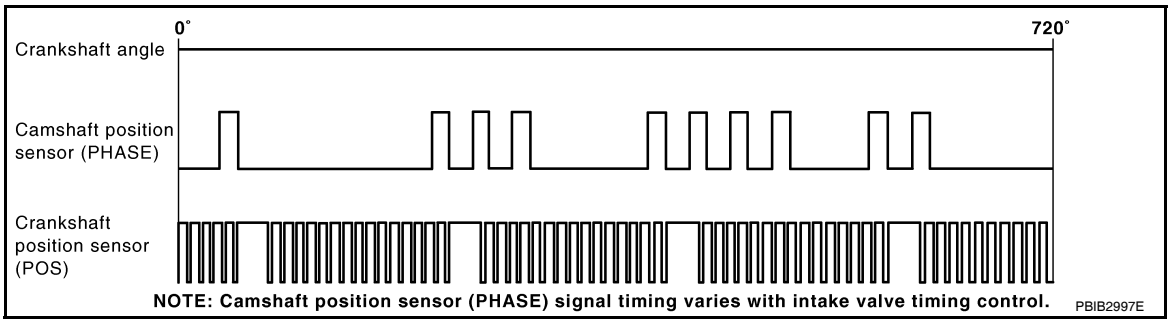


CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004500151

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

INFOID:0000000004500152

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335 0335	Crankshaft position sensor (POS) circuit	• The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. • The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	• Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) • Crankshaft position sensor (POS) • Accelerator pedal position sensor • Refrigerant pressure sensor • EVAP control system pressure sensor • Signal plate

DTC Confirmation Procedure

INFOID:0000000004500153

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:

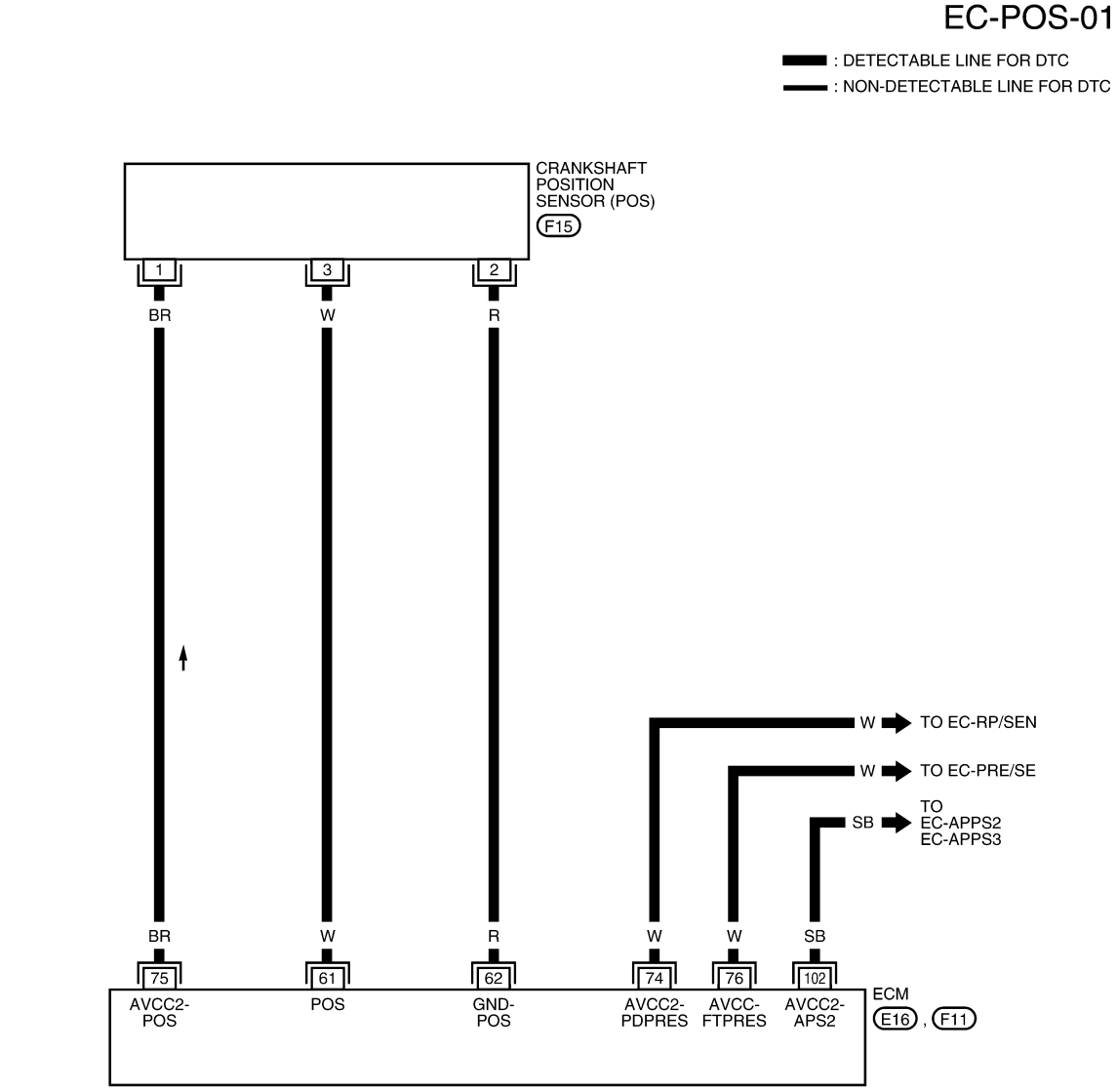
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

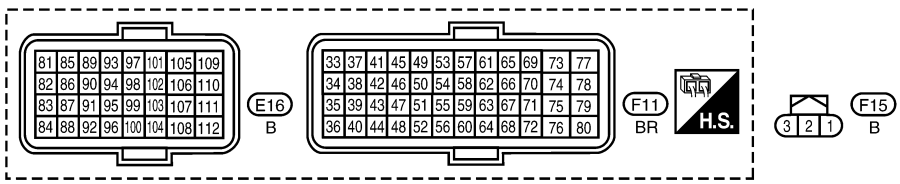
1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-1295, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004500154

EC-POS-01

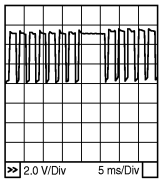
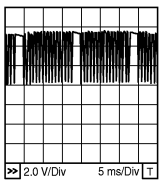




BBWA3071E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
61	W	Crankshaft position sensor (POS)	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 4.0V  PBIB2998E
			[Engine is running] • Engine speed: 2,000 rpm	Approximately 4.0V  PBIB2999E
62	R	Sensor ground [Crankshaft position sensor (POS)]	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
74	W	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
75	BR	Sensor power supply [Crankshaft position sensor (POS)]	**[Ignition switch: ON]**	Approximately 5V
76	W	EVAP control system pressure sensor power supply	**[Ignition switch: ON]**	Approximately 5V
102	SB	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V

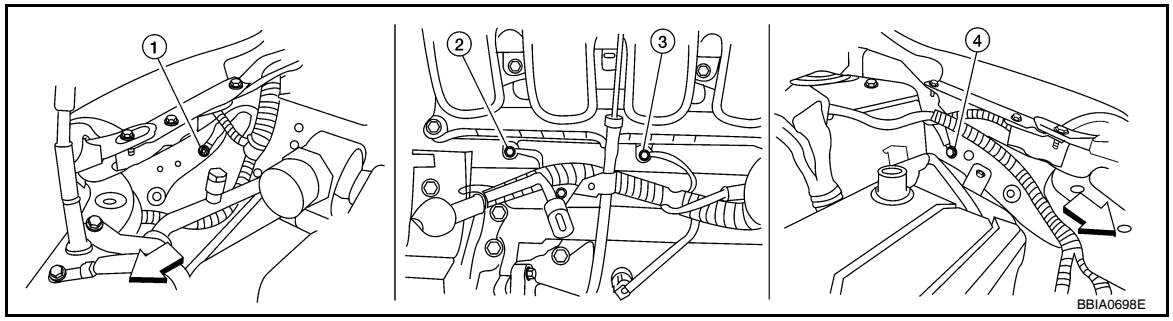
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004500155

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

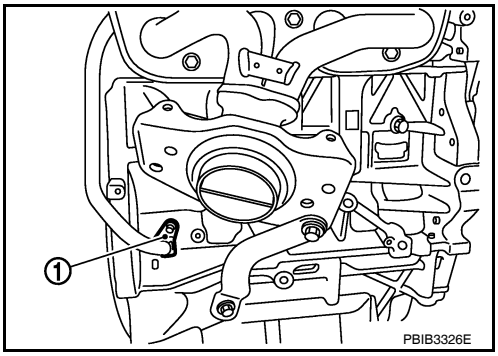
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

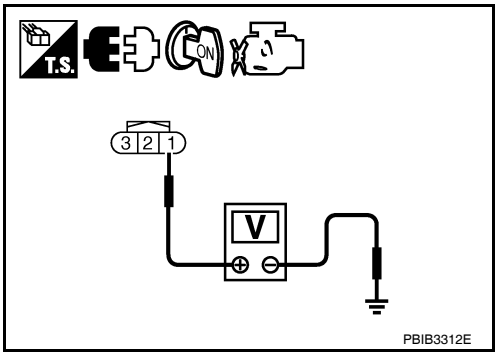
2.CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT-I

1. Disconnect crankshaft position (CKP) sensor (POS) (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between CKP sensor (POS) terminal 1 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

3.CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between CKP sensor (POS) terminal 1 and ECM terminal 75. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit.

4.CHECK COMPONENTS POWER SUPPLY

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
74	Refrigerant pressure sensor terminal 3	EC-1528, "Wiring Diagram"
75	Crankshaft position sensor (POS) terminal 1	EC-1294, "Wiring Diagram"
76	EVAP control system pressure sensor terminal 3	EC-1353, "Wiring Diagram"
102	APP sensor terminal 5	EC-1471, "Wiring Diagram"

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5.CHECK COMPONENTS

Check the following.
- Refrigerant pressure sensor. (Refer to EC-1529.)
- EVAP control system pressure sensor. (Refer to EC-1350.)

OK or NG

OK >> GO TO 6.
NG >> Replace malfunctioning components.

6.CHECK APP SENSOR

Refer to EC-1468, "Component Inspection".

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-1084, "Accelerator Pedal Released Position Learning".
3. Perform EC-1084, "Throttle Valve Closed Position Learning".
4. Perform EC-1084, "Idle Air Volume Learning".

>> **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 harness continuity between CKP sensor (POS) terminal 2 and ECM terminal 62. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between CKP sensor (POS) terminal 3 and ECM terminal 61. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-1298, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> Replace crankshaft position sensor (POS).

11.CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 12.
NG >> Replace the signal plate.

12. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

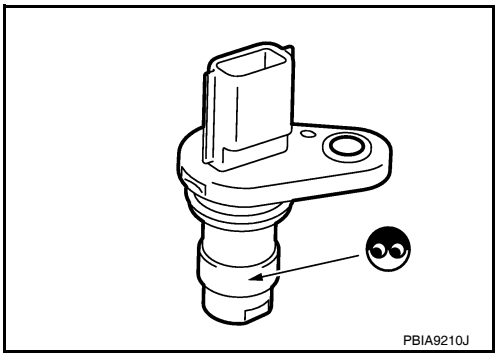
>> **INSPECTION END**

Component Inspection

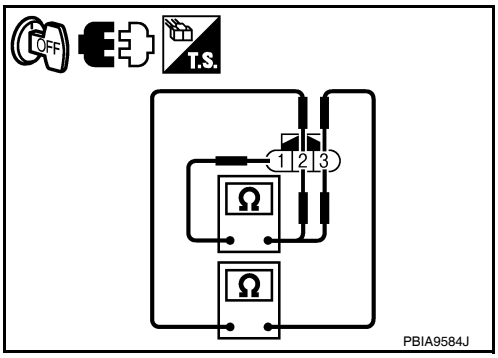
INFOID:0000000004500156

CRANKSHAFT POSITION SENSOR (POS)

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor (POS) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.



Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	

6. If NG, replace crankshaft position sensor (POS).

Removal and Installation

INFOID:0000000004500157

CRANKSHAFT POSITION SENSOR (POS)

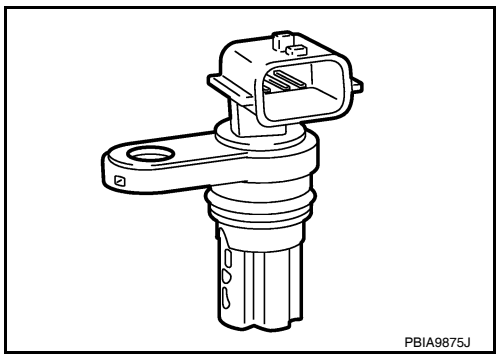
Refer to EM-199, "Component".

DTC P0340 CMP SENSOR (PHASE)

Component Description

INFOID:0000000004500158

The camshaft position sensor (PHASE) senses the protrusion of camshaft (INT) to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position. When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals. The sensor consists of a permanent magnet and Hall IC. When engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes.
ECM receives the signals as shown in the figure.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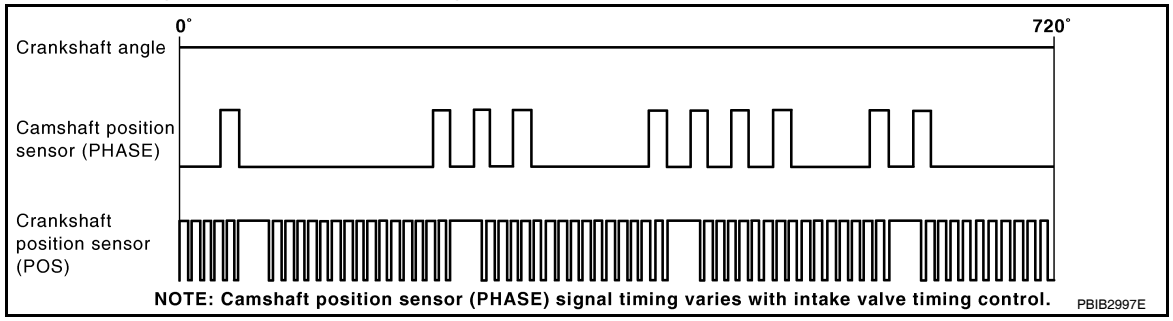


CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004500159

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	• Run engine and compare CONSULT-III value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

INFOID:0000000004500160

NOTE:
If DTC P0340 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.
Refer to EC-1396.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340	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 set to ECM during engine running. • The cylinder No. signal is not in the normal pattern during engine running.	• Harness or connectors [Camshaft position sensor (PHASE) circuit is open or shorted.] • Camshaft position sensor (PHASE) • Camshaft (INT) • Starter motor • Starting system circuit • Dead (Weak) battery

DTC Confirmation Procedure

INFOID:0000000004500161

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.

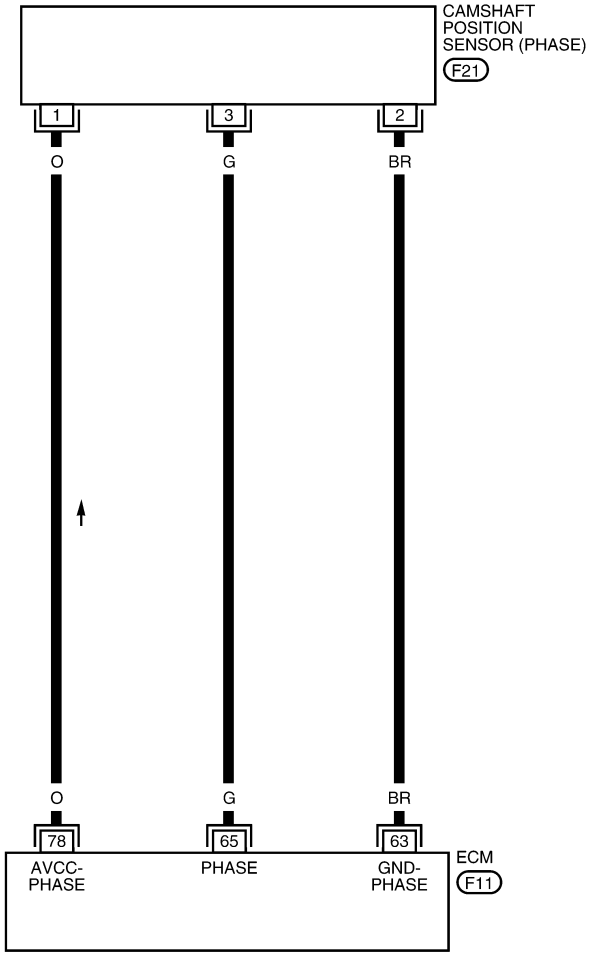
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-1301, "Diagnosis Procedure".
   If 1st trip DTC is not detected, go to next step.
4. Maintain engine speed at more than 800 rpm for at least 5 seconds.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to EC-1301, "Diagnosis Procedure".

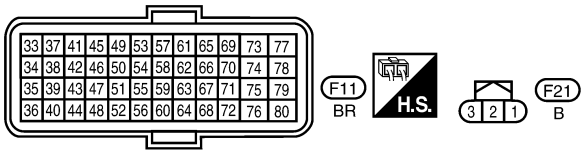
Wiring Diagram

INFOID:0000000004500162

EC-PHASE-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

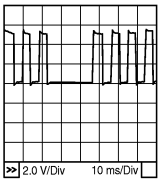
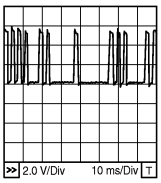




BBWA2639E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
63	BR	Sensor ground [Camshaft position sensor (PHASE)]	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
65	G	Camshaft position sensor (PHASE)	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 2.0V  PBIB2986E
			[Engine is running] • Engine speed: 2,000 rpm	1.0 - 2.0V  PBIB2987E
78	O	Sensor power supply [Camshaft position sensor (PHASE)]	**[Ignition switch: ON]**	Approximately 5V

: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004500163

1.CHECK STARTING SYSTEM

Turn ignition switch to START position.

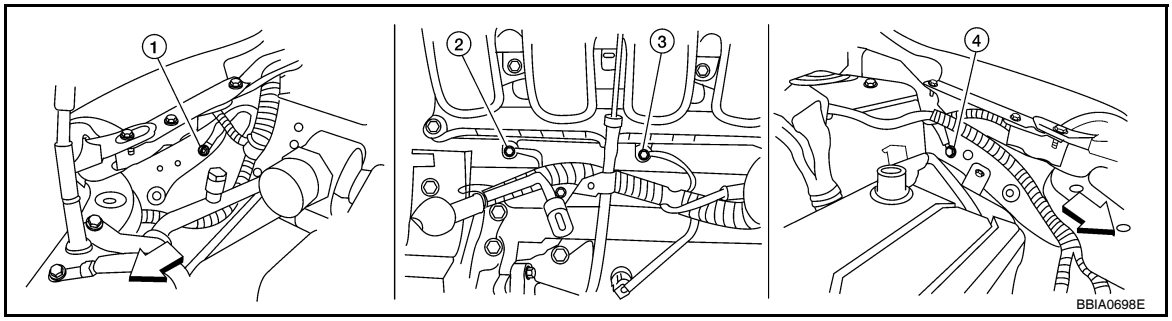
Does the engine turn over?
Does the starter motor operate?

Yes or No

Yes >> GO TO 2.
No >> Check starting system. (Refer to SC-16, "Trouble Diagnosis with Multitasking Battery Diagnostic Station".)

2.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

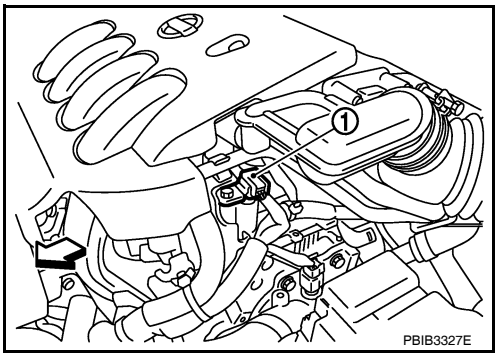
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

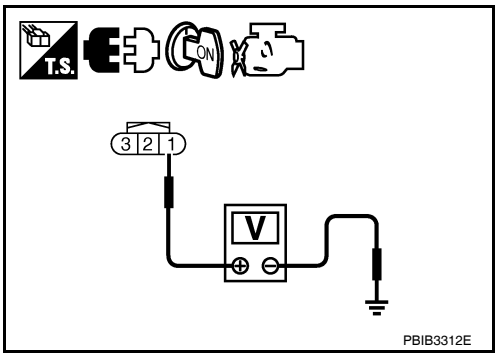
3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) (1) harness connector.
- : Vehicle front
2. Turn ignition switch ON.



3. Check voltage between CMP sensor (PHASE) terminal 1 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between CMP sensor (PHASE) terminal 2 and ECM terminal 63. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between CMP sensor (PHASE) terminal 3 and ECM terminal 65. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-1303, "Component Inspection".

OK or NG

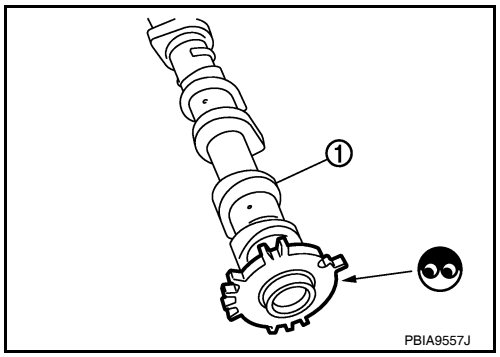
OK >> GO TO 7.
NG >> Replace camshaft position sensor (PHASE).

7. 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

OK or NG

OK >> GO TO 8.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



8. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

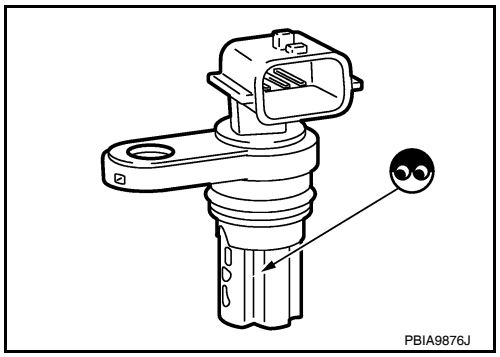
>> **INSPECTION END**

Component Inspection

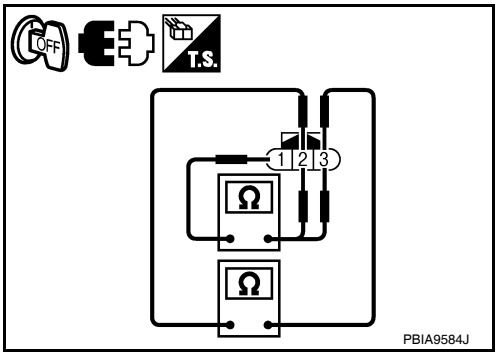
INFOID:0000000004500164

CAMSHAFT POSITION SENSOR (PHASE)

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor (PHASE) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.



Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	

6. If NG, replace camshaft position sensor (PHASE).

Removal and Installation

INFOID:0000000004500165

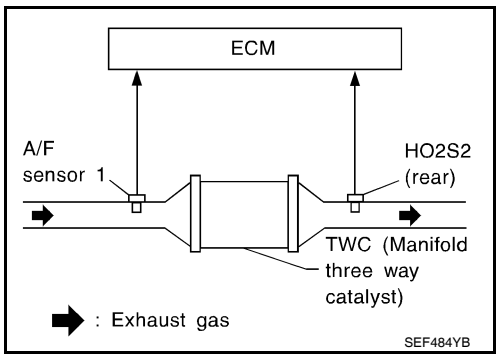
CAMSHAFT POSITION SENSOR (PHASE)
Refer to EM-170, "Component".

DTC P0420 THREE WAY CATALYST FUNCTION

On Board Diagnosis Logic

INFOID:0000000004500166

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2.
A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.
When the frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420 0420	Catalyst system efficiency below threshold	• Three way catalyst (manifold) does not operate properly. • Three way catalyst (manifold) does not have enough oxygen storage capacity.	• Three way catalyst (manifold) • Exhaust tube • Intake air leaks • Fuel injector • Fuel injector leaks • Spark plug • Improper ignition timing

DTC Confirmation Procedure

INFOID:0000000004500167

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-III

TESTING CONDITION:
Do not hold engine speed for more than the specified minutes below.

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
7. Open engine hood.
8. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-III.
9. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
   If “INCMP” of “CATALYST” changed to “CMPLT”, go to step 12.
10. Wait 5 seconds at idle.
11. Rev engine up to 2,000 to 3,000 rpm and maintain it until “INCMP” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes).
    If not “CMPLT”, stop engine and cool it down to less than 70°C (158°F) and then retest from step 1.
12. Check 1st trip DTC.
    If 1st trip DTC is detected, go to EC-1306, "Diagnosis Procedure".

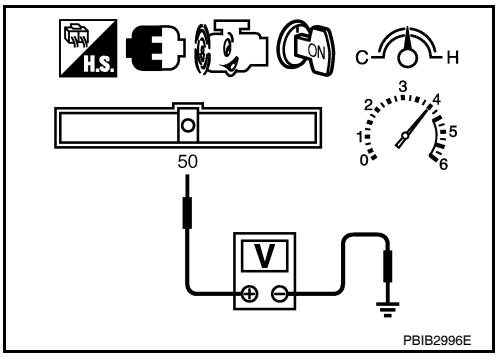
Overall Function Check

INFOID:0000000004500168

Use this procedure to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.
6. Set voltmeter probe between ECM terminals 50 (HO2S2 signal) and ground.
7. Keep engine speed at 2,500 rpm constant under no load.
8. Make sure that the voltage does not vary for more than 5 seconds.
   If the voltage fluctuation cycle takes less than 5 seconds, go to EC-1306, "Diagnosis Procedure".
   • 1 cycle: 0.6 - 1.0 → 0 - 0.3 → 0.6 - 1.0



Diagnosis Procedure

INFOID:0000000004500169

1.CHECK EXHAUST SYSTEM

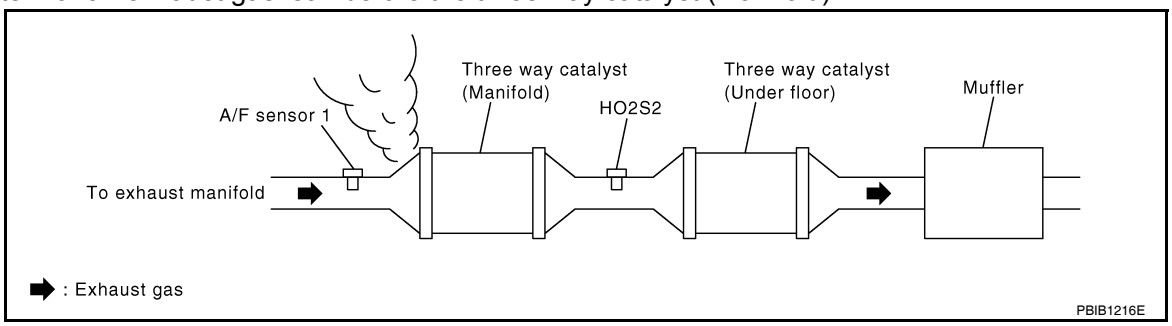
Visually check exhaust tubes and muffler for dent.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (manifold).



OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3.CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4.CHECK IGNITION TIMING

Check the following items. Refer to EC-1078, "Basic Inspection".

Items	Specifications
Target idle speed	A/T: 700 ± 50 rpm (in P or N position)
	CVT: 700 ± 50 rpm (in P or N position)
	M/T: 700 ± 50 rpm (in Neutral position)
Ignition timing	A/T: 13 ± 5° BTDC (in P or N position)
	CVT: 13 ± 5° BTDC (in P or N position)
	M/T: 13 ± 5° BTDC (in Neutral position)

OK or NG

OK >> GO TO 5.
NG >> Follow the EC-1078, "Basic Inspection".

5.CHECK FUEL INJECTOR

1. Stop engine and turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check voltage between ECM terminals 25, 29, 30, 31 and ground with CONSULT-III or tester. Refer to Wiring Diagram for fuel injectors, EC-1509, "Wiring Diagram".

Voltage: Battery voltage

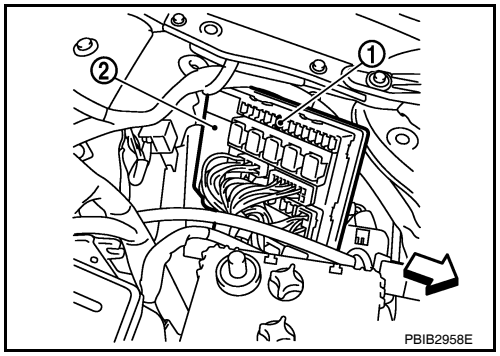
OK or NG

OK >> GO TO 6.
NG >> Perform EC-1510, "Diagnosis Procedure".

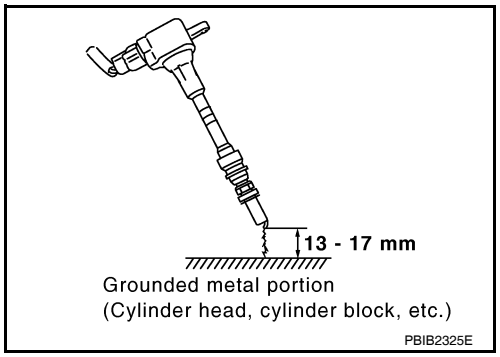
6.CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump (1) fuse in IPDM E/R (2) to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.



- : Vehicle front
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:
- **Do not approach to the spark plug and the ignition coil within 50cm. 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.

OK or NG

OK >> GO TO 10.
NG >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

OK or NG

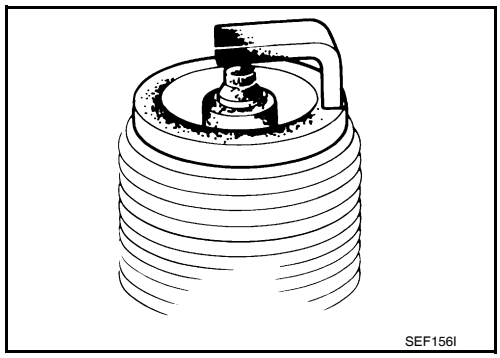
OK >> GO TO 8.
NG >> Check ignition coil, power transistor and their circuits. Refer to EC-1518.

8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

OK or NG

OK >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-227, "Standard and Limit".
NG >> 1. Repair or clean spark plug.
2. GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

OK or NG

OK >> **INSPECTION END**
NG >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-227, "Standard and Limit".

10. CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Remove fuel injector assembly.
   Refer to EM-156, "Removal and Installation".
   Keep fuel hose and all fuel injectors connected to fuel tube.
3. Disconnect all ignition coil harness connectors.
4. Reconnect all fuel injector harness connectors disconnected.
5. Turn ignition switch ON.
   Make sure fuel does not drip from fuel injector.

OK or NG

OK (Does not drip.)>>GO TO 11.
NG (Drips.)>>Replace the fuel injector(s) from which fuel is dripping.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

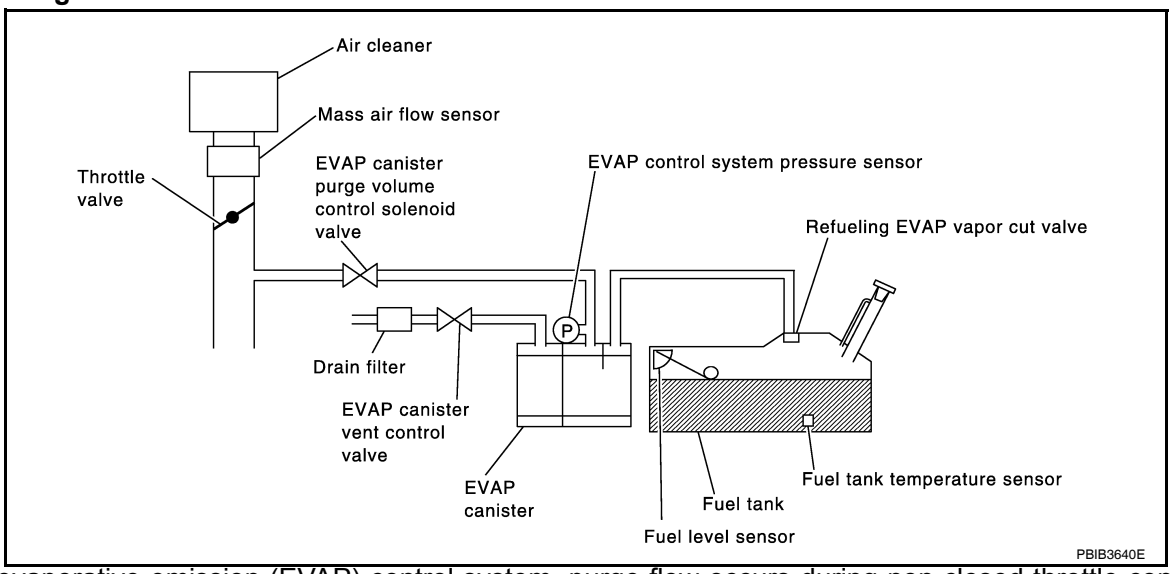
Trouble is fixed.>>**INSPECTION END**
Trouble is not fixed.>>Replace three way catalyst (manifold).

DTC P0441 EVAP CONTROL SYSTEM

System Description

INFOID:0000000004500170

NOTE:
If DTC P0441 is displayed with other DTC such as P2122, P2123 P2127, P2128, P2138, first perform trouble diagnosis for other DTC.



In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

INFOID:0000000004500171

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a malfunction is determined.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0441 0441	EVAP control system incorrect purge flow	• EVAP control system does not operate properly. • EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	• EVAP canister purge volume control solenoid valve stuck closed • EVAP control system pressure sensor and the circuit • Loose, disconnected or improper connection of rubber tube • Blocked rubber tube • Cracked EVAP canister • EVAP canister purge volume control solenoid valve circuit • Accelerator pedal position sensor • Blocked purge port • EVAP canister vent control valve • Drain filter

DTC Confirmation Procedure

INFOID:0000000004500172

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 70 seconds.
4. Select “PURG FLOW P0441” of “EVAPORATIVE SYSTEM” in “DTC CONFIRMATION” mode with CONSULT-III.
5. Touch “START”.
   If “COMPLETED” is displayed, go to step 7.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-III screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 35 seconds.)

Shift lever	Suitable position
VHCL SPEED SE	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,800 rpm
B/FUEL SCHDL	1.0 - 10.0 msec
COOLAN TEMP/S	More than 0°C

If TESTING is not changed for a long time, retry from step 2.

7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-1311, "Diagnosis Procedure".

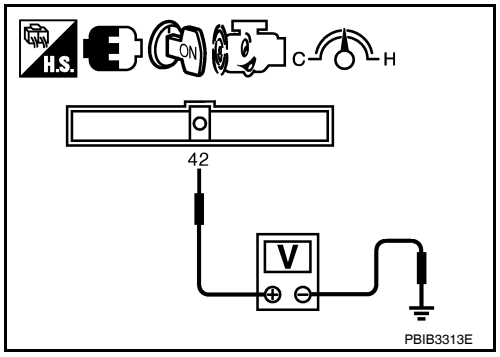
Overall Function Check

INFOID:0000000004500173

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Lift up drive wheels.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and wait at least 70 seconds.
5. Set voltmeter probes to ECM terminals 42 (EVAP control system pressure sensor signal) and ground.
6. Check EVAP control system pressure sensor value at idle speed and note it.
7. Establish and maintain the following conditions for at least 1 minute.



Air conditioner switch	ON
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Shift lever	Any position other than P, N or R

8. Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.
9. If NG, go to EC-1311, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004500174

1.CHECK EVAP CANISTER

1. Turn ignition switch OFF.
2. Check EVAP canister for cracks.

OK or NG

OK (With CONSULT-III)>>GO TO 2.
OK (Without CONSULT-III)>>GO TO 3.
NG >> Replace EVAP canister.

2.CHECK PURGE FLOW

With CONSULT-III

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to EC-1036, "Description".
2. Start engine and let it idle.
3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III.
4. Rev engine up to 2,000 rpm.
5. Touch “Qd” and “Qu” on CONSULT-III screen to adjust “PURG VOL CONT/V” opening and check vacuum existence.

PURG VOL CONT/V	VACUUM
100%	Should exist.
0%	should not exist.

OK or NG

OK >> GO TO 7.
NG >> GO TO 4.

3.CHECK PURGE FLOW

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to EC-1036, "Description".
4. Start engine and let it idle.
   Do not depress accelerator pedal even slightly.
5. Check vacuum gauge indication before 60 seconds passed after starting engine.

   Vacuum should not exist.

6. Revving engine up to 2,000 rpm after 100 seconds passed after starting engine.

   Vacuum should exist.

OK or NG

OK >> GO TO 7.
NG >> GO TO 4.

4.CHECK EVAP PURGE LINE

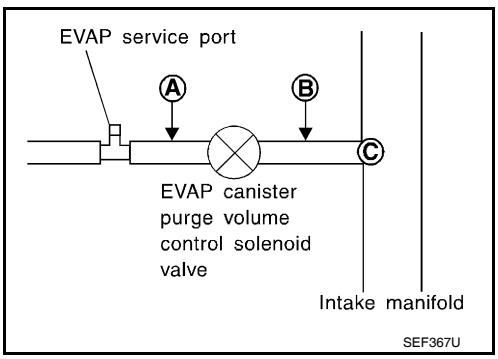
1. Turn ignition switch OFF.
2. Check EVAP purge line for improper connection or disconnection. Refer to EC-1036, "Description".

OK or NG

OK >> GO TO 5.
NG >> Repair it.

5.CHECK EVAP PURGE HOSE AND PURGE PORT

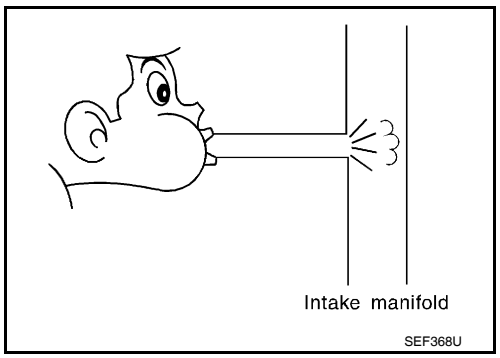
1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.
2. Blow air into each hose and EVAP purge port **C**.



3. Check that air flows freely.

OK or NG

OK (With CONSULT-III)>>GO TO 6.
OK (Without CONSULT-III)>>GO TO 7.
NG >> Repair or clean hoses and/or purge port.



6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III. Check that engine speed varies according to the valve opening.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1334, "Component Inspection".

OK or NG

OK >> GO TO 8.
NG >> Replace EVAP canister purge volume control solenoid valve.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP control system pressure sensor.

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to EC-1351 or DTC P0452 and EC-1359 for DTC P0453.

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.

10. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 11.
NG >> Clean the rubber tube using an air blower.

11. CHECK DRAIN FILTER

Refer to EC-1314, "Component Inspection".

OK or NG

OK >> GO TO 12.
NG >> Replace Drain filter.

12. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-1340, "Component Inspection".

OK or NG

OK >> GO TO 13.
NG >> Replace EVAP canister vent control valve.

13. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to EC-1036, "Description".

OK or NG

OK >> GO TO 14.
NG >> Replace it.

14. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 15.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

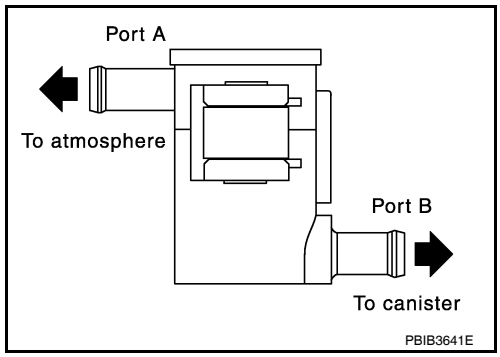
>> **INSPECTION END**

Component Inspection

INFOID:0000000004535232

DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.
7. If NG, replace drain filter.

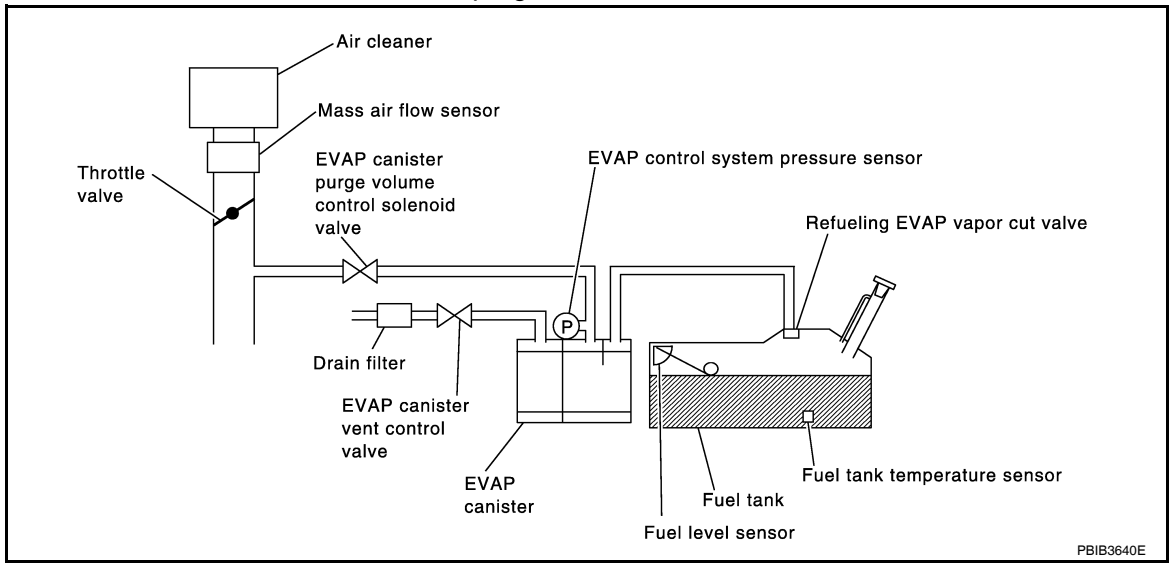


DTC P0442 EVAP CONTROL SYSTEM

On Board Diagnosis Logic

INFOID:0000000004500175

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.
If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following Vacuum test conditions.
The EVAP canister vent control valve is closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve will then be opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0442 0442	EVAP control system small leak detected (negative pressure)	EVAP control system has a leak, EVAP control system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or fails to close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Fuel tank temperature sensor • O-ring of EVAP canister vent control valve is missing or damaged • Drain filter • EVAP canister is saturated with water • EVAP control system pressure sensor • Fuel level sensor and the circuit • Refueling EVAP vapor cut valve • ORVR system leaks

CAUTION:
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC Confirmation Procedure

INFOID:0000000004500176

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**
- **Open engine hood before conducting following procedure.**

WITH CONSULT-III

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
4. Check the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 30°C (32 - 86°F)
5. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
   Follow the instruction displayed.
   NOTE:
   If the engine speed cannot be maintained within the range displayed on the CONSULT-III screen, go to EC-1078, "Basic Inspection".
6. Make sure that "OK" is displayed.
   If "NG" is displayed, refer to EC-1316, "Diagnosis Procedure".
   NOTE:
   Make sure that EVAP hoses are connected to the EVAP canister purge volume control solenoid valve properly.

WITH GST

NOTE:
Be sure to read the explanation of Driving Pattern on EC-1052, "Emission-related Diagnostic Information" before driving vehicle.
1. Start engine.
2. Drive vehicle according to Driving Pattern, EC-1052, "Emission-related Diagnostic Information".
3. Stop vehicle.
4. Turn ignition switch OFF and wait at least 10 seconds and then turn ignition switch ON.
5. Select Service $07 with GST.

- If P0442 is displayed on the screen, go to EC-1316, "Diagnosis Procedure".
- If P0441 is displayed on the screen, go to EC-1311, "Diagnosis Procedure" for DTC P0441.

Diagnosis Procedure

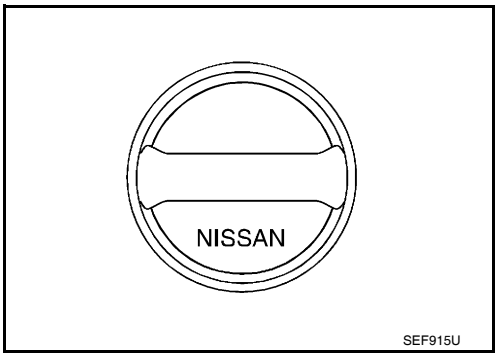
INFOID:0000000004500177

1.CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.

OK or NG

OK >> GO TO 2.
NG >> Replace with genuine NISSAN fuel filler cap.



2.CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK >> GO TO 3.
NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
2. Retighten until reteaching sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-1038, "Component Inspection".

OK or NG

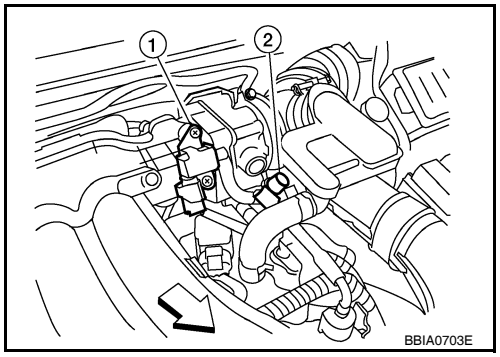
OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

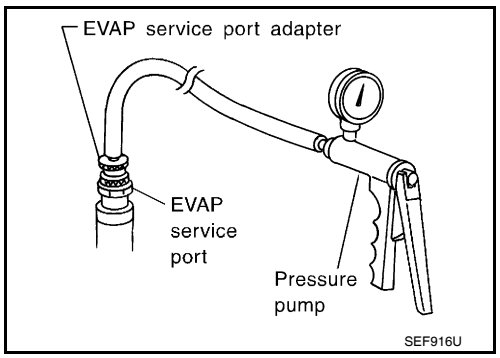
5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.
For the location of EVAP service port (2), refer to EC-1036, "Description".

- EVAP canister purge volume control solenoid valve (1)
- : Vehicle front

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.





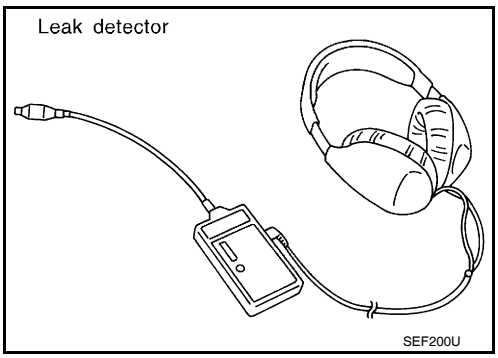
With CONSULT-III>>GO TO 6.
Without CONSULT-III>>GO TO 7.

6. CHECK FOR EVAP LEAK

With CONSULT-III

1. Turn ignition switch ON.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-III.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   CAUTION:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-1036, "Description".



OK or NG

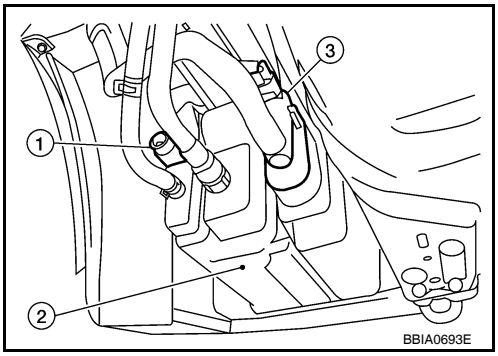
OK >> GO TO 8.
NG >> Repair or replace.

7. CHECK FOR EVAP LEAK

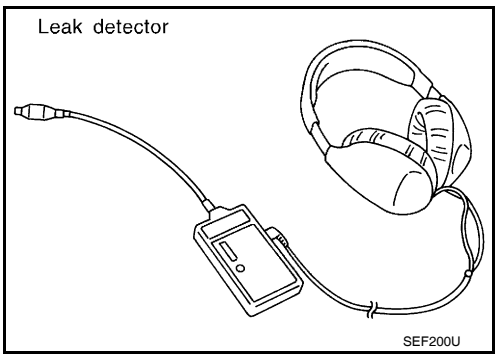
Without CONSULT-III

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
- EVAP control system pressure sensor (1)
- EVAP canister (2)
- EVAP canister vent control valve (3)
3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

CAUTION:
- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-1036, "Description".



OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK DRAIN FILTER

Refer to EC-1321, "Component Inspection".

OK or NG

OK >> GO TO 9.
NG >> Replace drain filter.

9. CHECK EVAP CANISTER VENT CONTROL VALVE

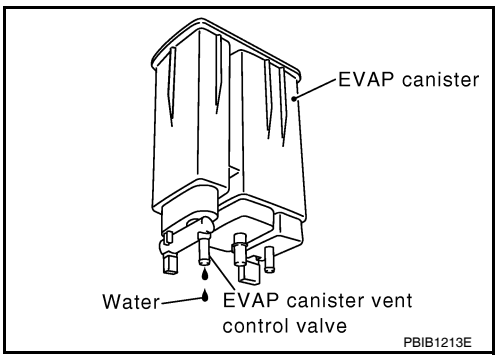
Check the following,
- EVAP canister vent control valve is installed properly.
  Refer to EC-1040, "Removal and Installation".
- EVAP canister vent control valve.
  Refer to EC-1340, "Component Inspection".

OK or NG

OK >> GO TO 10.
NG >> Repair or replace EVAP canister vent control valve and O-ring.

10. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Does water drain from the EVAP canister?



Yes or No

Yes >> GO TO 11.
No (With CONSULT-III)>>GO TO 13.
No (Without CONSULT-III)>>GO TO 14.

11. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensorattached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK (With CONSULT-III)>>GO TO 13.
OK (Without CONSULT-III)>>GO TO 14.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose connected to EVAP canister for clogging or poor connection

>> Repair hose or replace EVAP canister.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-III screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum.

Vacuum should exist.

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

15. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-1106, "Vacuum Hose Drawing".

OK or NG

OK >> GO TO 16.
NG >> Repair or reconnect the hose.

16. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1334, "Component Inspection".

OK or NG

OK >> GO TO 17.
NG >> Replace EVAP canister purge volume control solenoid valve.

17. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-1273, "Component Inspection".

OK or NG

OK >> GO TO 18.
NG >> Replace fuel level sensor unit.

18. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1350, "Component Inspection".

OK or NG

OK >> GO TO 19.
NG >> Replace EVAP control system pressure sensor.

19. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-1036.

OK or NG

OK >> GO TO 20.
NG >> Repair or reconnect the hose.

20. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 21.

21. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-1042.

OK or NG

OK >> GO TO 22.
NG >> Repair or replace hoses and tubes.

22. CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 23.
NG >> Repair or replace hoses, tubes or filler neck tube.

23. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-1045, "Component Inspection".

OK or NG

OK >> GO TO 24.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

24. CHECK FUEL LEVEL SENSOR

Refer to DI-19.

OK or NG

OK >> GO TO 25.
NG >> Replace fuel level sensor unit.

25. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

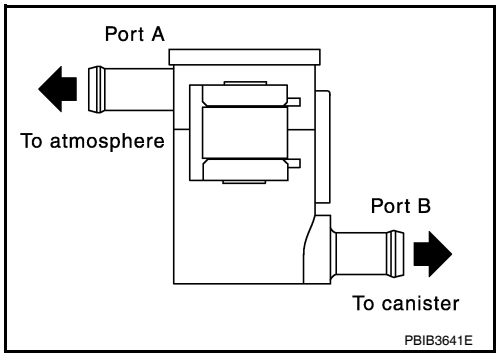
>> **INSPECTION END**

Component Inspection

INFOID:0000000004535233

DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.
7. If NG, replace drain filter.



DTC P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:0000000004500178

SYSTEM DESCRIPTION

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)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
ABS actuator and electric unit (control unit)	Vehicle speed*2		
Combination meter			

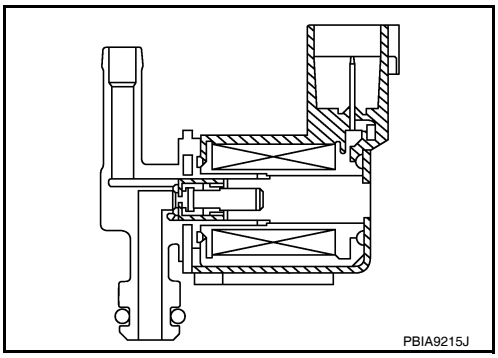
*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to the ECM though CAN communication line.

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve 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.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004500179

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	• Engine: After warming up • Shift lever: P or N (A/T, CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle (Accelerator pedal is not depressed even slightly, after engine starting)	0%
		2,000 rpm	0 - 50%

On Board Diagnosis Logic

INFOID:0000000004500180

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0443 0443	EVAP canister purge volume control solenoid valve	A)	The canister purge flow is detected during the vehicle is stopped while the engine is running, even when EVAP canister purge volume control solenoid valve is completely closed.	• EVAP control system pressure sensor • EVAP canister purge volume control solenoid valve (EVAP canister purge volume control solenoid valve is stuck open.) • EVAP canister vent control valve • Drain filter • EVAP canister • Hoses (Hoses are connected incorrectly or clogged.)
		B)	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	

DTC Confirmation Procedure

INFOID:0000000004500181

Perform PROCEDURE FOR MALFUNCTION A first.
If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

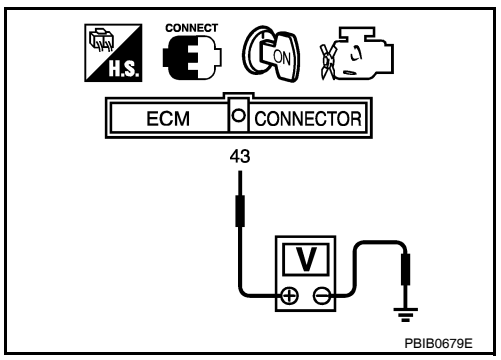
TESTING CONDITION:
- Perform "DTC Confirmation Procedure" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.
- Always perform test at a temperature of 5 to 60°C (41 to 140°F).
- Cool the vehicle so that engine coolant temperature becomes same level as ambient temperature.

With CONSULT-III

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
2. Check that the following condition are met.
   FUEL T/TMP SE: 0 – 35°C (32 – 95°F)
3. Start engine and wait at least 60 seconds.
4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to EC-1326, "Diagnosis Procedure".

With GST

1. Turn ignition switch ON.
2. Set voltmeter probes to ECM terminal 43 (FTT sensor signal) and ground.
3. Check that the voltage is 3.1 – 4.2 V.
4. Start engine and wait at least 60 seconds.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to EC-1326, "Diagnosis Procedure".



PROCEDURE FOR MALFUNCTION B

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “PURG VOL CN/V P1444” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-III.
5. Touch “START”.
6. Start engine and let it idle until “TESTING” on CONSULT-III changes to “COMPLETED”. (It will take approximately 10 seconds.)
   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-1326, "Diagnosis Procedure".

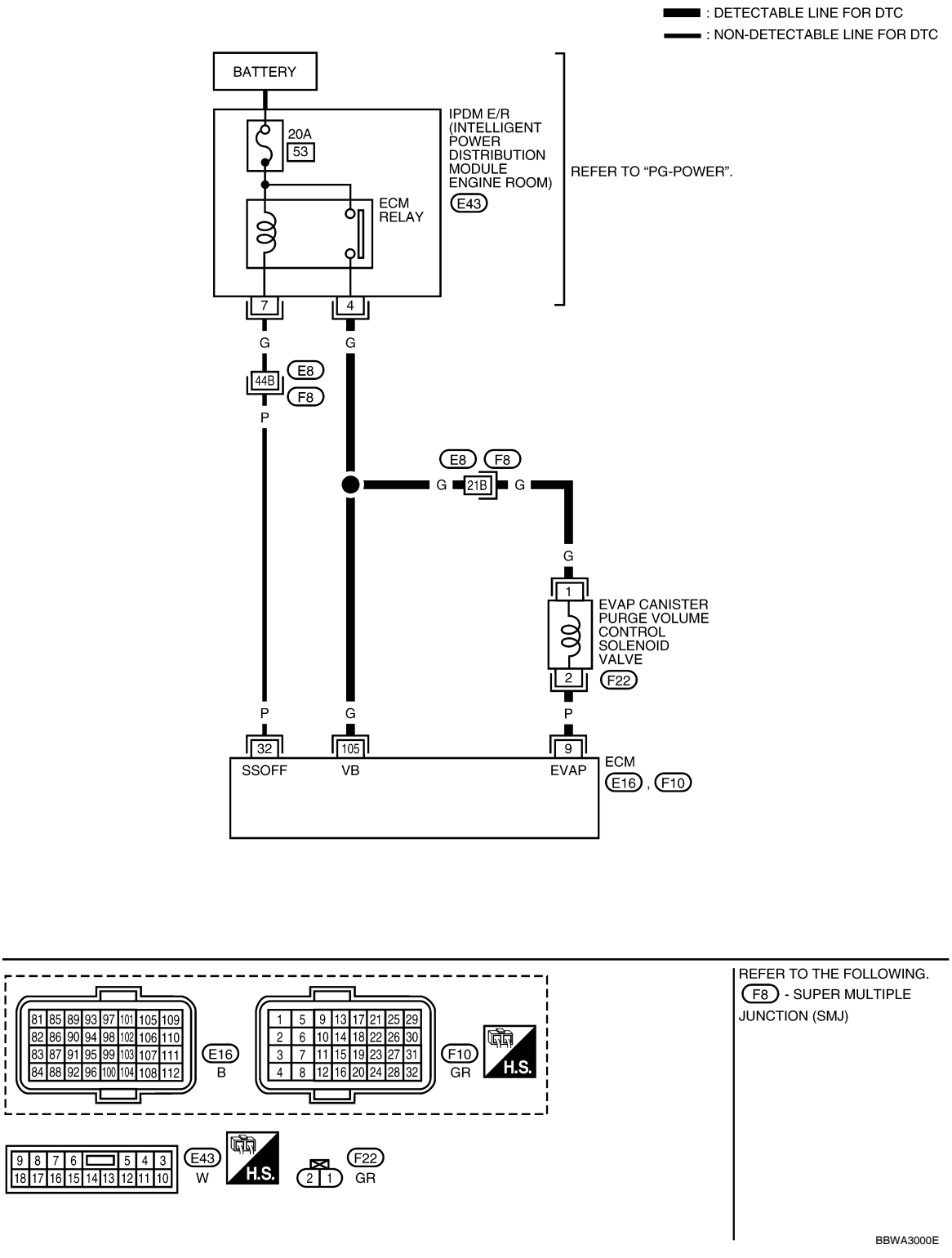
With GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 20 seconds.
4. Select Service $07 with GST.
5. If 1st trip DTC is detected, go to EC-1326, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004500182

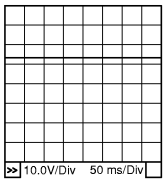
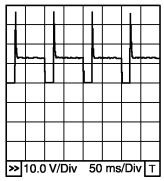
EC-PGC/V-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
9	P	EVAP canister purge volume control solenoid valve	**[Engine is running]** • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting.	BATTERY VOLTAGE (11 - 14V)  PBIB0050E
			[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V  PBIB0520E
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For 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)
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

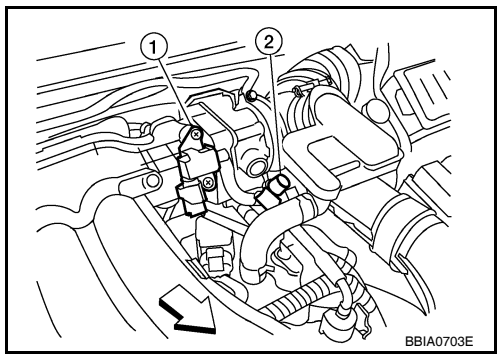
INFOID:0000000004500183

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve (1) harness connector.

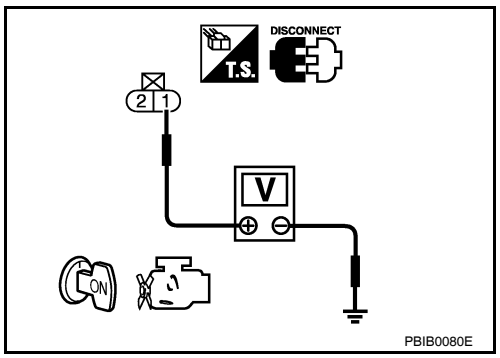
- EVAP service port (2)
- : Vehicle front

3. Turn ignition switch ON.



BBIA0703E

4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R

>> 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 harness continuity between ECM terminal 9 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

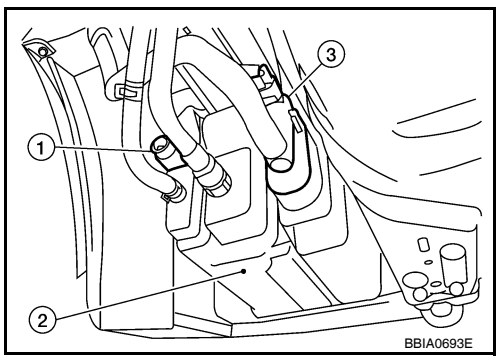
4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
- EVAP control system pressure sensor (1)
- EVAP canister (2)
- EVAP canister vent control valve (3)
2. Check connectors for water.



Water should not exist.

OK or NG

OK >> GO TO 5.
NG >> Replace EVAP control system pressure sensor.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1350, "Component Inspection".

OK or NG

OK (With CONSULT-III)>>GO TO 6.
OK (Without CONSULT-III)>>GO TO 7.
NG >> Replace EVAP control system pressure sensor.

6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Start engine.

4. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III. Check that engine speed varies according to the valve opening.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1329, "Component Inspection".

OK or NG

OK >> GO TO 8.
NG >> Replace EVAP canister purge volume control solenoid valve.

8. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 9.
NG >> Clean the rubber tube using an air blower.

9. CHECK DRAIN FILTER

Refer to EC-1314, "Component Inspection".

OK or NG

OK >> GO TO 10.
NG >> Replace drain filter.

10. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-1340, "Component Inspection".

OK or NG

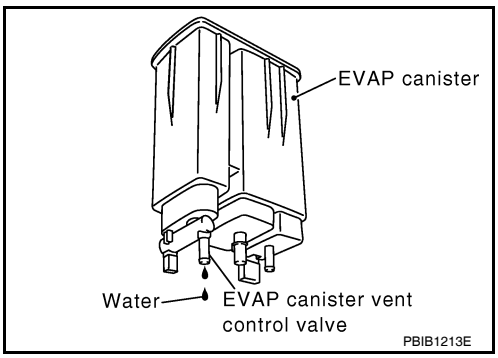
OK >> GO TO 11.
NG >> Replace EVAP canister vent control valve.

11. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Does water drain from the EVAP canister?

YES or NO

YES >> GO TO 12.
NO >> GO TO 14.



12. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage

• EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

Component Inspection

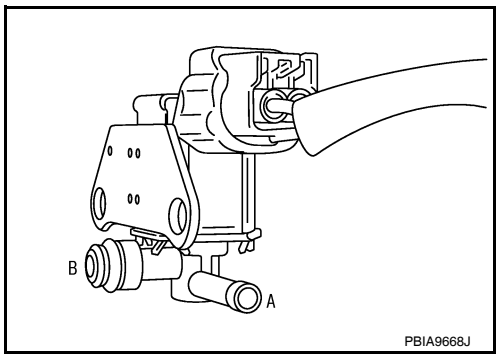
INFOID:0000000004500184

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

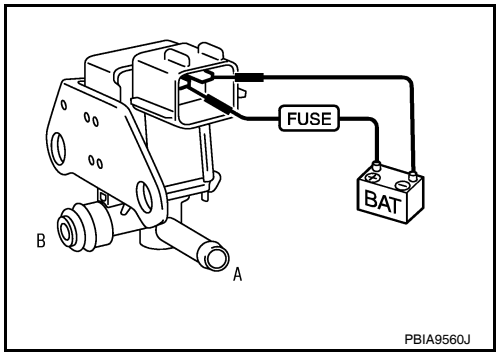
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100%	Yes
0%	No



Without CONSULT-III

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No



Removal and Installation

INFOID:0000000004500185

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EM-141, "Component".

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:0000000004501184

SYSTEM DESCRIPTION

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)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
ABS actuator and electric unit (control unit)	Vehicle speed*2		
Combination meter			

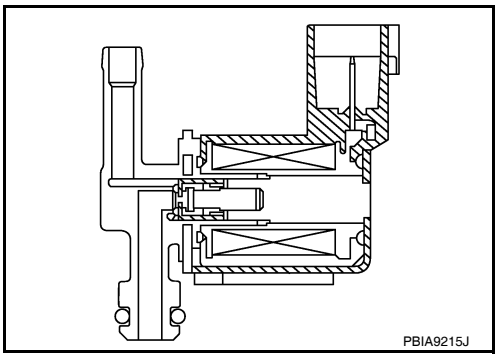
*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to the ECM though CAN communication line.

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve 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.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004501185

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	• Engine: After warming up • Shift lever: P or N (A/T, CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle (Accelerator pedal is not depressed even slightly, after engine starting)	0%
		2,000 rpm	0 - 50%

On Board Diagnosis Logic

INFOID:0000000004500188

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444 0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	• Harness or connectors (EVAP canister purge volume control solenoid valve circuit is open or shorted.) • EVAP canister purge volume control solenoid valve
P0445 0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	• Harness or connectors (EVAP canister purge volume control solenoid valve circuit is shorted.) • EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

INFOID:0000000004500189

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

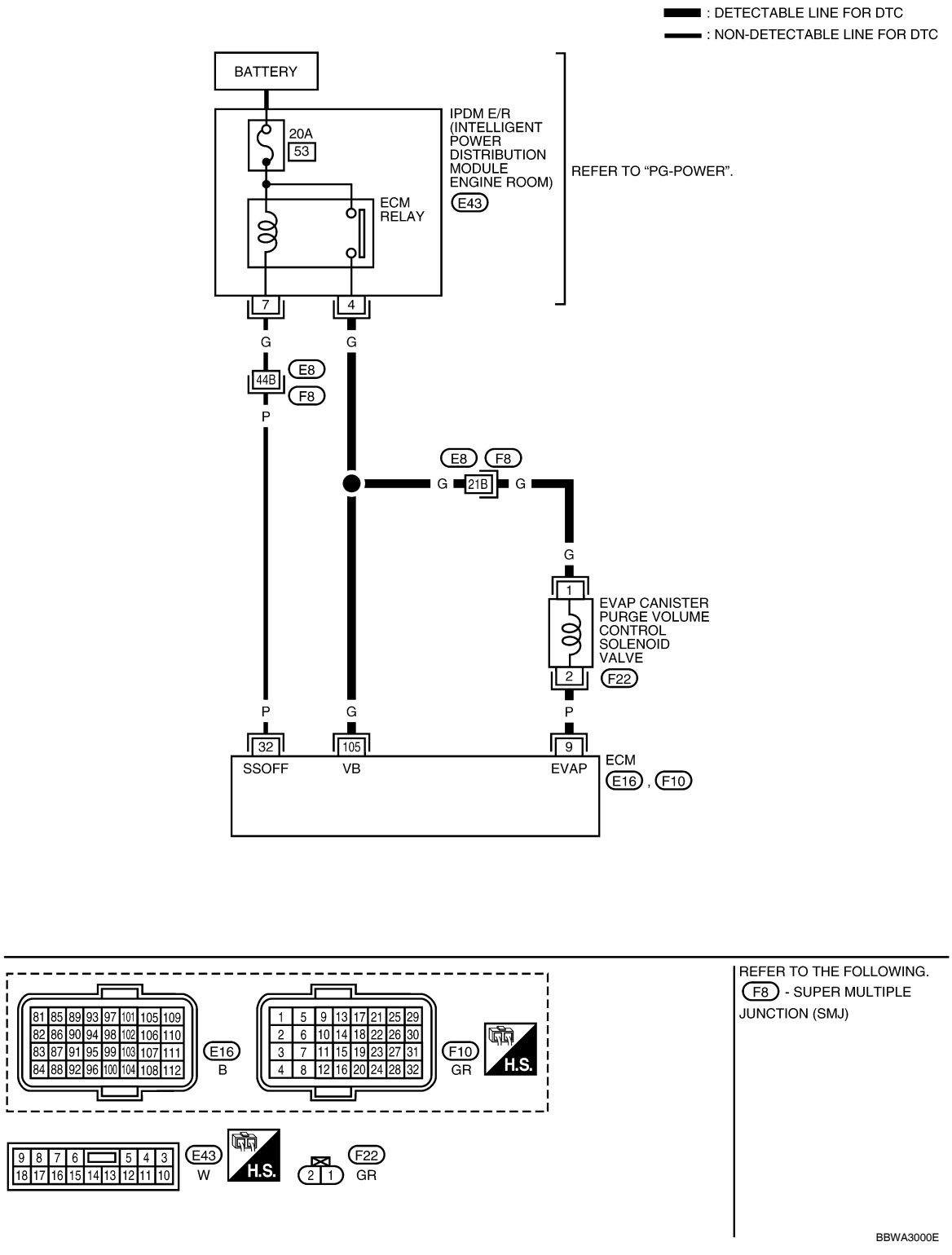
TESTING CONDITION:
Before performing the following procedure, confirm battery voltage is more than 11V at idle.

1. Start engine and let it idle for at least 13 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-1333, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004501186

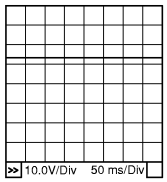
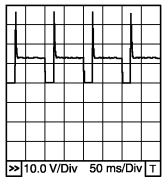
EC-PGC/V-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
9	P	EVAP canister purge volume control solenoid valve	**[Engine is running]** • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting.	BATTERY VOLTAGE (11 - 14V)  PBIB0050E
			[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V  PBIB0520E
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For 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)
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

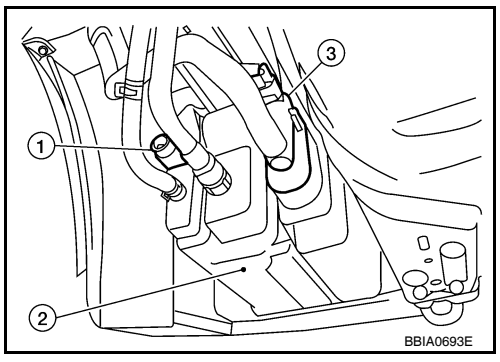
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004500191

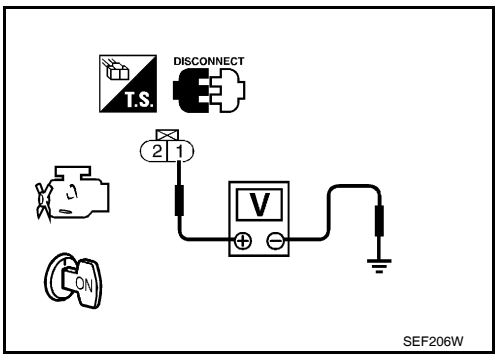
1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve (1) harness connector.
- EVAP canister port (2)
3. Turn ignition switch ON.



BBIA0693E

4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between EVAP canister purge volume control solenoid valve and IPDM E/R

>> 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 harness continuity between ECM terminal 9 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK (With CONSULT-III)>>GO TO 4.
OK (Without CONSULT-III)>>GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

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.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1329, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace EVAP canister purge volume control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

Component Inspection

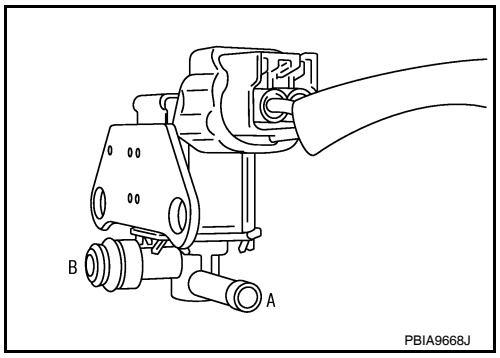
INFOID:0000000004501187

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

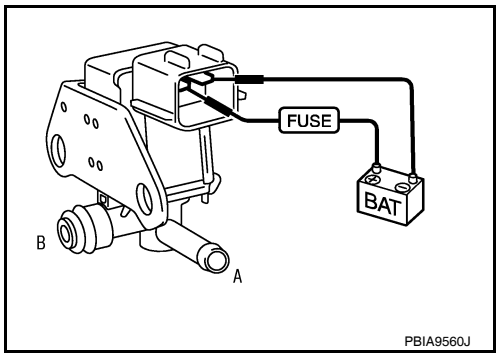
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100%	Yes
0%	No



Without CONSULT-III

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No



Removal and Installation

INFOID:0000000004501188

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

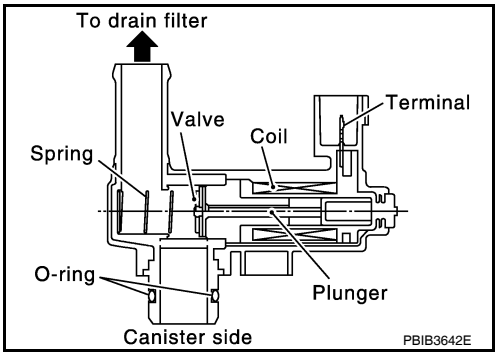
Refer to EM-141, "Component".

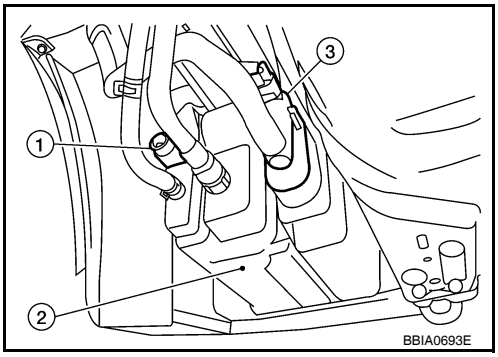
DTC P0447 EVAP CANISTER VENT CONTROL VALVE

Component Description

INFOID:0000000004500194

The EVAP canister vent control valve (3) is located on the EVAP canister (2) and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows EVAP control system diagnoses.
- EVAP control system pressure sensor (1)





CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004500195

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

INFOID:0000000004500196

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0447 0447	EVAP canister vent control valve circuit open	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	• Harness or connectors (EVAP canister vent control valve circuit is open or shorted.) • EVAP canister vent control valve • Drain filter

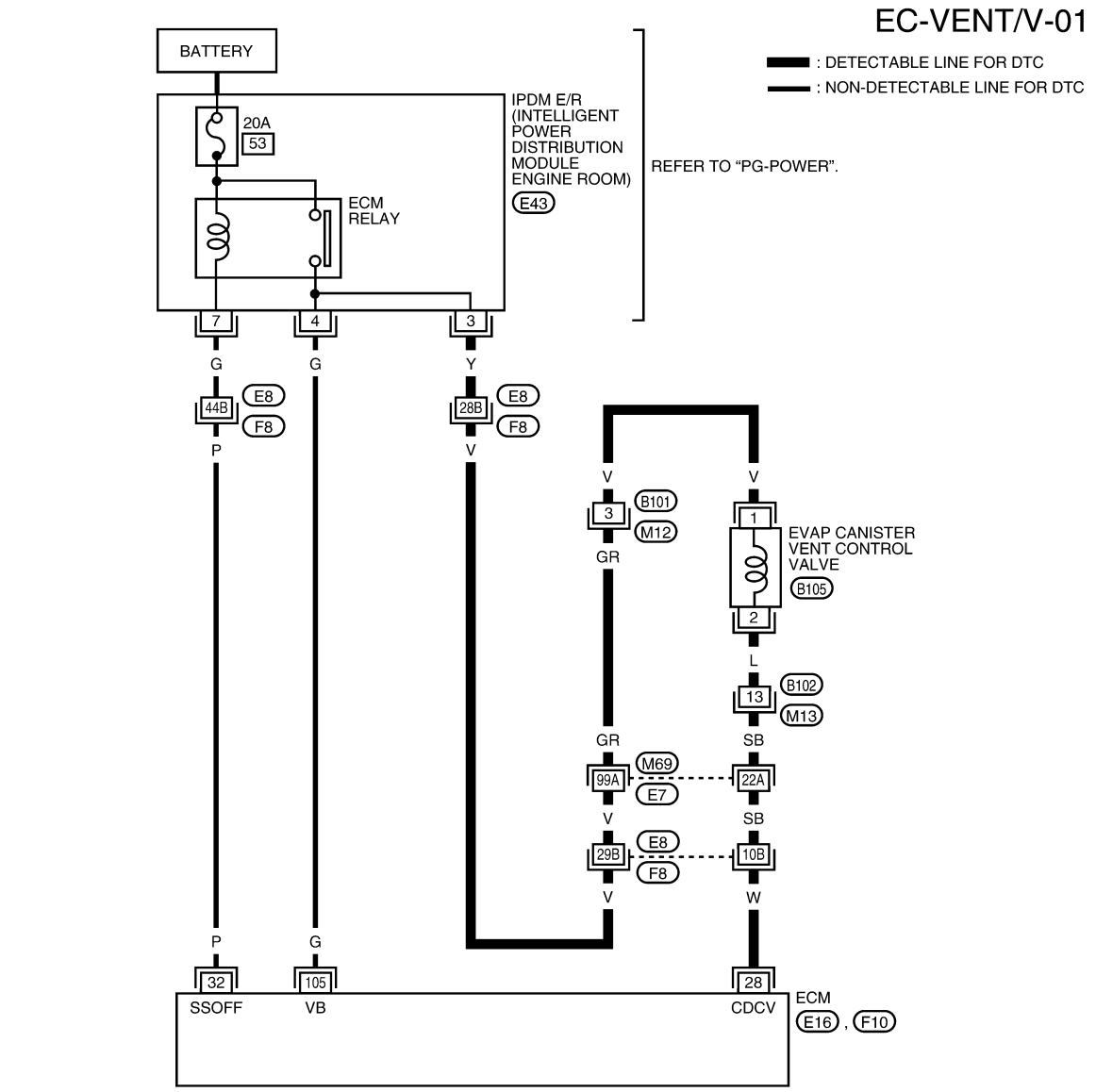
DTC Confirmation Procedure

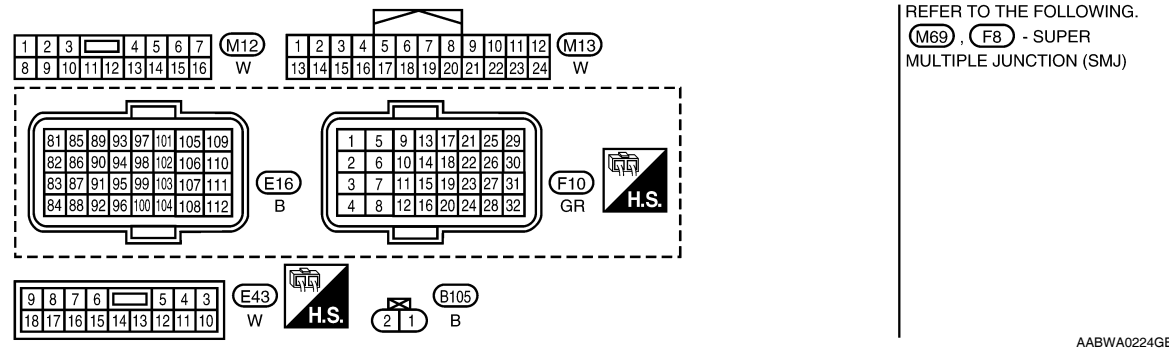
INFOID:0000000004500197

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm battery voltage is more than 11V at idle.
1. Start engine and wait at least 8 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-1338, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004500198





Specification data are reference values and are measured between each terminal 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.

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	W	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For 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)
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:0000000004500199

1.INSPECTION START

1. Do you have CONSULT-III?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2.CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

With CONSULT-III

1. Turn ignition switch OFF and then turn ON.
2. Select “VENT CONTROL/V” in “ACTIVE TEST” mode with CONSULT-III.
3. Touch “ON/OFF” on CONSULT-III screen.
4. Check for operating sound of the valve.

Clicking noise should be heard.

OK or NG

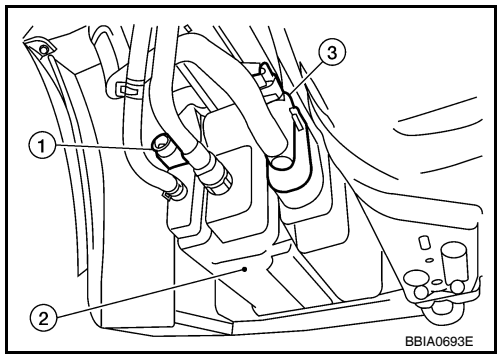
OK >> GO TO 8.
NG >> GO TO 3.

3.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

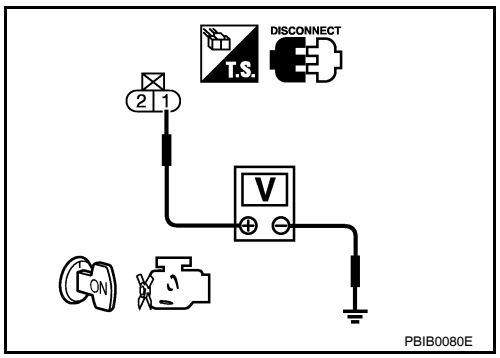
1. Turn ignition switch OFF.
2. Disconnect EVAP canister vent control valve (3) harness connector.

- EVAP control system pressure sensor (1)
- EVAP canister (2)

3. Turn ignition switch ON.



4. Check voltage between EVAP canister vent control valve terminal 1 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors E7, M69
- Harness connectors M12, B101
- 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.

5. 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 harness continuity between ECM terminal 28 and EVAP canister vent control valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors E7, M69
- Harness connectors M13, B102
- Harness for open or short between EVAP canister vent control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 8.
NG >> Clean the rubber tube using an air blower.

8. CHECK DRAIN FILTER

Refer to EC-1314, "Component Inspection".

OK or NG

OK >> GO TO 9.
NG >> Replace drain filter.

9. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-1340, "Component Inspection".

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP canister vent control valve.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

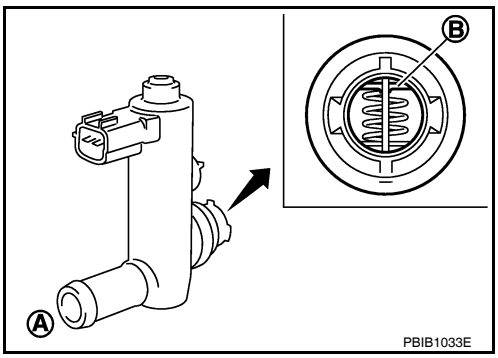
Component Inspection

INFOID:0000000004500200

EVAP CANISTER VENT CONTROL VALVE

With CONSULT-III

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.
   If NG, replace EVAP canister vent control valve.
   If OK, go to next step.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch ON.



5. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
6. Check air passage continuity and operation delay time.
   Make sure new O-ring is installed properly.

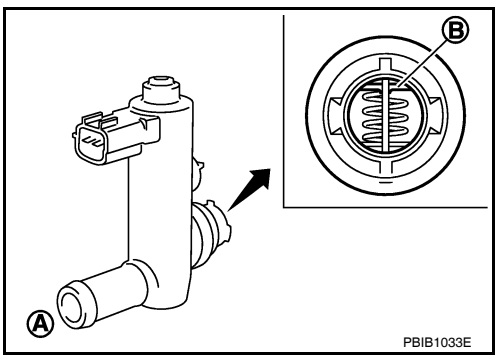
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.
If NG, go to next step.

7. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform step 6 again.
   If NG, replace EVAP canister vent control valve.

Without CONSULT-III

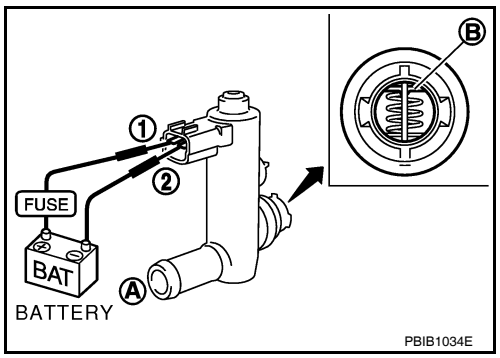
1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



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
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.
If NG, go to next step.



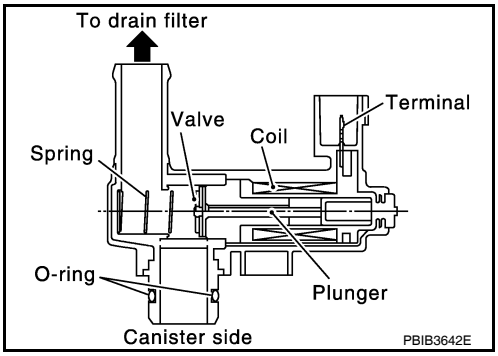
4. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform step 3 again.
If NG, replace EVAP canister vent control valve.

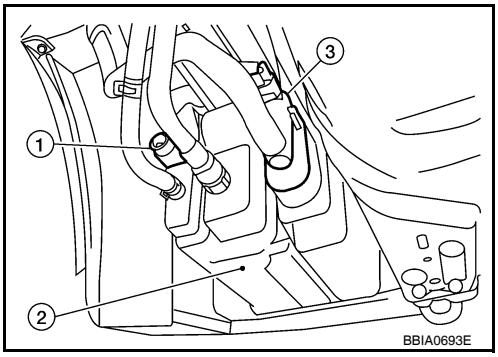
DTC P0448 EVAP CANISTER VENT CONTROL VALVE

Component Description

INFOID:0000000004501189

The EVAP canister vent control valve (3) is located on the EVAP canister (2) and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows EVAP control system diagnoses.
- EVAP control system pressure sensor (1)





CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004501190

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	• Ignition switch: ON	OFF

On Board Diagnosis Logic

INFOID:0000000004500203

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0448 0448	EVAP canister vent control valve close	EVAP canister vent control valve remains closed under specified driving conditions.	• EVAP canister vent control valve • EVAP control system pressure sensor and the circuit • Blocked rubber tube to EVAP canister vent control valve • Drain filter • EVAP canister is saturated with water

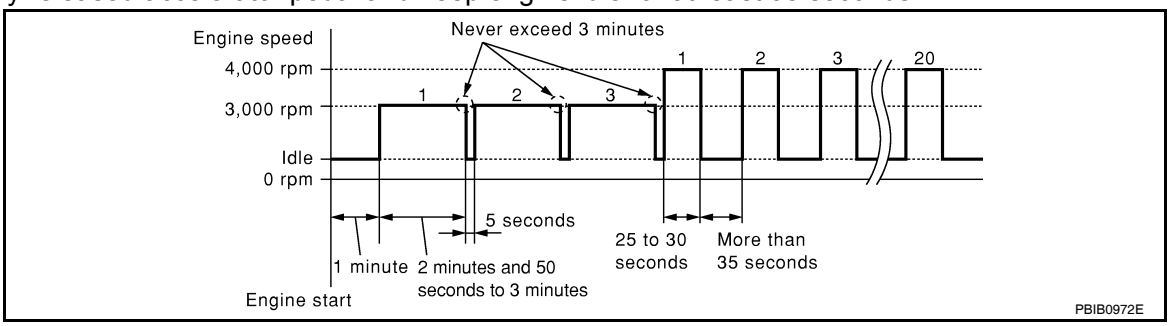
DTC Confirmation Procedure

INFOID:0000000004500204

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 1 minute.
4. Repeat next procedures three times.

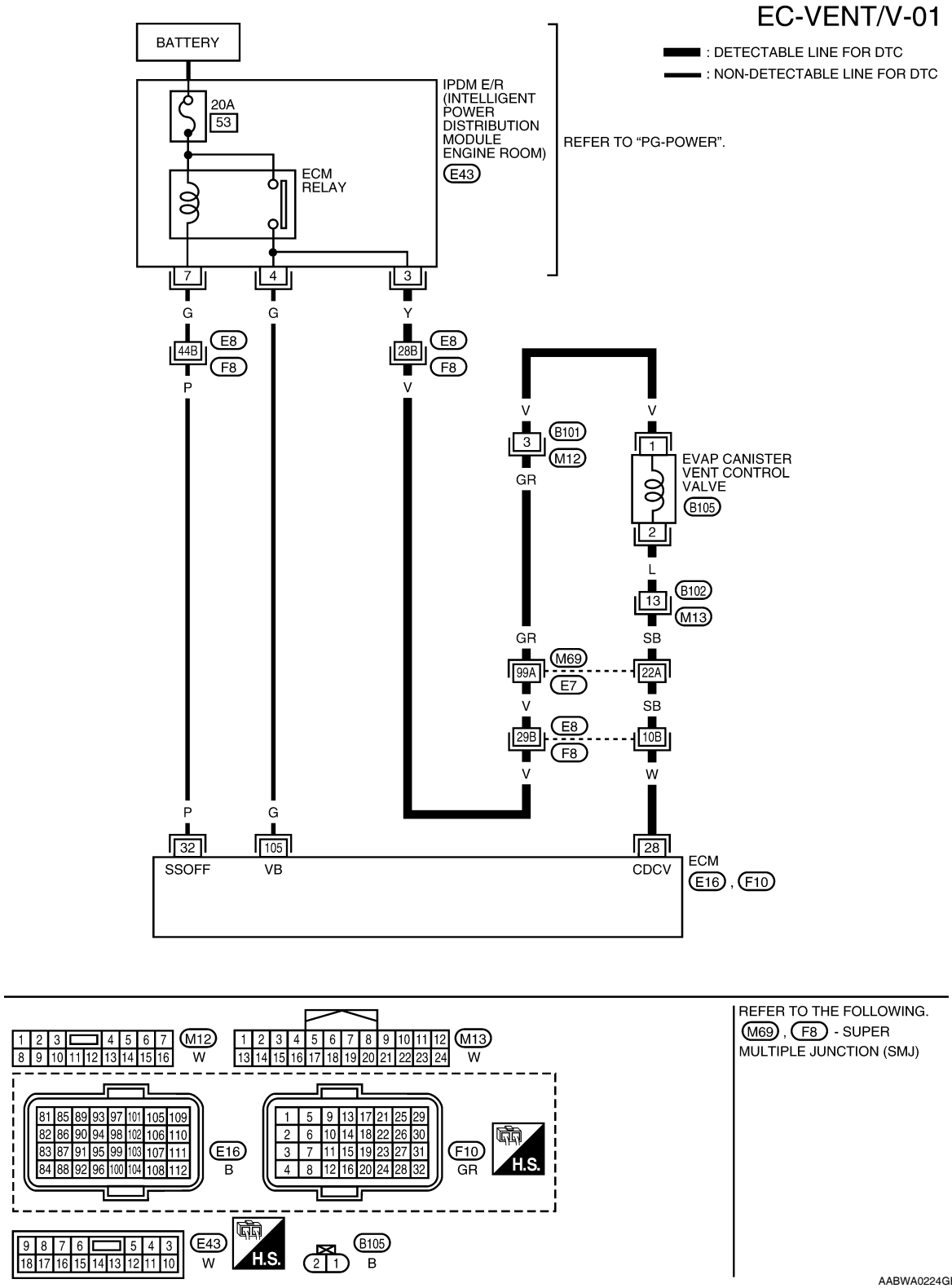
a. Increase the engine speed up to 3,000 to 3,500 rpm and keep it for 2 minutes and 50 seconds to 3 minutes.
Never exceed 3 minutes.
b. Fully released accelerator pedal and keep engine idle for about 5 seconds.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to EC-1345, "Diagnosis Procedure".
If 1st trip DTC is not detected, go to the next step.
7. Repeat next procedure 20 times.
a. Quickly increase the engine speed up to 4,000 to 4,500 rpm or more and keep it for 25 to 30 seconds.
b. Fully released accelerator pedal and keep engine idle for at least 35 seconds.



8. Check 1st trip DTC.
9. If 1st trip DTC is detected, go to EC-1345, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004501191



Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
28	W	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For 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)
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

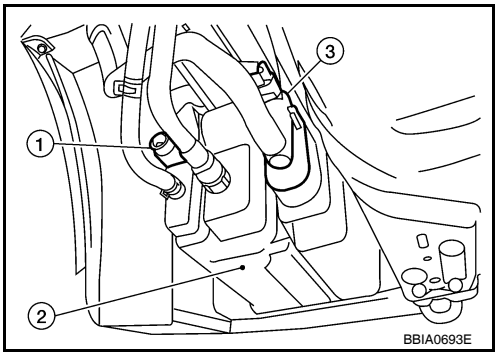
Diagnosis Procedure

INFOID:0000000004500206

1.CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Disconnect rubber tube connected to EVAP canister vent control valve (3).
3. Check the rubber tube for clogging.

- EVAP control system pressure sensor (1)
- EVAP canister (2)



OK or NG

OK >> GO TO 2.
NG >> Clean rubber tube using an air blower.

2.CHECK DRAIN FILTER

Refer to EC-1314, "Component Inspection".

OK or NG

OK >> GO TO 3.
NG >> Replace drain filter.

3.CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-1340, "Component Inspection".

OK or NG

OK >> GO TO 4.
NG >> Replace EVAP canister vent control valve.

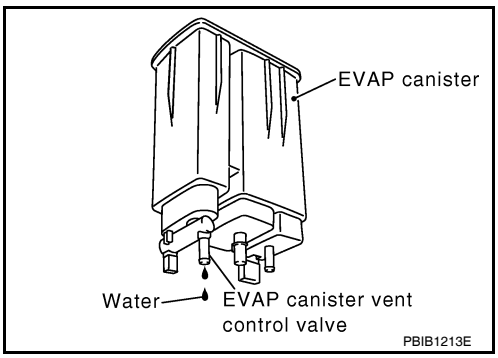
4.CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.

2. Does water drain from the EVAP canister.

Yes or No

Yes >> GO TO 5.
No >> GO TO 7.



5. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

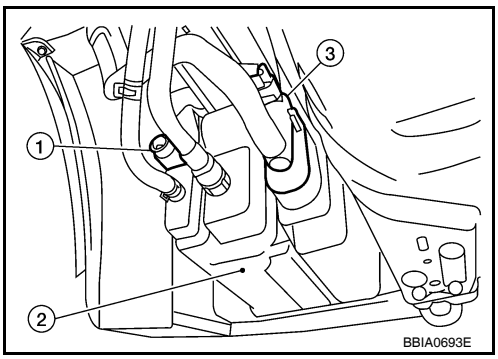
- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor (1) harness connector.
- EVAP canister (2)
- EVAP canister vent control valve (3)
2. Check connectors for water.

Water should not exist.



OK or NG

OK >> GO TO 8.
NG >> Replace EVAP control system pressure sensor.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1350, "Component Inspection".

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP control system pressure sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

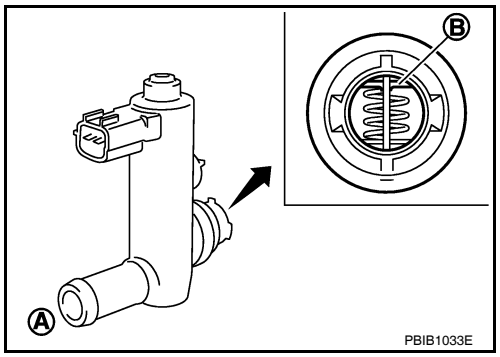
Component Inspection

INFOID:0000000004501192

EVAP CANISTER VENT CONTROL VALVE

With CONSULT-III

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.
   If NG, replace EVAP canister vent control valve.
   If OK, go to next step.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch ON.



5. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
6. Check air passage continuity and operation delay time.
   Make sure new O-ring is installed properly.

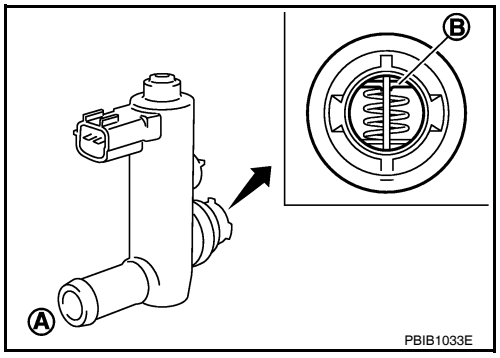
Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

Operation takes less than 1 second.
If NG, go to next step.

7. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform step 6 again.
   If NG, replace EVAP canister vent control valve.

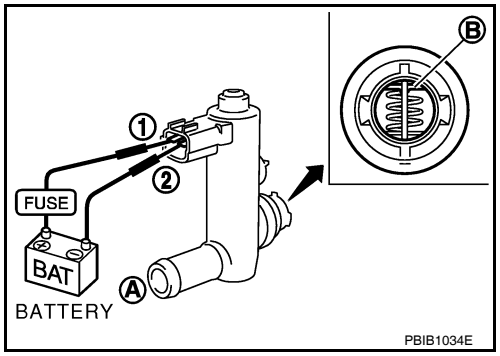
Without CONSULT-III

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
12V direct current supply between terminals 1 and 2	No
OFF	Yes



Operation takes less than 1 second.
If NG, go to next step.

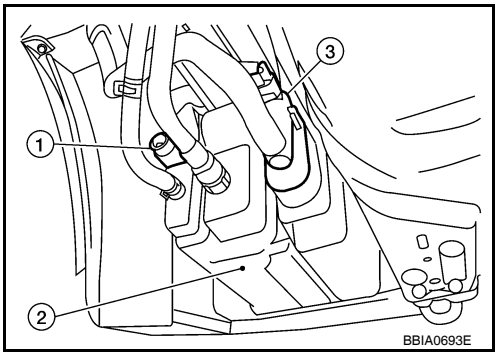
4. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform step 3 again.
   If NG, replace EVAP canister vent control valve.

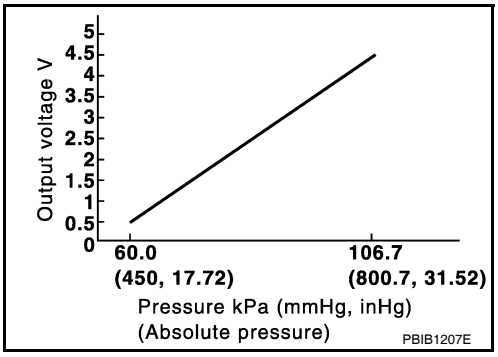
DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

Component Description

INFOID:0000000004500208

The EVAP control system pressure sensor (1) detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.
- EVAP canister (2)
- EVAP canister vent control valve (3)





CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004500209

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 1.8 - 4.8V

On Board Diagnosis Logic

INFOID:0000000004500210

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0451 0451	EVAP control system pressure sensor performance	ECM detects a sloshing signal from the EVAP control system pressure sensor	• Harness or connectors [Crankshaft position sensor (POS) circuit is shorted.] (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Crankshaft position sensor (POS) • Accelerator pedal position sensor • Refrigerant pressure sensor

DTC Confirmation Procedure

INFOID:0000000004500211

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and wait at least 40 seconds.
   NOTE:

Do not depress accelerator pedal even slightly.

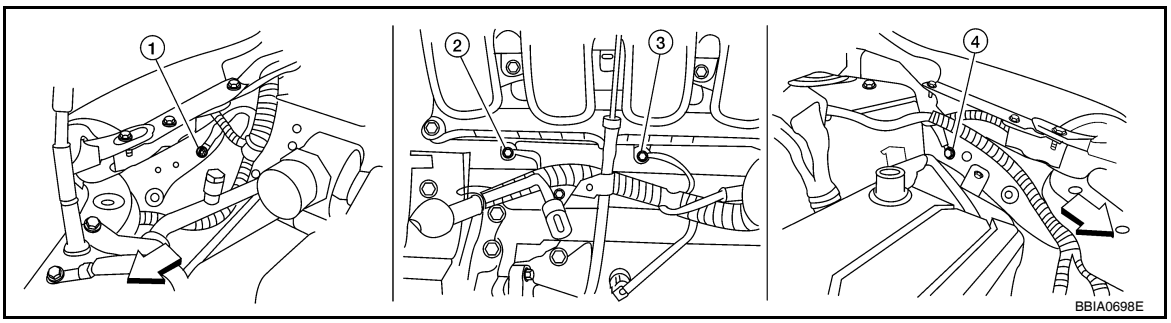
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-1349, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004500212

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

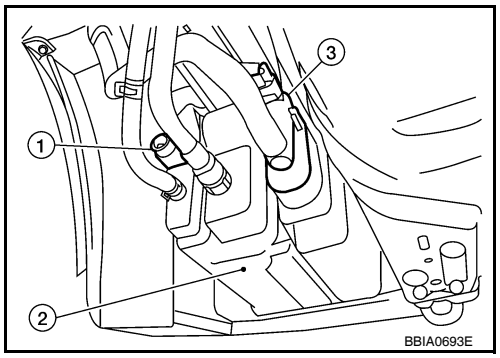
1. Body ground E24
2. Engine ground F9
3. engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK EVPA CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

1. Disconnect EVAP control system pressure sensor (1) harness connector.
- EVAP canister (2)
- EVAP canister vent control valve (3)
2. Check sensor harness connector for water.



Water should not exist.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace harness connector.

3.CHECK COMPONENTS POWER SUPPLY

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
74	Refrigerant pressure sensor terminal 3	EC-1528, "Wiring Diagram"
75	Crankshaft position sensor (POS) terminal 1	EC-1294, "Wiring Diagram"
76	EVAP control system pressure sensor terminal 3	EC-1353, "Wiring Diagram"
102	APP sensor terminal 5	EC-1471, "Wiring Diagram"

OK or NG

OK >> GO TO 4.
NG >> Repair short to ground or short to power in harness or connectors.

4.CHECK COMPONENTS

Check the following.

- Refrigerant pressure sensor (Refer to MTC-37.)
- Crankshaft position sensor (POS) (Refer to EC-1298, "Component Inspection".)

OK or NG

OK >> GO TO 5.
NG >> Replace malfunctioning components.

5.CHECK APP SENSOR

Refer to EC-1468, "Component Inspection".

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-1084, "Accelerator Pedal Released Position Learning".
3. Perform EC-1084, "Throttle Valve Closed Position Learning".
4. Perform EC-1084, "Idle Air Volume Learning".

>> **INSPECTION END**

7.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1350, "Component Inspection".

OK or NG

OK >> GO TO 8.
NG >> Replace EVAP control system pressure sensor.

8.CHECK INTERMITTENT INCIDENT

Refer to EC-1138.
For wiring diagram, refer to EC-1353, "Wiring Diagram".

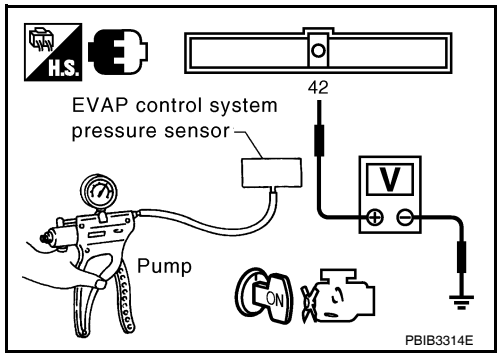
>> **INSPECTION END**

Component Inspection

INFOID:0000000004500213

EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 42 (EVAP control system pressure sensor signal) and ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**

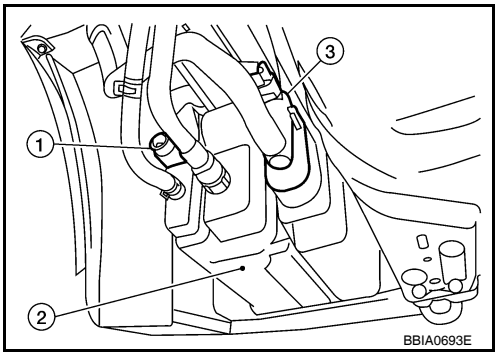
4. If NG, replace EVAP control system pressure sensor.

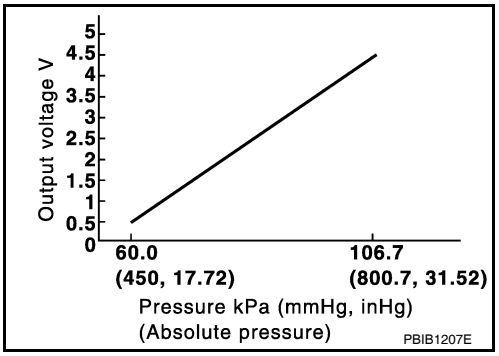
DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

Component Description

INFOID:0000000004501193

The EVAP control system pressure sensor (1) detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.
- EVAP canister (2)
- EVAP canister vent control valve (3)





CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004501194

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 1.8 - 4.8V

On Board Diagnosis Logic

INFOID:0000000004500216

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0452 0452	EVAP control system pressure sensor low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Crankshaft position sensor (POS) • Accelerator pedal position sensor • Refrigerant pressure sensor

DTC Confirmation Procedure

INFOID:0000000004500217

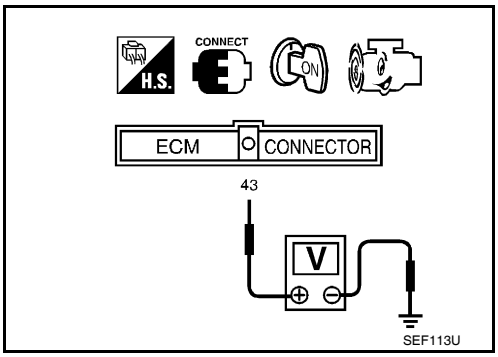
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Make sure that “FUEL T/TMP SE” is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to EC-1354, "Diagnosis Procedure".

WITH GST

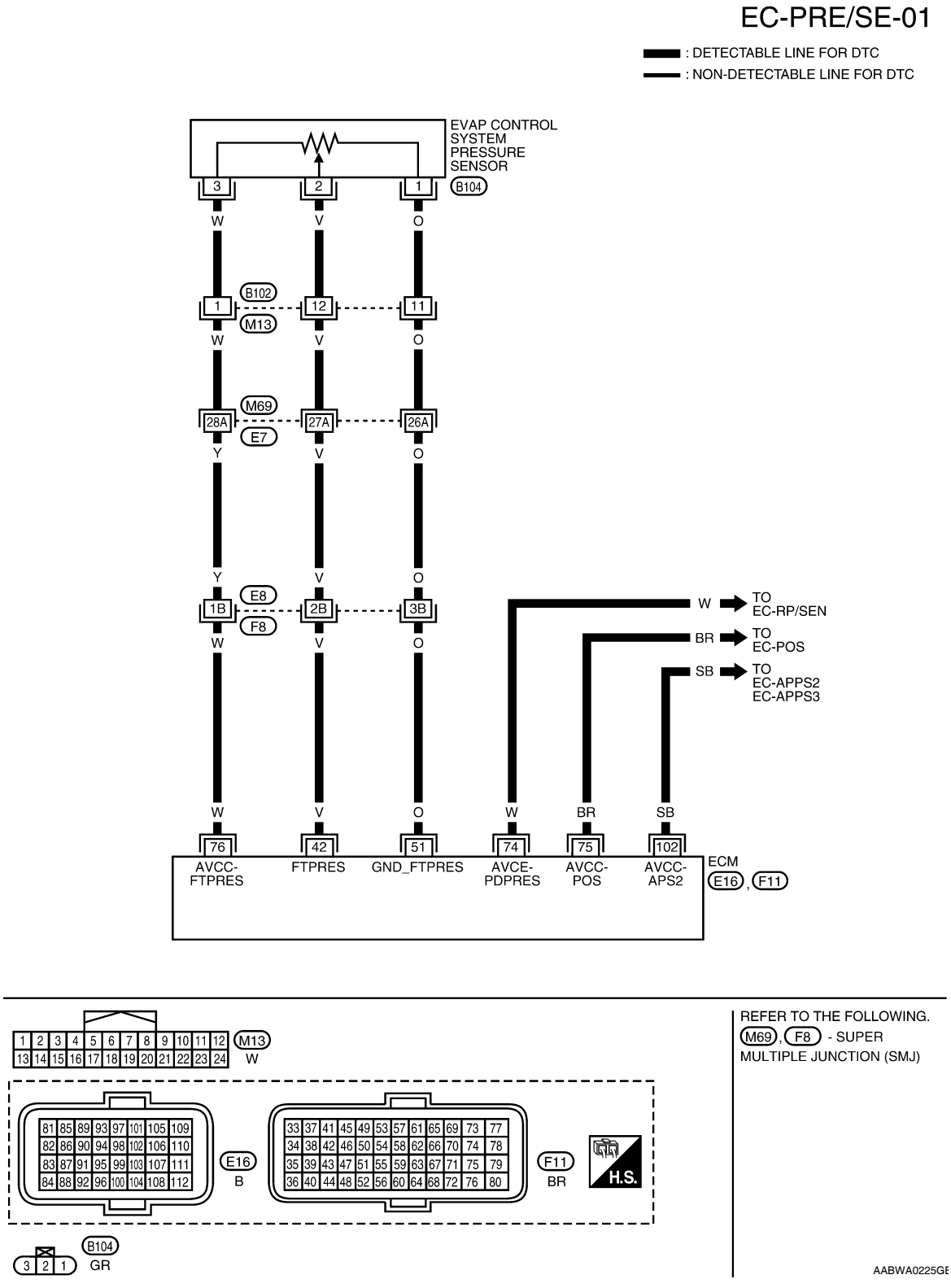
1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 43 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and wait at least 20 seconds.
5. Select Service $07 with GST.
   If 1st trip DTC is detected, go to EC-1354, "Diagnosis Procedure".



Wiring Diagram

INFOID:0000000004500218

EC-PRE/SE-01



Specification data are reference values and are measured between each terminal 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.

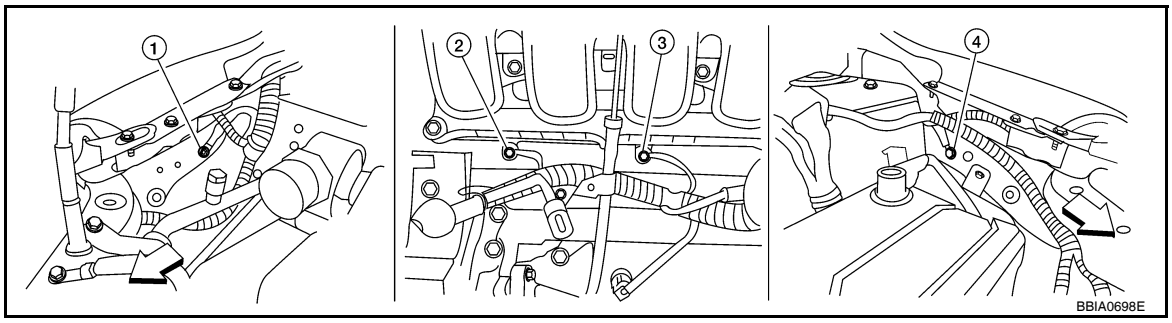
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	V	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8V
51	O	Sensor ground (EVAP control system pressure sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
74	W	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
75	BR	Sensor power supply [Crankshaft position sensor (POS)]	**[Ignition switch: ON]**	Approximately 5V
76	W	EVAP control system pressure sensor power supply	**[Ignition switch: ON]**	Approximately 5V
102	SB	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V

Diagnosis Procedure

INFOID:0000000004500219

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

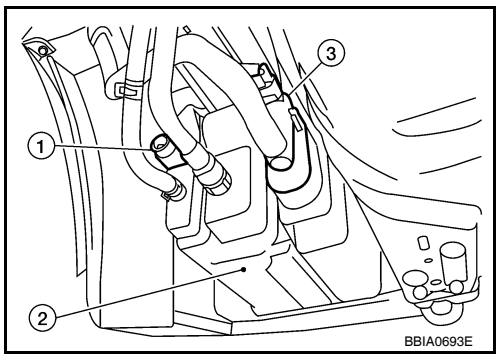
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor (1) harness connector.
- EVAP canister (2)
- EVAP canister vent control valve (3)
2. Check sensor harness connector for water.



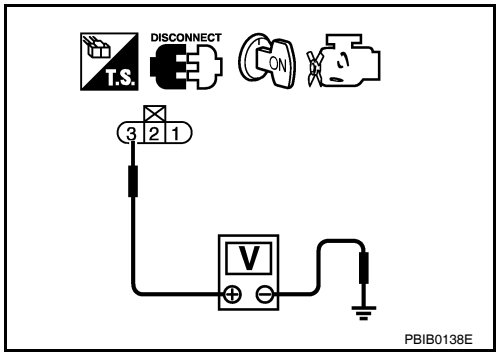
Water should not exist.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace harness connector.

3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-III or tester.



Voltage: Approximately 5V

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 3 and ECM terminal 76.

Continuity should exist.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK COMPONENTS POWER SUPPLY

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
74	Refrigerant pressure sensor terminal 3	EC-1528, "Wiring Diagram"
75	Crankshaft position sensor (POS) terminal 1	EC-1294, "Wiring Diagram"
76	EVAP control system pressure sensor terminal 3	EC-1353, "Wiring Diagram"
102	APP sensor terminal 5	EC-1471, "Wiring Diagram"

OK or NG

OK >> GO TO 8.
NG >> Repair short to ground or short to power in harness or connectors.

8.CHECK COMPONENTS

Check the following.
- Refrigerant pressure sensor (Refer to MTC-37.)
- Crankshaft position sensor (POS) (Refer to EC-1298, "Component Inspection".)

OK or NG

OK >> GO TO 9.
NG >> Replace malfunctioning components.

9.CHECK APP SENSOR

Refer to EC-1468, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-1084, "Accelerator Pedal Released Position Learning".
3. Perform EC-1084, "Throttle Valve Closed Position Learning".
4. Perform EC-1084, "Idle Air Volume Learning".

>> **INSPECTION END**

11.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 51. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

13.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 42 and EVAP control system pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between ECM and EVAP control system pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1350, "Component Inspection".

OK or NG

OK >> GO TO 16.
NG >> Replace EVAP control system pressure sensor.

16. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

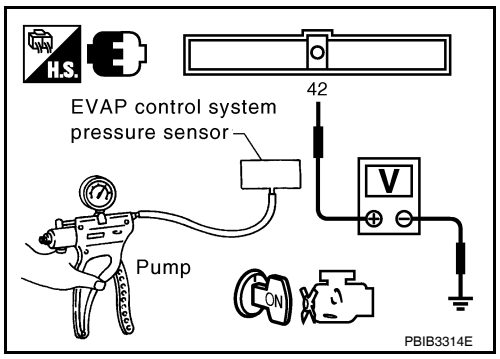
>> **INSPECTION END**

Component Inspection

INFOID:0000000004501197

EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 42 (EVAP control system pressure sensor signal) and ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**

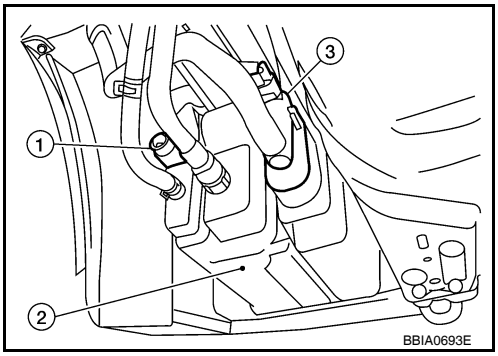
4. If NG, replace EVAP control system pressure sensor.

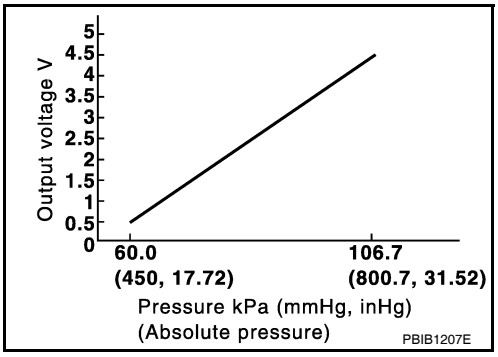
DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

Component Description

INFOID:0000000004501195

The EVAP control system pressure sensor (1) detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.
- EVAP canister (2)
- EVAP canister vent control valve (3)





CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004501196

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	• Ignition switch: ON	Approx. 1.8 - 4.8V

On Board Diagnosis Logic

INFOID:0000000004500223

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0453 0453	EVAP control system pressure sensor high input	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.) (Accelerator pedal position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Crankshaft position sensor (POS) • Accelerator pedal position sensor • Refrigerant pressure sensor • EVAP canister vent control valve • EVAP canister • Drain filter • Rubber hose to EVAP canister vent control valve

DTC Confirmation Procedure

INFOID:0000000004500224

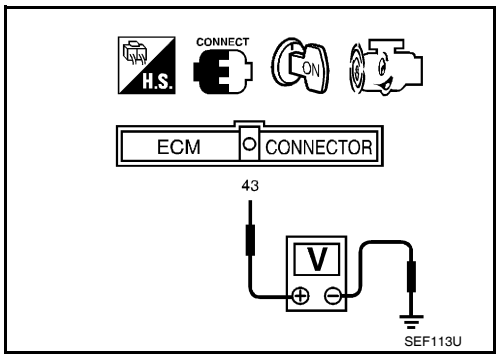
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-III.
5. Make sure that “FUEL T/TMP SE” is more than 0°C (32°F).
6. Wait at least 10 seconds.
7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to EC-1361, "Diagnosis Procedure".

WITH GST

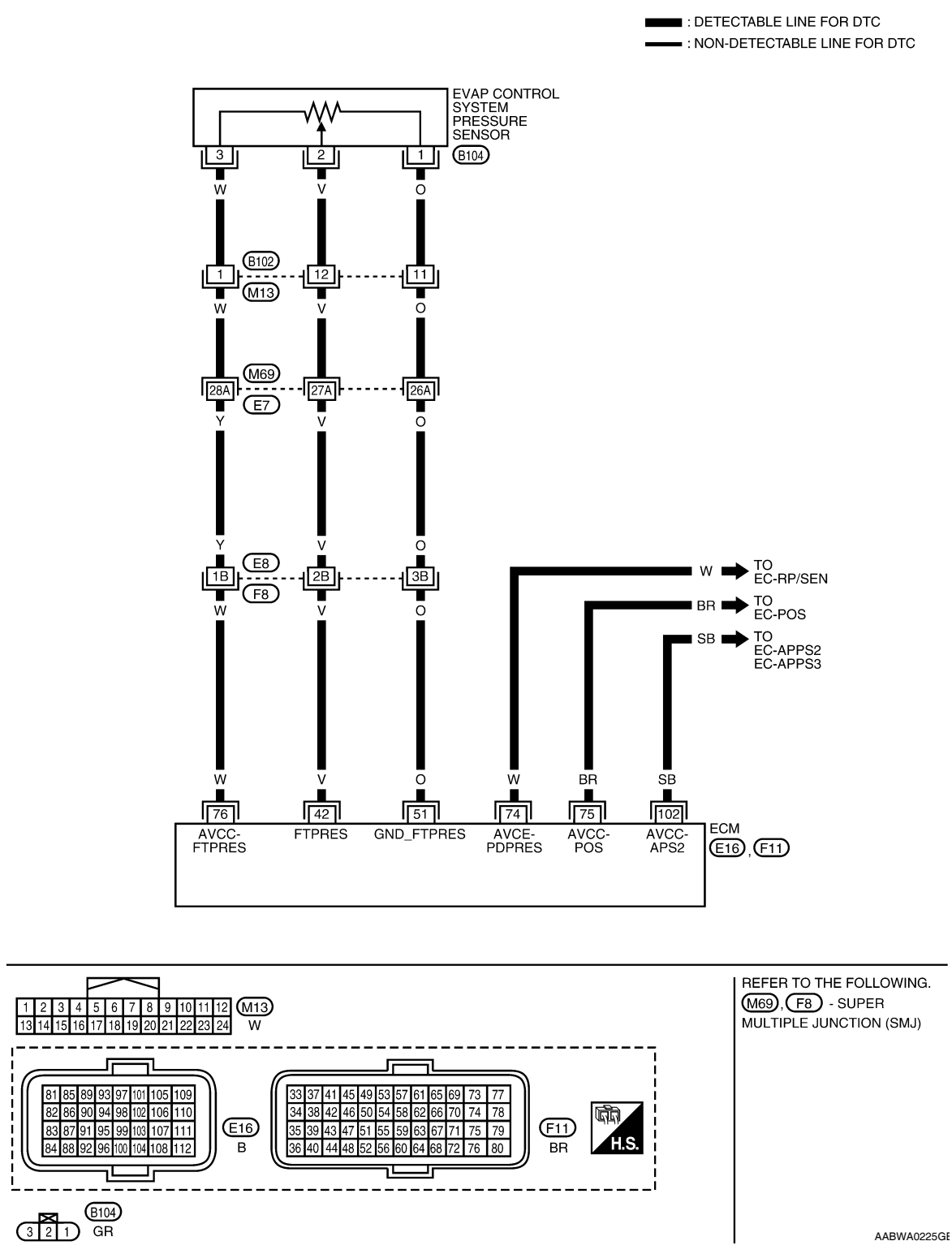
1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 43 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Wait at least 10 seconds.
5. Select Service $07 with GST.
   If 1st trip DTC is detected, go to EC-1361, "Diagnosis Procedure".



Wiring Diagram

INFOID:0000000004501199

EC-PRE/SE-01



Specification data are reference values and are measured between each terminal 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.

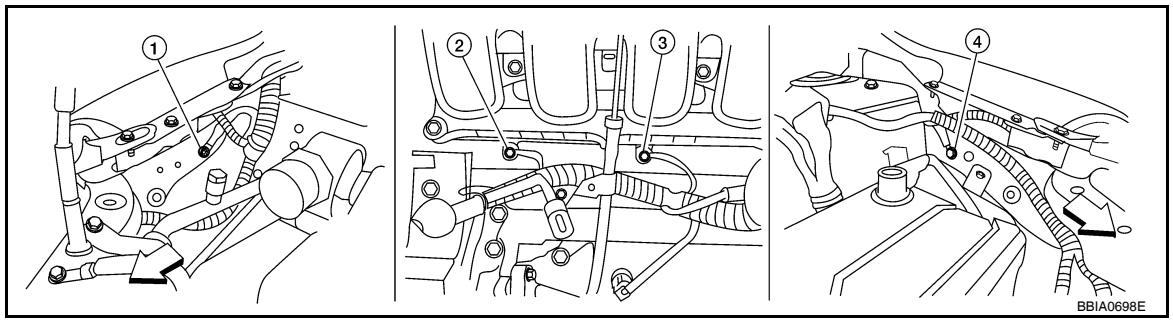
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
42	V	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8V
51	O	Sensor ground (EVAP control system pressure sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
74	W	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
75	BR	Sensor power supply [Crankshaft position sensor (POS)]	**[Ignition switch: ON]**	Approximately 5V
76	W	EVAP control system pressure sensor power supply	**[Ignition switch: ON]**	Approximately 5V
102	SB	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V

Diagnosis Procedure

INFOID:0000000004500226

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

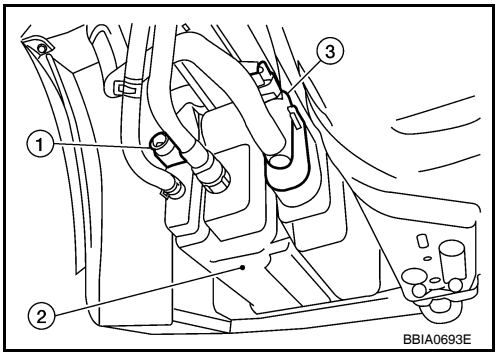
1. Engine ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor (1) harness connector.
- EVAP canister (2)
- EVAP canister vent control valve (3)
2. Check sensor harness connector for water.



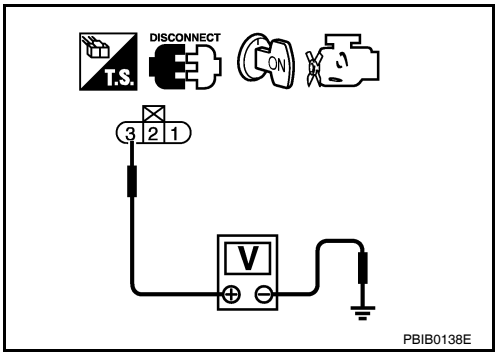
Water should not exist.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace harness connector.

3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-III or tester.



Voltage: Approximately 5V

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 3 and ECM terminal 76.

Continuity should exist.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK COMPONENTS POWER SUPPLY

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
74	Refrigerant pressure sensor terminal 3	EC-1528, "Wiring Diagram"
75	Crankshaft position sensor (POS) terminal 1	EC-1294, "Wiring Diagram"
76	EVAP control system pressure sensor terminal 3	EC-1353, "Wiring Diagram"
102	APP sensor terminal 5	EC-1471, "Wiring Diagram"

OK or NG

OK >> GO TO 8.
NG >> Repair short to ground or short to power in harness or connectors.

8.CHECK COMPONENTS

Check the following.
- Refrigerant pressure sensor (Refer to MTC-37.)
- Crankshaft position sensor (POS) (Refer to EC-1298, "Component Inspection".)

OK or NG

OK >> GO TO 9.
NG >> Replace malfunctioning components.

9.CHECK APP SENSOR

Refer to EC-1468, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-1084, "Accelerator Pedal Released Position Learning".
3. Perform EC-1084, "Throttle Valve Closed Position Learning".
4. Perform EC-1084, "Idle Air Volume Learning".

>> **INSPECTION END**

11.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 51. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E85, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

13.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 42 and EVAP control system pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness connectors M69, E7
- Harness connectors B102, M13
- Harness for open or short between ECM and EVAP control system pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK RUBBER TUBE

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging, vent and kinked.

OK or NG

OK >> GO TO 16.
NG >> Clean the rubber tube using an air blower, repair or replace rubber tube.

16. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-1340, "Component Inspection".

OK or NG

OK >> GO TO 17.
NG >> Replace EVAP canister vent control valve.

17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1350, "Component Inspection".

OK or NG

OK >> GO TO 18.
NG >> Replace EVAP control system pressure sensor.

18. CHECK DRAIN FILTER

Refer to EC-1314, "Component Inspection".

OK or NG

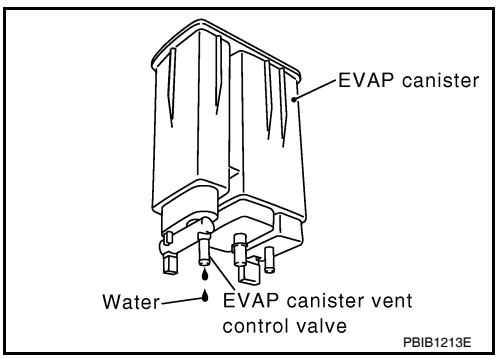
OK >> GO TO 19.
NG >> Replace drain filter.

19. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 20.
No >> GO TO 22.



20. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensorattached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK >> GO TO 22.
NG >> GO TO 21.

21. DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose connected to EVAP canister for clogging or poor connection

>> Repair hose or replace EVAP canister.

22. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

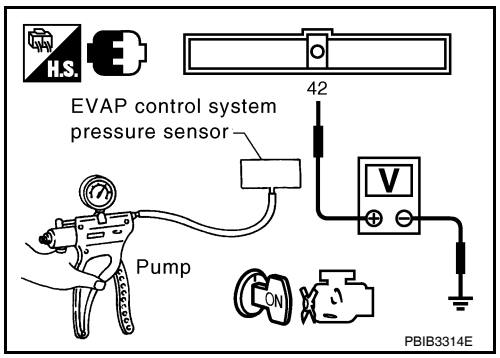
>> **INSPECTION END**

Component Inspection

INFOID:0000000004501198

EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 42 (EVAP control system pressure sensor signal) and ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**

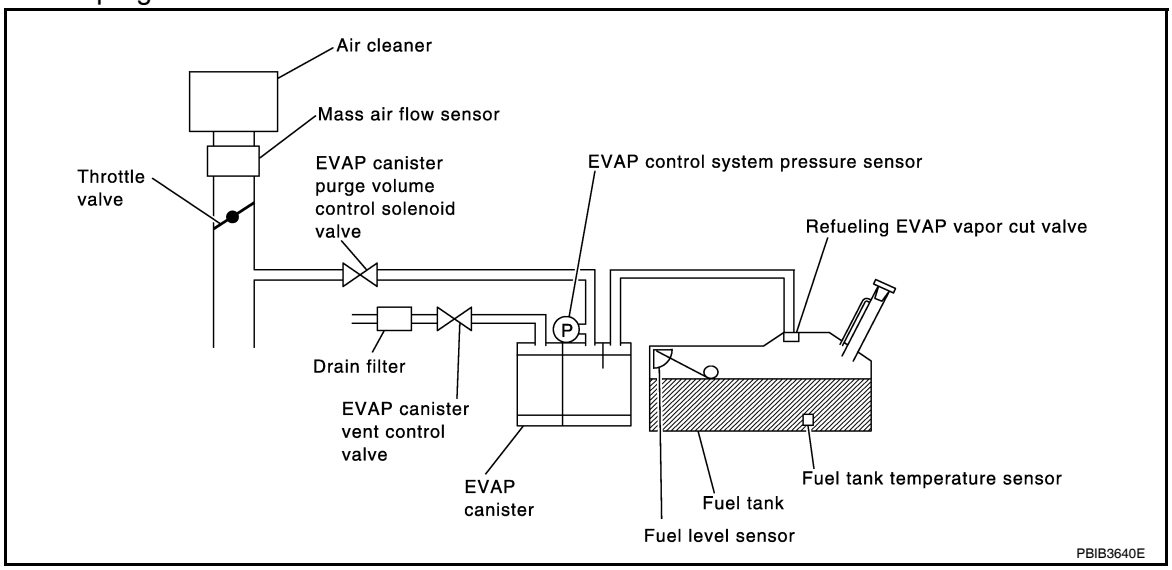
4. If NG, replace EVAP control system pressure sensor.

DTC P0455 EVAP CONTROL SYSTEM

On Board Diagnosis Logic

INFOID:0000000004500228

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in EVAP system between the fuel tank and EVAP canister purge volume control solenoid valve.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0455 0455	EVAP control system gross leak detected	• EVAP control system has a very large leak such as fuel filler cap fell off. • EVAP control system does not operate properly.	• Fuel filler cap remains open or fails to close. • Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent. • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • Drain filter • EVAP canister purge volume control solenoid valve and the circuit • Fuel tank temperature sensor • O-ring of EVAP canister vent control valve is missing or damaged. • EVAP control system pressure sensor • Refueling EVAP vapor cut valve • ORVR system leaks

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC Confirmation Procedure

INFOID:0000000004500229

CAUTION:

Never remove fuel filler cap during the DTC Confirmation Procedure.

NOTE:
- **Make sure that EVAP hose are connected to EVAP canister purge volume control solenoid valve properly.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedure.**

WITH CONSULT-III

1. Tighten fuel filler cap securely until reteaching sound is heard.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
5. Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 60°C (32 - 140°F)
6. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-III.
   Follow the instruction displayed.
   NOTE:
   If the engine speed cannot be maintained within the range displayed on the CONSULT-III screen, go to EC-1078, "Basic Inspection".
7. Make sure that "OK" is displayed.
   If "NG" is displayed, select "SELF-DIAG RESULTS" mode with CONSULT-III and make sure that "EVAP GROSS LEAK [P0455]" is displayed. If it is displayed, refer to EC-1367, "Diagnosis Procedure".
   If P0442 is displayed, perform Diagnostic Procedure for DTC P0442, EC-1316, "Diagnosis Procedure".

WITH GST

NOTE:
Be sure to read the explanation of Driving Pattern on EC-1052, "Emission-related Diagnostic Information" before driving vehicle.

1. Start engine.
2. Drive vehicle according to Driving Pattern, EC-1052, "Emission-related Diagnostic Information".
3. Stop vehicle.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ignition switch ON.
5. Select Service $07 with GST.

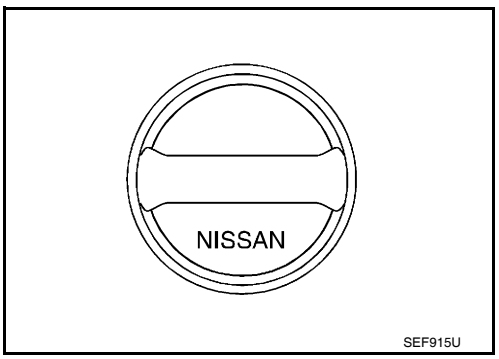
- If P0441 is displayed on the screen, go to EC-1311, "Diagnosis Procedure" for DTC P0441.
- If P0442 is displayed on the screen, go to EC-1316, "Diagnosis Procedure" for DTC P0442.
- If P0455 is displayed on the screen, go to EC-1367, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004500230

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.



OK or NG

OK >> GO TO 2.
NG >> Replace with genuine NISSAN fuel filler cap.

2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK >> GO TO 3.
NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
2. Retighten until reteaching sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-1038, "Component Inspection".

OK or NG

OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

5. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection.
Refer to EC-1036.

OK or NG

OK >> GO TO 6.
NG >> Repair or reconnect the hose.

6. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 7.

7. CHECK DRAIN FILTER

Refer to EC-1372, "Component Inspection".

OK or NG

OK >> GO TO 8.
NG >> Replace drain filter.

8. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.
- EVAP canister vent control is installed properly.
  Refer to EC-1040, "Removal and Installation".
- EVAP canister vent control valve.
  Refer to EC-1340, "Component Inspection".

OK or NG

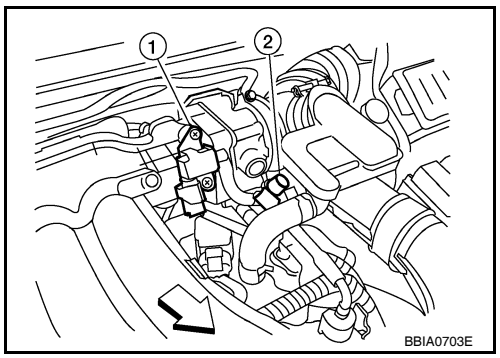
OK >> GO TO 9.
NG >> Repair or replace EVAP canister vent control valve and O-ring.

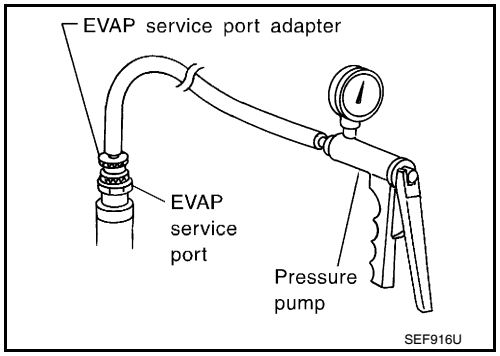
9. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.
For the location of EVAP service port (2), refer to EC-1036, "Description".
- EVAP canister purge volume control solenoid valve (1)

• : Vehicle front

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.



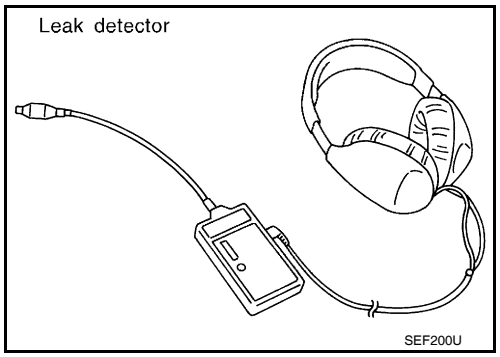


With CONSULT-III>>GO TO 10.
Without CONSULT-III>>GO TO 11.

10. CHECK FOR EVAP LEAK

With CONSULT-III

1. Turn ignition switch ON.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-III.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   CAUTION:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**
4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-1036, "Description".



OK or NG

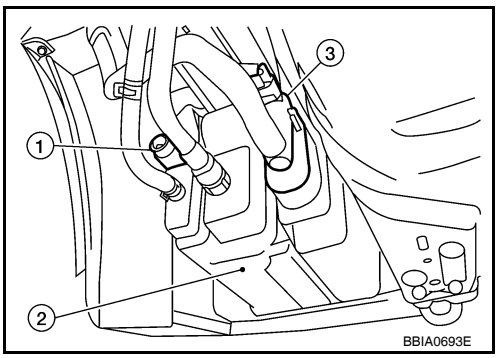
OK >> GO TO 12.
NG >> Repair or replace.

11. CHECK FOR EVAP LEAK

Without CONSULT-III

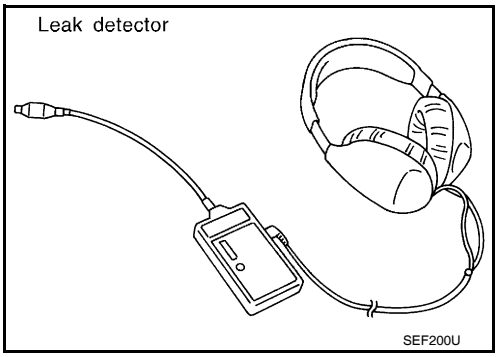
1. Turn ignition switch OFF.

2. Apply 12 volts DC to EVAP canister vent control valve (3). The valve will close. (Continue to apply 12 volts until the end of test.)
- EVAP control system pressure sensor (1)
- EVAP canister (2)



3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.
CAUTION:
- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
Refer to EC-1036, "Description".



OK or NG

OK >> GO TO 13.
NG >> Repair or replace.

12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-III screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum.

Vacuum should exist.

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK >> GO TO 16.
NG >> GO TO 14.

14. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-1106, "Vacuum Hose Drawing".

OK or NG

OK (With CONSULT-III)>>GO TO 15.
OK (Without CONSULT-III)>>GO TO 16.
NG >> Repair or reconnect the hose.

15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-III

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-III. Check that engine speed varies according to the valve opening.

OK or NG

OK >> GO TO 17.
NG >> GO TO 16.

16. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1329, "Component Inspection".

OK or NG

OK >> GO TO 17.
NG >> Replace EVAP canister purge volume control solenoid valve.

17. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-1273, "Component Inspection".

OK or NG

OK >> GO TO 18.
NG >> Replace fuel level sensor unit.

18. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1350, "Component Inspection".

OK or NG

OK >> GO TO 19.
NG >> Replace EVAP control system pressure sensor.

19. CHECK EVAP/ORVR LINE

Check refueling EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-1042.

OK or NG

OK >> GO TO 20.
>> Repair or replace hoses and tubes.

20. CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 21.
>> Repair or replace hoses, tubes or filler neck tube.

21. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-1045, "Component Inspection".

OK or NG

OK >> GO TO 22.
>> Replace refueling EVAP vapor cut valve with fuel tank.

22. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

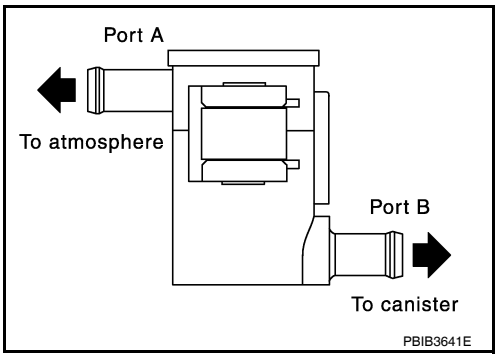
>> **INSPECTION END**

Component Inspection

INFOID:0000000004535234

DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.
7. If NG, replace drain filter.

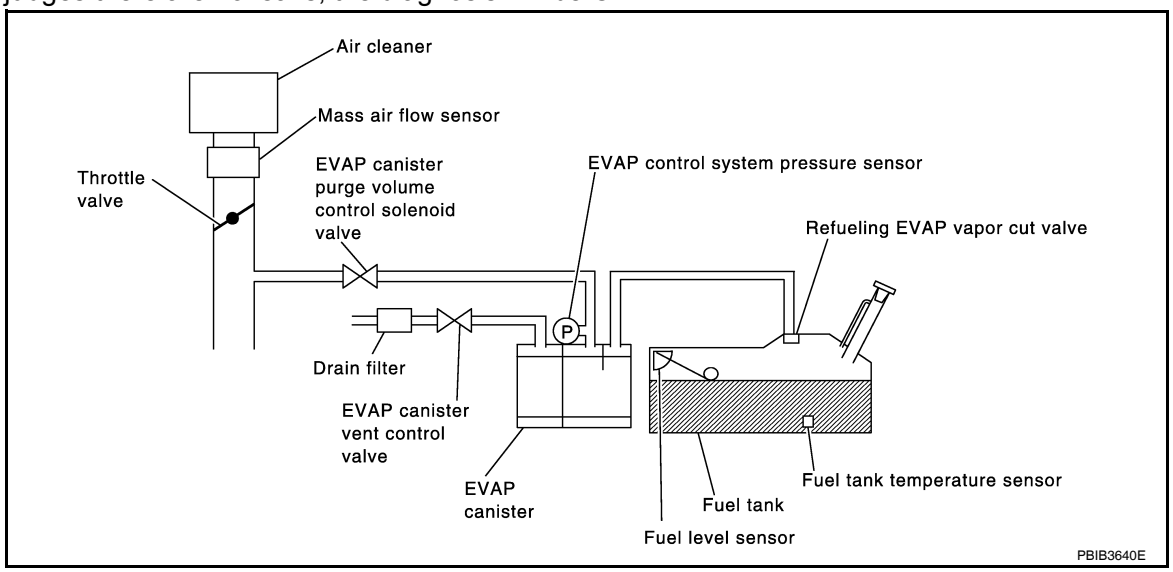


DTC P0456 EVAP CONTROL SYSTEM

On Board Diagnosis Logic

INFOID:0000000004500231

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.
If ECM judges a leak which corresponds to a very small leak, the very small leak P0456 will be detected.
If ECM judges a leak equivalent to a small leak, EVAP small leak P0442 will be detected.
If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0456 0456	Evaporative emission control system very small leak (negative pressure check)	• EVAP system has a very small leak. • EVAP system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or fails to close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Fuel tank temperature sensor • Drain filter • O-ring of EVAP canister vent control valve is missing or damaged • EVAP canister is saturated with water • EVAP control system pressure sensor • Refueling EVAP vapor cut valve • ORVR system leaks • Fuel level sensor and the circuit • Foreign matter caught in EVAP canister purge volume control solenoid valve

CAUTION:
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC Confirmation Procedure

INFOID:0000000004500232

NOTE:
- **If DTC P0456 is displayed with P0442, first perform trouble diagnosis for DTC P0456.**
- **After repair, make sure that the hoses and clips are installed properly.**
- 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:
- **Open engine hood before conducting following procedure.**
- **If any of following conditions are met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.**
- **Fuel filler cap is removed.**
- **Refilled or drained the fuel.**
- **EVAP component parts is/are removed.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-III

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-III.
2. Make sure the following conditions are met.
   FUEL LEVEL SE: 0.25 - 1.4V
   COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
   FUEL T/TMP SE: 0 - 35°C (32 - 95°F)
   INT/A TEMP SE: More than 0°C (32°F)
   If NG, turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the “FUEL LEVEL SE” meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “EVAP V/S LEAK P0456” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-III.
   Follow the instruction displayed.
6. Make sure that “OK” is displayed.
   If “NG” is displayed, refer to EC-1375, "Diagnosis Procedure".
   NOTE:
   - **If the engine speed cannot be maintained within the range displayed on CONSULT-III screen, go to EC-1078, "Basic Inspection".**
   - **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

Overall Function Check

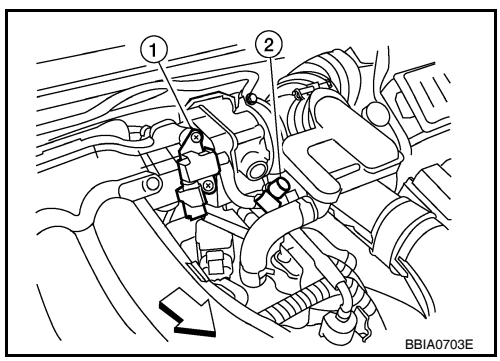
INFOID:0000000004500233

WITH GST

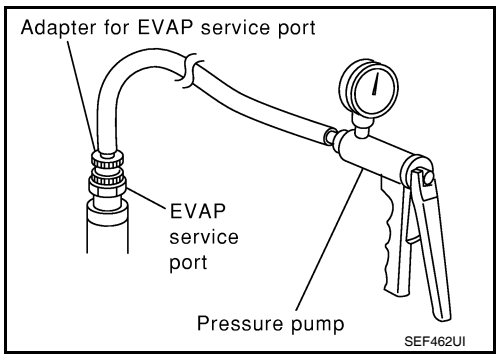
Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

CAUTION:
- **Never use compressed air, doing so may damage the EVAP system.**
- **Do not start engine.**
- **Do not exceeded 4.12 kPa (0.042 kg/cm^2, 0.6 psi).**

1. Attach the EVAP service port adapter securely to the EVAP service port (2).
- EVAP canister purge volume control solenoid valve (1)
- : Vehicle front



2. Set the pressure pump and a hose.
3. Also set the pressure pump with pressure gauge to the EVAP service port adapter.
4. Turn ignition switch ON.
5. Connect GST and select Service $08.
6. Using Service $08 control the EVAP canister vent control valve (close).
7. Apply pressure and make sure the following conditions are satisfied.
   Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)
   Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg).
   If NG, go to EC-1375, "Diagnosis Procedure".
   If OK, go to next step.
8. Disconnect GST.
9. Start engine and warm it up to normal operating temperature.
10. Turn ignition switch OFF and wait at least 10 seconds.
11. Restart engine and let it idle for 90 seconds.
12. Keep engine speed at 2,000 rpm for 30 seconds.
13. Turn ignition switch OFF.
    NOTE:
    For more information, refer to GST Instruction Manual.



Diagnosis Procedure

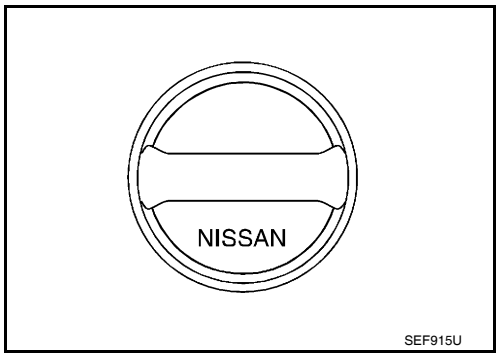
INFOID:0000000004500234

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.

OK or NG

OK >> GO TO 2.
NG >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK >> GO TO 3.
NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
2. Retighten until reteaching sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-1038, "Component Inspection".

OK or NG

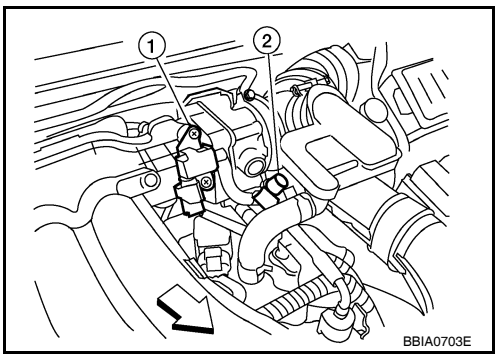
OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

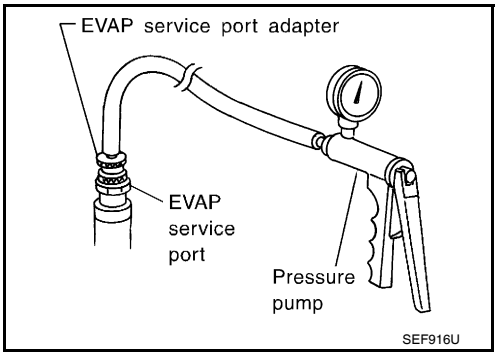
5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely. For the location of EVAP service port (2), refer to EC-1036, "Description".

- EVAP canister purge volume control solenoid valve (1)
- : Vehicle front

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.



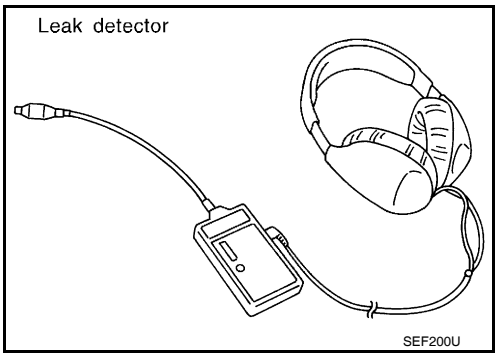


With CONSULT-III>>GO TO 6.
Without CONSULT-III>>GO TO 7.

6. CHECK FOR EVAP LEAK

With CONSULT-III

1. Turn ignition switch ON.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-III.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.
   CAUTION:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**
4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-1036, "Description".



OK or NG

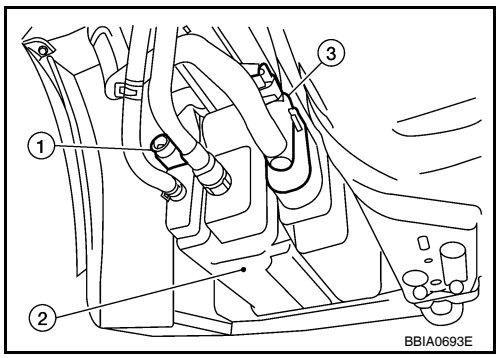
OK >> GO TO 8.
NG >> Repair or replace.

7. CHECK FOR EVAP LEAK

Without CONSULT-III

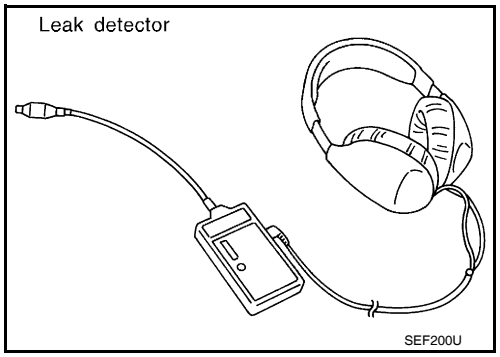
1. Turn ignition switch OFF.

2. Apply 12 volts DC to EVAP canister vent control valve (3). The valve will close. (Continue to apply 12 volts until the end of test.)
- EVAP control system pressure sensor (1)
- EVAP canister (2)



3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.
CAUTION:
- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in the system.**

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
Refer to EC-1036, "Description".



OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK DRAIN FILTER

Refer to EC-1380, "Component Inspection".

OK or NG

OK >> GO TO 9.
NG >> Replace drain filter.

9. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.
- EVAP canister vent control valve is installed properly.
  Refer to EC-1040, "Removal and Installation".
- EVAP canister vent control valve.
  Refer to EC-1340, "Component Inspection".

OK or NG

OK >> GO TO 10.
NG >> Repair or replace EVAP canister vent control valve and O-ring.

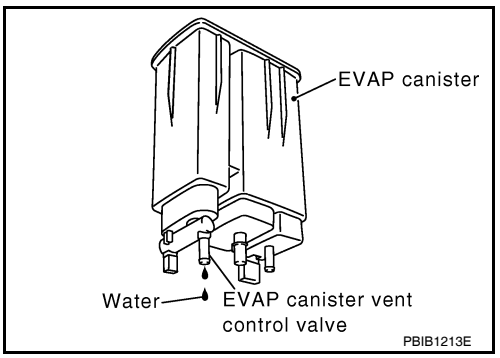
10. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.

2. Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 11.
No (With CONSULT-III)>>GO TO 13.
No (Without CONSULT-III)>>GO TO 14.



11. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK (With CONSULT-III)>>GO TO 13.
OK (Without CONSULT-III)>>GO TO 14.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-III

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-III screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum.

Vacuum should exist.

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK >> GO TO 17.
NG >> GO TO 15.

15. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-1106, "Vacuum Hose Drawing".

OK or NG

OK >> GO TO 16.
NG >> Repair or reconnect the hose.

16. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1329, "Component Inspection".

OK or NG

OK >> GO TO 17.
NG >> Replace EVAP canister purge volume control solenoid valve.

17. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-1273, "Component Inspection".

OK or NG

OK >> GO TO 18.
NG >> Replace fuel level sensor unit.

18. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1350, "Component Inspection".

OK or NG

OK >> GO TO 19.
NG >> Replace EVAP control system pressure sensor.

19. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to EC-1036, "Description".

OK or NG

OK >> GO TO 20.
NG >> Repair or reconnect the hose.

20. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 21.

21. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-1042.

OK or NG

OK >> GO TO 22.
NG >> Repair or replace hoses and tubes.

22. CHECK RECIRCULATION LINE

Check recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 23.
NG >> Repair or replace hose, tube or filler neck tube.

23. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-1045, "Component Inspection".

OK or NG

OK >> GO TO 24.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

24. CHECK FUEL LEVEL SENSOR

Refer to DI-19.

OK or NG

OK >> GO TO 25.

NG >> Replace fuel level sensor unit.

25.CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

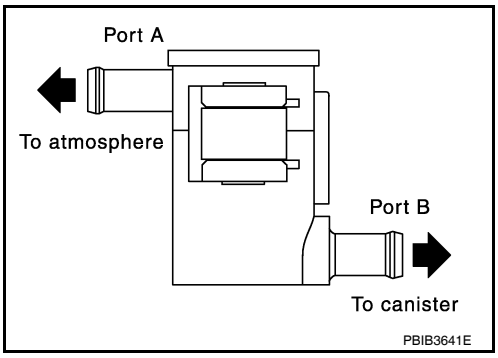
>> **INSPECTION END**

Component Inspection

INFOID:0000000004535235

DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.
7. If NG, replace drain filter.

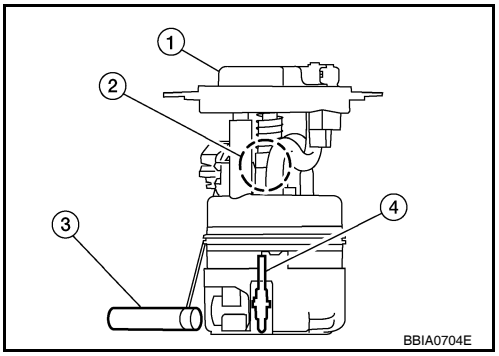


DTC P0460 FUEL LEVEL SENSOR

Component Description

INFOID:0000000004500235

The fuel level sensor (3) is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line.
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.
- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel tank temperature sensor (4)



On Board Diagnosis Logic

INFOID:0000000004500236

NOTE:
- **If DTC P0460 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P0460 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1395.**

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0460 0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.	• Harness or connectors (CAN communication line is open or shorted) • Harness or connectors (Fuel level sensor circuit is open or shorted) • Combination meter • Fuel level sensor

DTC Confirmation Procedure

INFOID:0000000004500237

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
1. Start engine and wait maximum of 2 consecutive minutes.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-1381, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004500238

1.CHECK FUEL GAUGE OPERATION

Refer to DI-10, "Self-Diagnosis Mode of Combination Meter".

OK or NG

OK >> GO TO 2.
NG >> Follow the instruction of DI-10, "Self-Diagnosis Mode of Combination Meter".

2.CHECK FUEL LEVEL SENSOR AND CIRCUIT

Refer to DI-16, "Fuel Level Sensor Signal Inspection".

OK or NG

OK >> GO TO 3.
NG >> Repair or replace malfunctioning parts.

3.CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

Removal and Installation

INFOID:0000000004500239

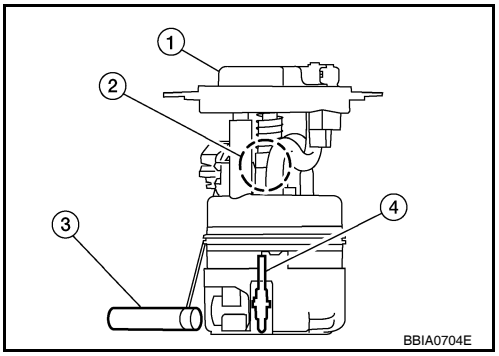
FUEL LEVEL SENSOR
Refer to FL-5.

DTC P0461 FUEL LEVEL SENSOR

Component Description

INFOID:0000000004501200

The fuel level sensor (3) is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line.
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.
- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel tank temperature sensor (4)



On Board Diagnosis Logic

INFOID:0000000004500241

NOTE:
- **If DTC P0461 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P0461 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1395.**

This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.Driving long distances naturally affect fuel gauge level.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0461 0461	Fuel level sensor circuit range/performance	The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.	• Harness or connectors (CAN communication line is open or shorted) • Harness or connectors (Fuel level sensor circuit is open or shorted) • Combination meter • Fuel level sensor

Overall Function Check

INFOID:0000000004500242

Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

WARNING:
When performing following procedure, be sure to observe the handling of the fuel.
Refer to FL-4.
TESTING CONDITION:
Before starting overall function check, preparation of draining fuel and refilling fuel is required.

WITH CONSULT-III

NOTE:
Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 (7-7/8 US gal, 6-5/8 Imp gal) in advance.
1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-1086, "Fuel Pressure Check".
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.
6. Select “FUEL LEVEL SE” in “DATA MONITOR” mode with CONSULT-III.
7. Check “FUEL LEVEL SE” output voltage and note it.
8. Select “FUEL PUMP RELAY” in “ACTIVE TEST” mode with CONSULT-III.
9. Touch “ON” and drain fuel approximately 30 (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10. Check “FUEL LEVEL SE” output voltage and note it.
11. Fill fuel into the fuel tank for 30 (7-7/8 US gal, 6-5/8 Imp gal).

12. Check “FUEL LEVEL SE” output voltage and note it.
13. Confirm whether the voltage changes more than 0.03V during step 7 to 10 and 10 to 12.
    If NG, go to EC-1384, "Diagnosis Procedure".

WITH GST

NOTE:
Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-1086, "Fuel Pressure Check".
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch ON.
6. Drain fuel by 30 (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
7. Confirm that the fuel gauge indication varies.
8. Fill fuel into the fuel tank for 30 (7-7/8 US gal, 6-5/8 Imp gal).
9. Confirm that the fuel gauge indication varies.
10. If NG, go to EC-1384, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004501202

1.CHECK FUEL GAUGE OPERATION

Refer to DI-10, "Self-Diagnosis Mode of Combination Meter".

OK or NG

OK >> GO TO 2.
NG >> Follow the instruction of DI-10, "Self-Diagnosis Mode of Combination Meter".

2.CHECK FUEL LEVEL SENSOR AND CIRCUIT

Refer to DI-16, "Fuel Level Sensor Signal Inspection".

OK or NG

OK >> GO TO 3.
NG >> Repair or replace malfunctioning parts.

3.CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

Removal and Installation

INFOID:0000000004501203

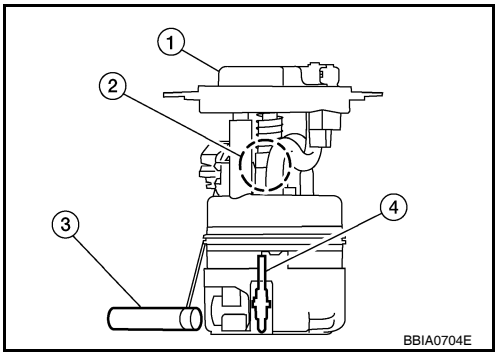
FUEL LEVEL SENSOR
Refer to FL-5.

DTC P0462, P0463 FUEL LEVEL SENSOR

Component Description

INFOID:0000000004501201

The fuel level sensor (3) is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line.
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.
- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel tank temperature sensor (4)



On Board Diagnosis Logic

INFOID:0000000004500246

NOTE:
- **If DTC P0462 or P0463 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P0462 or P0463 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1395.**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0462 0462	Fuel level sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (CAN communication line is open or shorted) • Harness or connectors (Fuel level sensor circuit is open or shorted) • Combination meter • Fuel level sensor
P0463 0463	Fuel level sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

INFOID:0000000004500247

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch ON.
1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-1385, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004501204

1.CHECK FUEL GAUGE OPERATION

Refer to DI-10, "Self-Diagnosis Mode of Combination Meter".

OK or NG

OK >> GO TO 2.
NG >> Follow the instruction of DI-10, "Self-Diagnosis Mode of Combination Meter".

2.CHECK FUEL LEVEL SENSOR AND CIRCUIT

Refer to DI-16, "Fuel Level Sensor Signal Inspection".

OK or NG

OK >> GO TO 3.
NG >> Repair or replace malfunctioning parts.

3.CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

Removal and Installation

INFOID:0000000004501205

FUEL LEVEL SENSOR
Refer to FL-5.

DTC P0500 VSS

Description

INFOID:0000000004500250

NOTE:
- **If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1395.**

The vehicle speed signal is sent from “ABS actuator and electric unit (control unit)” or combination meter through CAN communication line

On Board Diagnosis Logic

INFOID:0000000004500251

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500 0500	Vehicle speed sensor	The vehicle speed signal sent to ECM is almost km/h (0 MPH) even when vehicle is being driven.	• Harness or connectors (CAN communication line is open or shorted.) • Harness or connectors (Vehicle speed signal circuit is open or shorted) • ABS actuator and electric unit (control unit) • Combination meter

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode.

Detected item	Engine operating condition in fail-safe mode
Vehicle speed sensor	The cooling fan operates (High) while engine is running.

DTC Confirmation Procedure

INFOID:0000000004500252

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

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.
   If NG, go to EC-1388, "Diagnosis Procedure".
   If OK, go to following step.
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Warm engine up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	More than 1,600 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	5.5 - 31.8 msec
Shift lever	Suitable position
PW/ST SIGNAL	OFF

6. Check 1st trip DTC.
7. If 1st trip DTC is detected, go to EC-1388, "Diagnosis Procedure".

Overall Function Check

INFOID:0000000004500253

Use this procedure to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed signal in Service $01 with GST.
   The vehicle speed signal on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4. If NG, go to EC-1388, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004500254

1.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Refer to BRC-8.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK COMBINATION METER

Refer to DI-3.

>> **INSPECTION END**

DTC P0506 ISC SYSTEM

Description

INFOID:0000000004500255

NOTE:
If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.
The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The ECM calculates the actual engine speed from signals of crankshaft position sensor (POS) and camshaft position sensor (PHASE).
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

On Board Diagnosis Logic

INFOID:0000000004500256

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0506 0506	Idle speed control system RPM lower than expected	The idle speed is less than the target idle speed by 100 rpm or more.	• Electric throttle control actuator • Intake air leak

DTC Confirmation Procedure

INFOID:0000000004500257

NOTE:
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- **If the target idle speed is out of the specified value, perform EC-1084, "Idle Air Volume Learning", before conducting DTC Confirmation Procedure. For the target idle speed, refer to the EC-1534.**

TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**
- **Always perform the test at a temperature above −10°C (14°F).**

1. Open engine hood.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and run it for at least 1 minute at idle speed.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to EC-1389, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004500258

1.CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 2.
NG >> Discover air leak location and repair.

2.REPLACE ECM

1. Stop engine.
2. Replace ECM.
3. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-249, "ECM Re-communicating Function".
4. Perform EC-1084, "VIN Registration".
5. Perform EC-1084, "Accelerator Pedal Released Position Learning".
6. Perform EC-1084, "Throttle Valve Closed Position Learning".

7. Perform EC-1084, "Idle Air Volume Learning".

>> **INSPECTION END**

DTC P0507 ISC SYSTEM

Description

INFOID:0000000004500259

NOTE:
If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.
The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The ECM calculates the actual engine speed from signals of camshaft position sensor (POS) and camshaft position sensor (PHASE).
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

On Board Diagnosis Logic

INFOID:0000000004500260

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0507 0507	Idle speed control system RPM higher than expected	The idle speed is more than the target idle speed by 200 rpm or more.	• Electric throttle control actuator • Intake air leak • PCV system

DTC Confirmation Procedure

INFOID:0000000004500261

NOTE:
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- **If the target idle speed is out of the specified value, perform EC-1084, "Idle Air Volume Learning", before conducting DTC Confirmation Procedure. For the target idle speed, refer to the EC-1534.**

TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**
- **Always perform the test at a temperature above −10°C (14°F).**

1. Open engine hood.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and run it for at least 1 minute at idle speed.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to EC-1391, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004500262

1.CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2.CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 3.
NG >> Discover air leak location and repair.

3.REPLACE ECM

1. Stop engine.

2. Replace ECM.
3. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-249, "ECM Re-communicating Function".
4. Perform EC-1084, "VIN Registration".
5. Perform EC-1084, "Accelerator Pedal Released Position Learning".
6. Perform EC-1084, "Throttle Valve Closed Position Learning".
7. Perform EC-1084, "Idle Air Volume Learning".

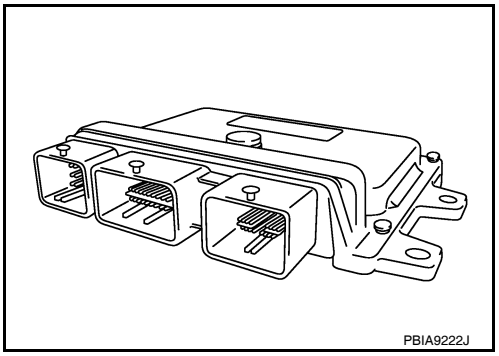
>> **INSPECTION END**

DTC P0605 ECM

Component Description

INFOID:0000000004500263

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.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On Board Diagnosis Logic

INFOID:0000000004500264

This self-diagnosis has one or two trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605 0605	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.	

FAIL-SAFE MODE

ECM enters fail-safe mode when malfunction A is detected.

Detected items	Engine operation condition in fail-safe mode
Malfunction A	• 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.

DTC Confirmation Procedure

INFOID:0000000004500265

Perform PROCEDURE FOR MALFUNCTION A first. If the 1st trip DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B. If there is no malfunction on PROCEDURE FOR MALFUNCTION B, perform PROCEDURE FOR MALFUNCTION C.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

1. Turn ignition switch ON.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-1394, "Diagnosis Procedure".

PROCEDURE FOR MALFUNCTION B

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Check 1st trip DTC.
4. If 1st trip DTC is detected, go to EC-1394, "Diagnosis Procedure".

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.
5. If 1st trip DTC is detected, go to EC-1394, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004500266

1.INSPECTION START

1. Erase DTC.
2. **Perform DTC Confirmation Procedure.**
   See EC-1393, "DTC Confirmation Procedure".
3. Is the 1st trip DTC P0605 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2.REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS(NATS) system and registration of all NVIS(NATS) ignition key IDs.
   Refer to BL-249, "ECM Re-communicating Function".
3. Perform EC-1084, "VIN Registration".
4. Perform EC-1084, "Accelerator Pedal Released Position Learning".
5. Perform EC-1084, "Throttle Valve Closed Position Learning".
6. Perform EC-1084, "Idle Air Volume Learning".

>> **INSPECTION END**

DTC P0607 ECM

Description

INFOID:0000000004501091

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

INFOID:0000000004306009

This self-diagnosis has the one trip detection logic (A/T and CVT).
The MIL will not light up for this self-diagnosis (M/T).

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0607 0607	CAN communication bus	When detecting error during the initial diagnosis for CAN controller of each control unit.	• ECM

DTC Confirmation Procedure

INFOID:0000000004306010

1. Turn ignition switch ON.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-1395, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004306011

1.INSPECTION START

1. Erase DTC.
2. Perform DTC Confirmation Procedure.
   See EC-1395, "DTC Confirmation Procedure".
3. Is the 1st trip DTC P0607 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2.REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs.
   Refer to BL-249, "ECM Re-communicating Function".
3. Perform EC-1084, "VIN Registration".
4. Perform EC-1084, "Accelerator Pedal Released Position Learning".
5. Perform EC-1084, "Throttle Valve Closed Position Learning".
6. Perform EC-1084, "Idle Air Volume Learning".

>> **INSPECTION END**

DTC P0643 SENSOR POWER SUPPLY

On Board Diagnosis Logic

INFOID:0000000004500267

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0643 0643	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	• Harness or connectors (APP sensor 1 circuit is shorted.) (Throttle position sensor circuit is shorted.) [Camshaft position sensor (PHASE) circuit is shorted.] • Accelerator pedal position sensor • Throttle position sensor • Camshaft position sensor (PHASE)

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

INFOID:0000000004500268

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

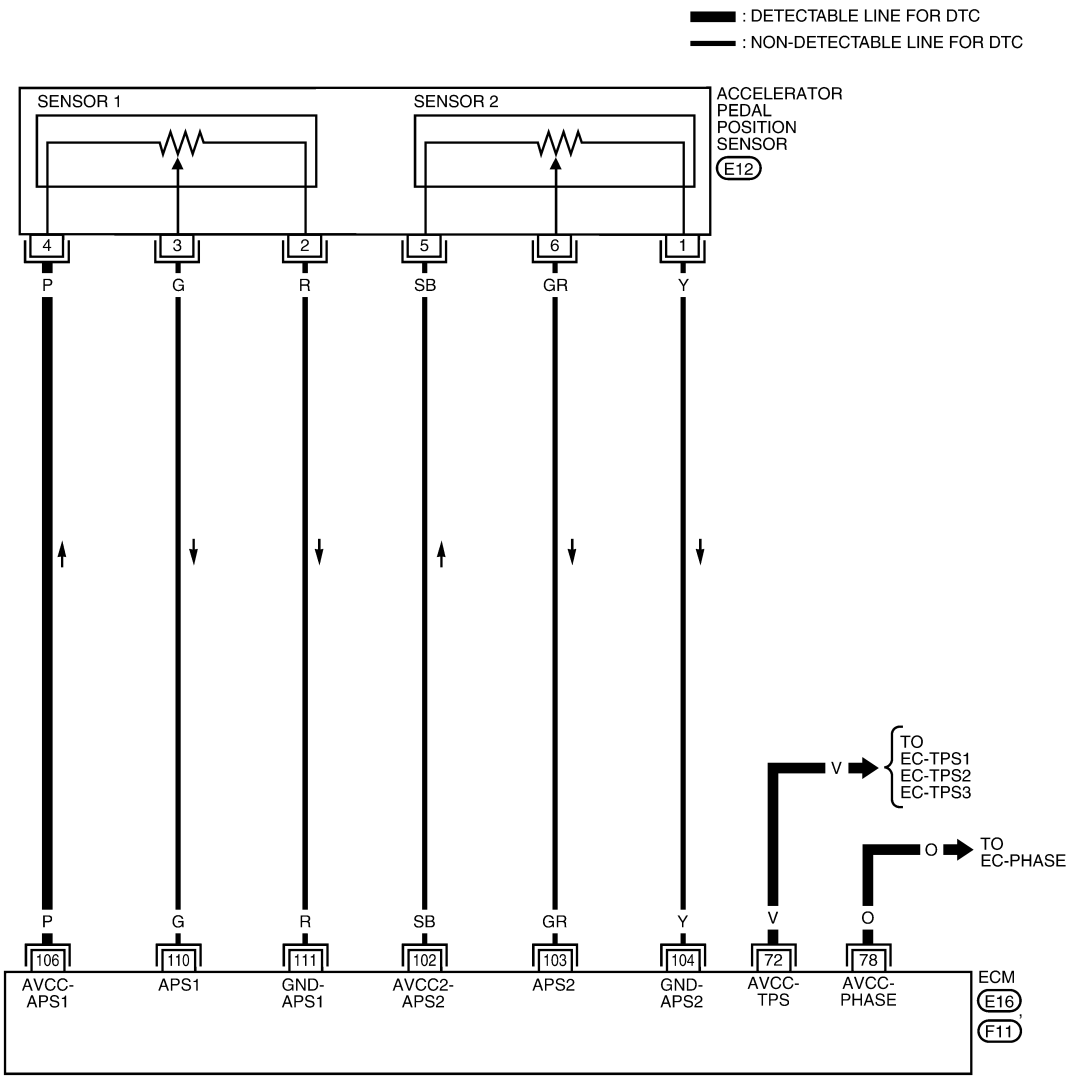
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

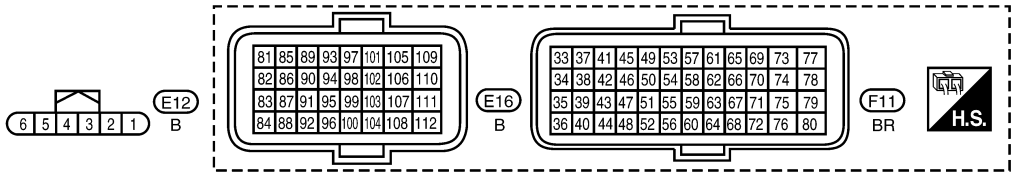
1. Start engine and let it idle for 1 second.
2. Check 1st trip DTC.
3. If DTC is detected, go to EC-1398, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004500269

EC-SEN/PW-01





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Specification data are reference values and are measured between each terminal 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.

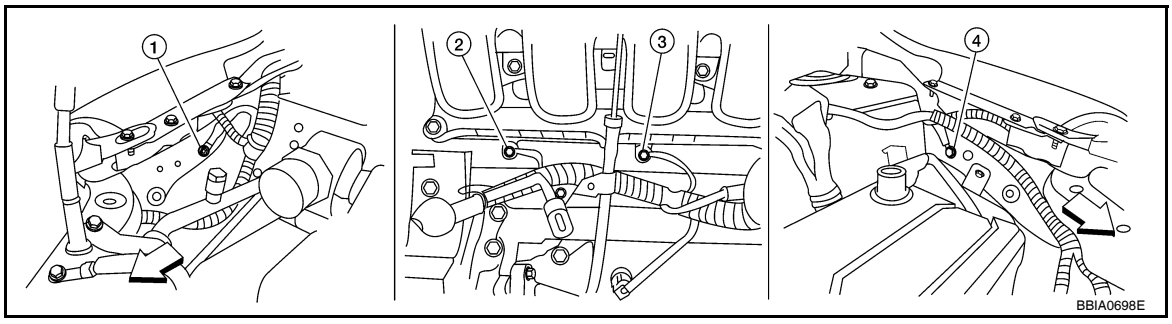
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
72	V	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
78	O	Sensor power supply [Camshaft position sensor (PHASE)]	**[Ignition switch: ON]**	Approximately 5V
102	SB	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V
103	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4V
104	Y	Sensor ground (APP sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
106	P	Sensor power supply (APP sensor 1)	**[Ignition switch: ON]**	Approximately 5V
110	G	Accelerator pedal position sensor 1	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7V
111	R	Sensor ground (APP sensor 1)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:0000000004500270

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

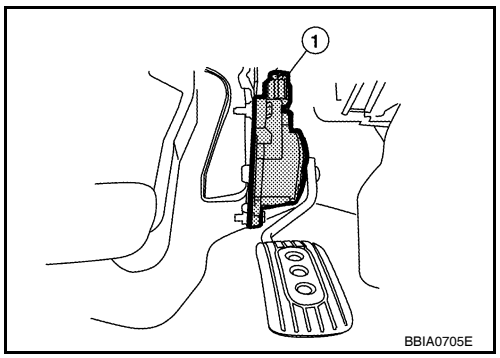
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

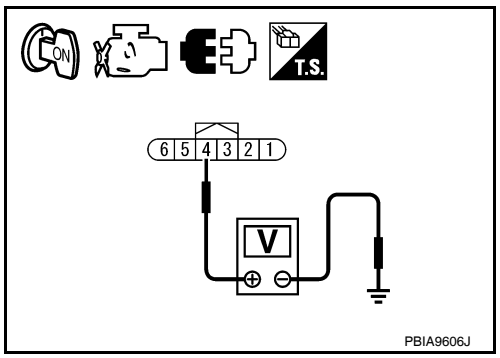
2. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 4 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

3. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 4 and ECM terminal 106. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
72	Throttle position sensor terminal 1	EC-1477, "Wiring Diagram"
78	Camshaft position sensor (PHASE) terminal 1	EC-1300, "Wiring Diagram"
106	APP sensor terminal 4	EC-1397, "Wiring Diagram"

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-1303, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace camshaft position sensor (PHASE).

6. CHECK THROTTLE POSITION SENSOR

Refer to EC-1201, "Component Inspection".

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-1084, "Throttle Valve Closed Position Learning".
3. Perform EC-1084, "Idle Air Volume Learning".

>> **INSPECTION END**

8. CHECK APP SENSOR

Refer to EC-1468, "Component Inspection".

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-1084, "Accelerator Pedal Released Position Learning".
3. Perform EC-1084, "Throttle Valve Closed Position Learning".
4. Perform EC-1084, "Idle Air Volume Learning".

>> **INSPECTION END**

10. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

DTC P0850 PNP SWITCH

Component Description

INFOID:0000000004500271

When the shift lever position is P or N (A/T, CVT), Neutral (M/T), park/neutral position (PNP) switch is ON. ECM detects the position because the continuity of the line (the ON signal) exists.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004500272

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	• Ignition switch: ON	Shift lever: P or N (A/T, CVT), Neutral (M/T)	ON
		Shift lever: Except above	OFF

On Board Diagnosis Logic

INFOID:0000000004500273

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0850 0850	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	• Harness or connectors [Park/neutral position (PNP) switch circuit is open or shorted.] • Park/neutral position (PNP) switch • TCM (CVT models)

DTC Confirmation Procedure

INFOID:0000000004500274

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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 (A/T, CVT) Neutral position (M/T)	ON
Except above	OFF

If NG, go to EC-1404, "Diagnosis Procedure".
If OK, go to following step.

3. Select “DATA MONITOR” mode with CONSULT-III.
4. Start engine and warm it up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	More than 1,200 rpm (CVT) More than 1,450 rpm (A/T) More than 1,900 rpm (M/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	2.4 - 31.8 msec (CVT) 1.4 - 31.8 msec (A/T) 1.7 - 31.8 msec (M/T)

VHCL SPEED SE	More than 64km/h (29 MPH)
Shift lever	Suitable position

6. Check 1st trip DTC.
7. If 1st trip DTC is detected, go to EC-1404, "Diagnosis Procedure".

Overall Function Check

INFOID:0000000004500275

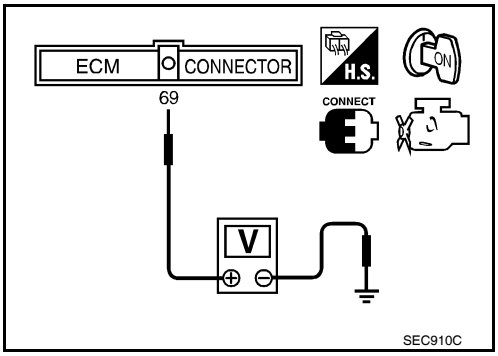
Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 69 (PNP switch signal) and ground under the following conditions.

Condition (Shift lever)	Voltage V (Known-good data)
P or N position (A/T, CVT) Neutral position (M/T)	BATTERY VOLTAGE (11 - 14V)
Except above	Approx. 0

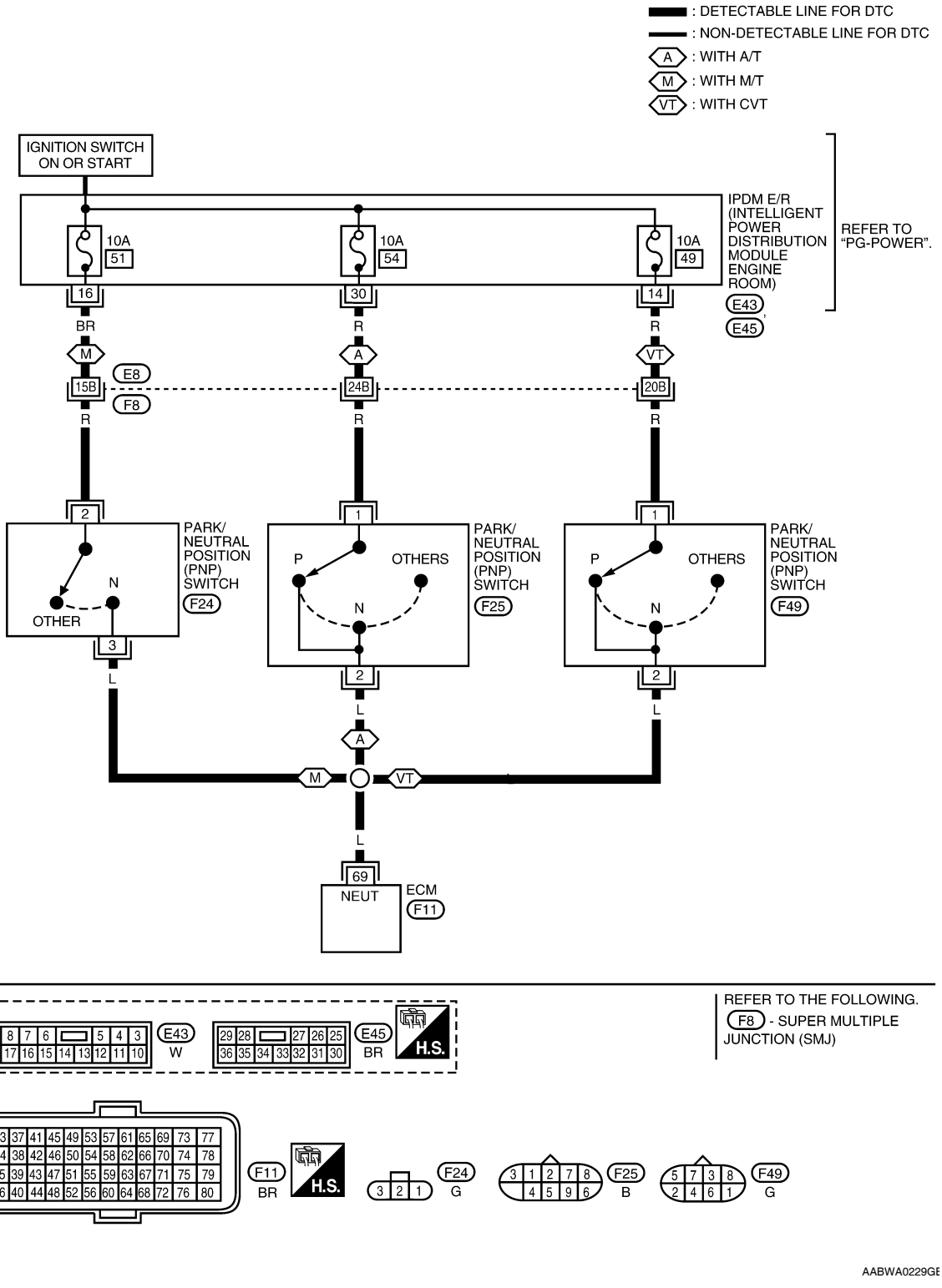
3. If NG, go to EC-1404, "Diagnosis Procedure".



Wiring Diagram

INFOID:0000000004500276

EC-PNP/SW-01



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Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
69	L	Park/neutral position (PNP) switch	**[Ignition switch: ON]** • Shift lever: P or N (A/T, CVT), Neutral (M/T)	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] • Except above	Approximately 0V

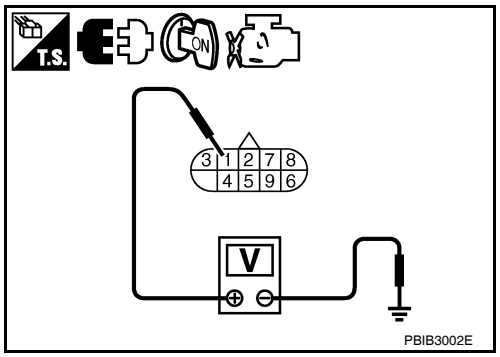
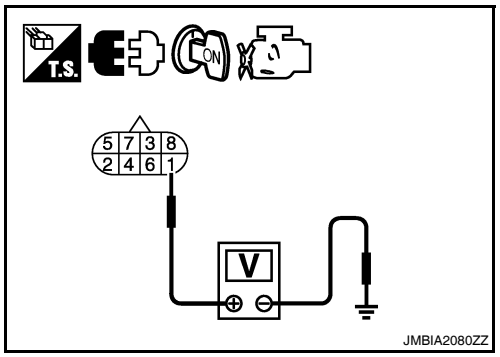
Diagnosis Procedure

INFOID:0000000004500277

A/T MODELS AND CVT MODELS

1.CHECK PNP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect PNP switch harness connector.
3. Turn ignition switch ON.
4. Check voltage between PNP switch terminal 1 and ground with CONSULT-III or tester.

A/T	CVT
	
PBIB3002E	JMBIA2080ZZ

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between PNP switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between PNP switch terminal 2 and ECM terminal 69. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK PNP SWITCH

Refer to AT-95, "Component Inspection" (A/T), CVT-247, "Component Inspection" (CVT).

OK or NG

OK >> GO TO 5.
NG >> Replace PNP switch.

5.CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

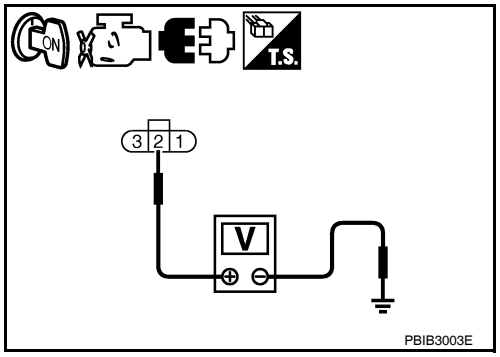
>> **INSPECTION END**

M/T MODELS

1.CHECK PNP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect PNP switch harness connector.
3. Turn ignition switch ON.
4. Check voltage between PNP switch terminal 2 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between PNP switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between PNP switch terminal 3 and ECM terminal 69. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK PNP SWITCH

Refer to MT-54.

OK or NG

OK >> GO TO 5.
NG >> Replace PNP switch.

5.CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

DTC P1148 CLOSED LOOP CONTROL

On Board Diagnosis Logic

INFOID:0000000004500278

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1148 1148	Closed loop control function	The closed loop control function does not operate even when vehicle is driving in the specified condition.	• Harness or connectors [Air fuel ratio (A/F) sensor 1 circuit is open or shorted.] • Air fuel ratio (A/F) sensor 1 • Air fuel ratio (A/F) sensor 1 heater

NOTE:
DTC P1148 is displayed with another DTC for air fuel ratio (A/F) sensor 1.
Perform the trouble diagnosis for the corresponding DTC.

DTC P1217 ENGINE OVER TEMPERATURE

System Description

INFOID:0000000004500279

SYSTEM DESCRIPTION

NOTE:

- **If DTC P1217 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P1217 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1395.**

Cooling Fan Control

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 relays)
Battery	Battery voltage*1		
ABS actuator and electric unit (control unit)	Vehicle speed*2		
Combination meter			
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner ON signal*2		
Refrigerant pressure sensor	Refrigerant pressure		

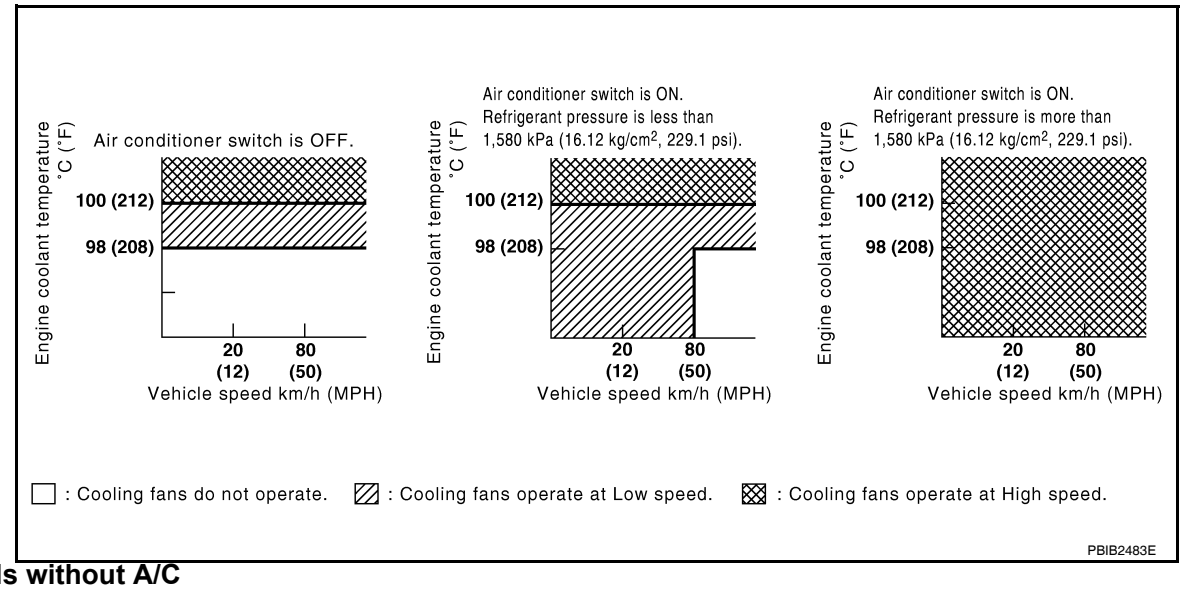
*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to ECM through CAN communication line.

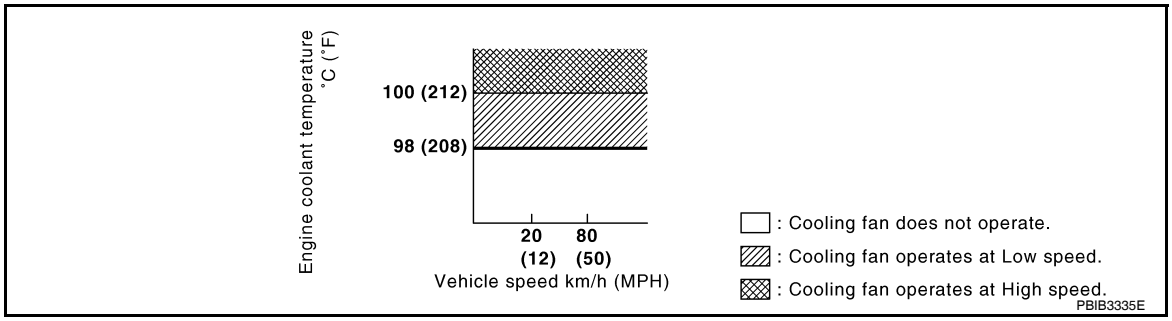
The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

Cooling Fan Operation

Models with A/C



Models without A/C



Cooling Fan Relay Operation

The ECM controls cooling fan relays in the IPDM E/R through CAN communication line.

Cooling fan speed	Cooling fan relay		
	1	2	3
Stop (OFF)	OFF	OFF	OFF
Low (LOW)	ON	OFF	OFF
High (HI)	ON	ON	ON

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004500280

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
COOLING FAN	• Engine: After warming up, idle the engine • Air conditioner switch: OFF	Engine coolant temperature: 97°C (207°F) or less	OFF
		Engine coolant temperature: Between 98°C (208°F) and 99°C (210°F)	LOW
		Engine coolant temperature: 100°C (212°F) or more	HIGH

On Board Diagnosis Logic

INFOID:0000000004500281

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.

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217 1217	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 (Cooling fan circuit is open or shorted.) • Cooling fan • IPDM E/R (Cooling fan relays) • Radiator hose • Radiator • Reservoir tank • Radiator cap • Water pump • Thermostat • Water control valve For more information, refer to EC-1415, "Main 13 Causes of Overheating".

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-17, "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-15, "Anti-freeze Coolant Mixture Ratio".**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

INFOID:0000000004500282

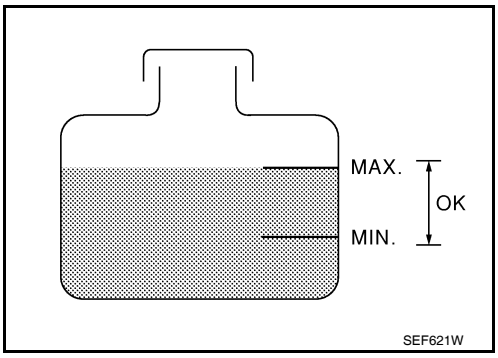
Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the reservoir tank or 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.

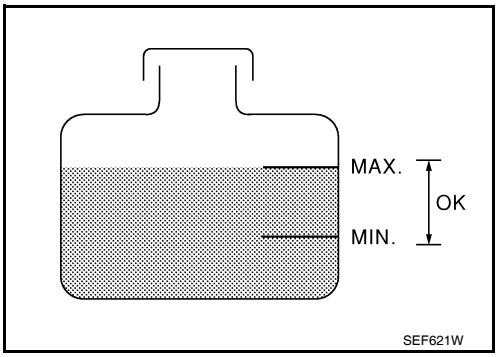
WITH CONSULT-III

1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-1412, "Diagnosis Procedure" or EC-1412, "Diagnosis Procedure".
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-1412, "Diagnosis Procedure" or EC-1412, "Diagnosis Procedure".
3. Turn ignition switch ON.
4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
5. If the results are NG, go to EC-1412, "Diagnosis Procedure" or EC-1412, "Diagnosis Procedure".



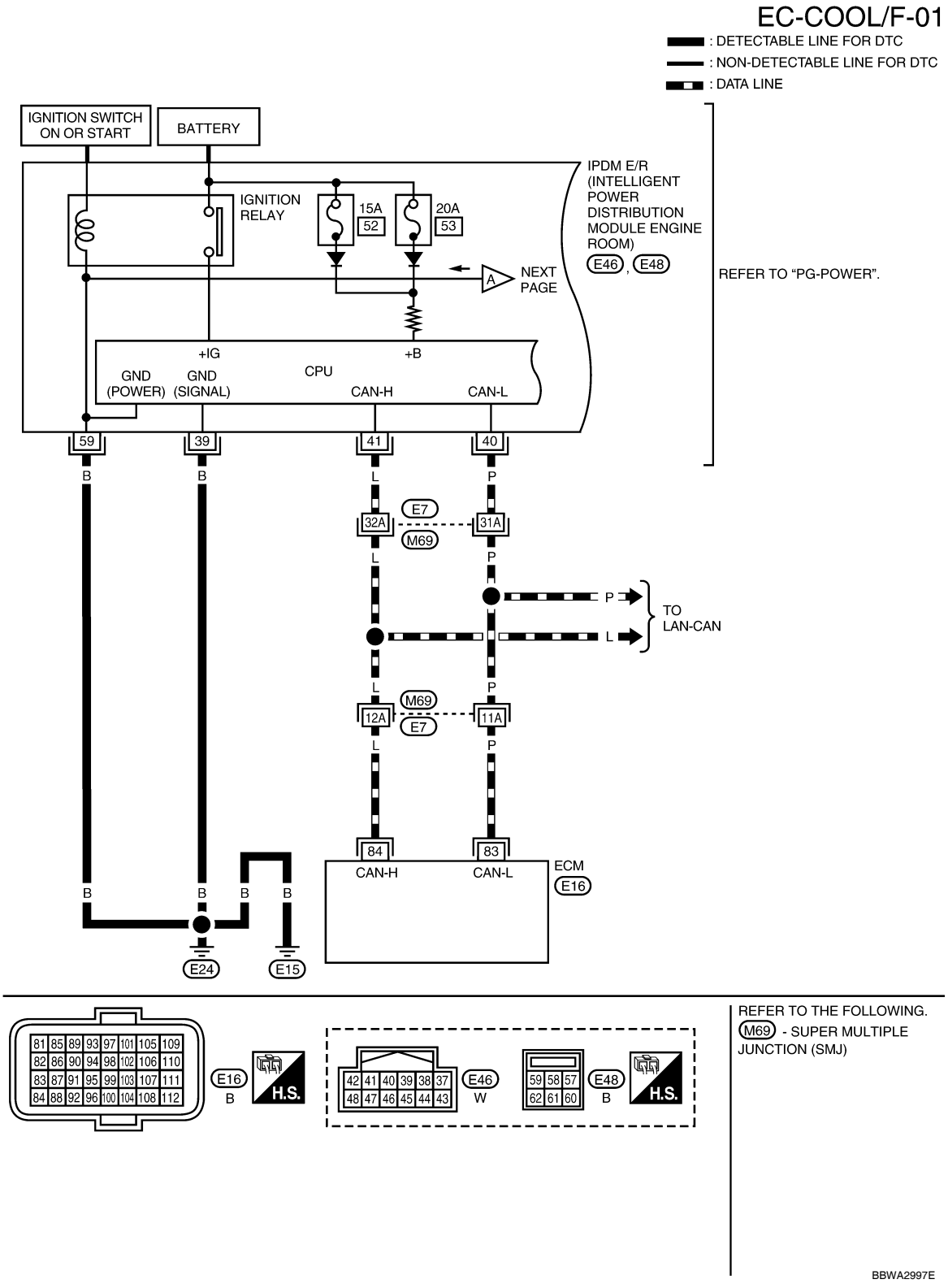
WITH GST

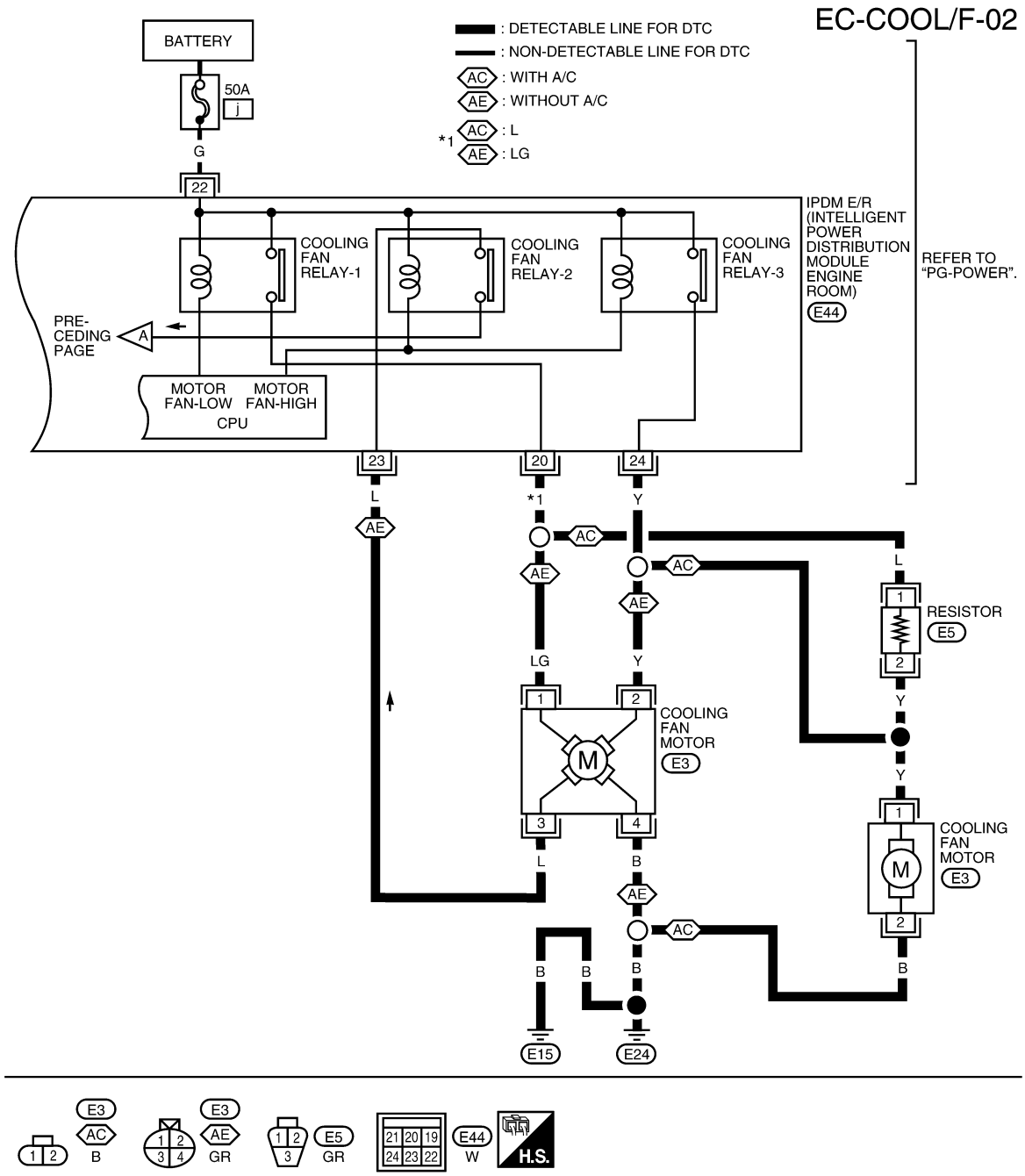
1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-1412, "Diagnosis Procedure".
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-1412, "Diagnosis Procedure".
3. Perform IPDM/ER auto active test and check cooling fan motor operation. Refer to PG-19, "Auto Active Test".
4. If NG, go to EC-1412, "Diagnosis Procedure".



Wiring Diagram

INFOID:0000000004500283





BBWA3001E

Diagnosis Procedure

INFOID:0000000004500284

1.INSPECTION START

Do you have CONSULT-III?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2.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 operates at each speed.

OK or NG

OK >> GO TO 4.
NG >> GO TO 8.

3.CHECK COOLING FAN OPERATION

Without CONSULT-III

1. Perform IPDM E/R auto active test and check cooling fan operation.
   Refer to PG-19, "Auto Active Test".
2. Make sure that cooling fan operates at each speed.

OK or NG

OK >> GO TO 4.
NG >> GO TO 8.

4.CHECK COOLING SYSTEM FOR LEAK

Refer to CO-35, "Inspection".

OK or NG

OK >> GO TO 5.
NG >> Check the following for leak. Refer to CO-35, "Inspection".
- Hose
- Radiator
- Water pump

5.CHECK RADIATOR CAP

Refer to CO-40, "Checking Radiator Cap".

OK or NG

OK >> GO TO 6.
NG >> Replace radiator cap.

6.CHECK COMPONENT PARTS

Check the following.
- Thermostat. (Refer to CO-45.)
- Water control valve. (Refer to CO-47.)
- Engine coolant temperature sensor. (Refer to EC-1190.)

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning component.

7.CHECK MAIN 13 CAUSES

If the cause cannot be isolated, go to EC-1415, "Main 13 Causes of Overheating".

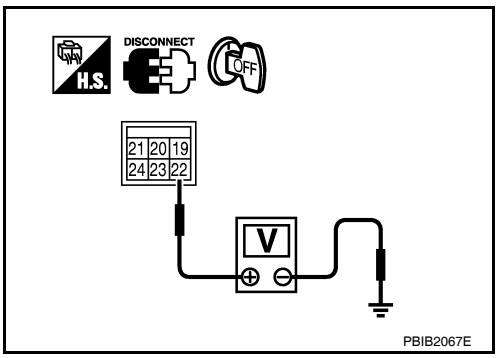
>> **INSPECTION END**

8.CHECK IPDM E/R POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E44.

3. Check voltage between IPDM E/R terminal 22 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- 50A fusible link
- Harness for open or short between IPDM E/R and battery

>> Repair open circuit or short to ground in harness or connectors.

10. CHECK IPDM E/R GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connectors E46 and E48.
3. Check harness continuity between IPDM E/R terminals 59, 39 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK (Models with A/C)>>GO TO 11.
OK (Models without A/C)>>GO TO 13.
NG >> Repair open circuit or short to power in harness or connectors.

11. CHECK COOLING FAN MOTOR CIRCUIT

1. Disconnect cooling fan motor harness connector.
2. Check harness continuity between the followings;
   Cooling fan motor terminal 1 and IPDM E/R terminals 20, 24.
   Cooling fan motor terminal 2 and ground.
   Refer to wiring diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 15.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground
- Resistor E5

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK COOLING FAN MOTOR CIRCUIT

1. Disconnect cooling fan motor harness connector.
2. Check harness continuity between the followings;
   Cooling fan motor terminal 1 and IPDM E/R terminal 20.

Cooling fan motor terminal 2 and IPDM E/R terminal 24.
Cooling fan motor terminal 3 and IPDM E/R terminal 23.
Cooling fan motor terminal 4 and ground.
Refer to wiring diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.
- Harness for open or short between cooling fan motor and IPDM E/R
- Harness for open or short between cooling fan motor and ground

>> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK COOLING FAN MOTOR

Refer to EC-1416, "Component Inspection".

OK or NG

OK >> GO TO 16.
NG >> Replace cooling fan motor.

16. CHECK INTERMITTENT INCIDENT

Perform EC-1138.

OK or NG

OK >> Replace IPDM E/R. Refer to PG-27, "Removal and Installation of IPDM E/R".
NG >> Repair or replace harness or connector.

Main 13 Causes of Overheating

INFOID:0000000004500285

Engine	Step	Inspection item	Equipment	Standard	Reference
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	See MA-15, "Anti-freeze Coolant Mixture Ratio".	
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See CO-35, "Inspection".
	4	• Radiator cap	• Pressure tester	See CO-40, "Checking Radiator Cap".	
ON*2	5	• Coolant leaks	• Visual	No leaks	See CO-35, "Inspection".
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-45, and CO-47
ON*1	7	• Cooling fan	• CONSULT-III	Operating	See trouble diagnosis for DTC P1217 (EC-1412, "Diagnosis Procedure").
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	See CO-35, "Changing Engine Coolant".

Engine	Step	Inspection item	Equipment	Standard	Reference
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See CO-35, "Inspection".
OFF	11	• Water control valve	• Remove and inspect the valve	Within the specified value	See CO-47, "Removal and Installation"
OFF	12	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-185.
	13	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See EM-199.

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

For more information, refer to CO-32.

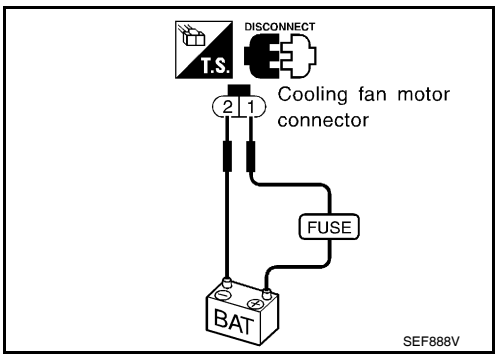
Component Inspection

INFOID:0000000004500286

COOLING FAN MOTOR

Model with A/C

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

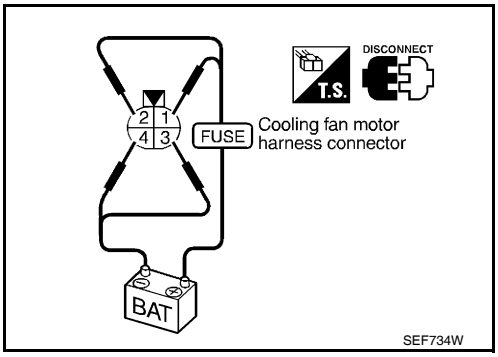


	Terminals	
	(+)	(-)
Cooling fan motor	1	2

Cooling fan motor should operate.
If NG, replace cooling fan motor.

Models without A/C

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.



	Speed	terminals	
		(+)	(–)
Cooling fan motor	Low	1	4
		2	3
	High	1 and 2	3 and 4

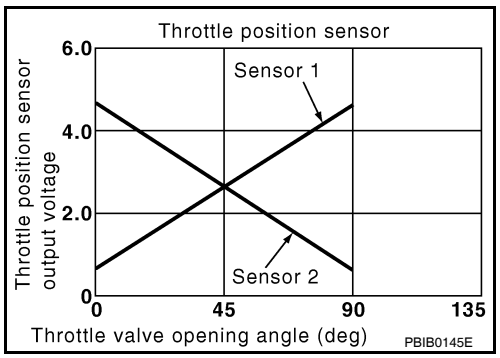
Cooling fan motor should operate.
If NG, replace cooling fan motor.

DTC P1225 TP SENSOR

Component Description

INFOID:0000000004500287

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.



On Board Diagnosis Logic

INFOID:0000000004500288

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225 1225	Closed throttle position learning performance	Closed throttle position learning value is excessively low.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC Confirmation Procedure

INFOID:0000000004500289

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

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.
5. If 1st trip DTC is detected, go to EC-1417, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004500290

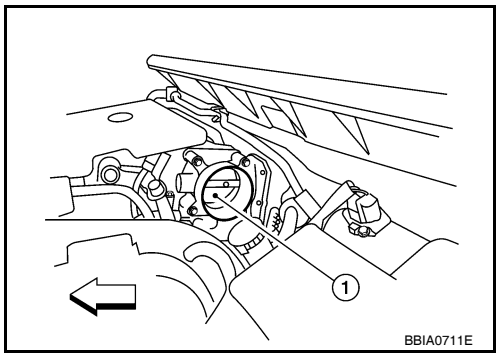
1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

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.

- : Vehicle front

OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-1084, "Throttle Valve Closed Position Learning".
3. Perform EC-1084, "Idle Air Volume Learning".

>> **INSPECTION END**

Removal and Installation

INFOID:0000000004500291

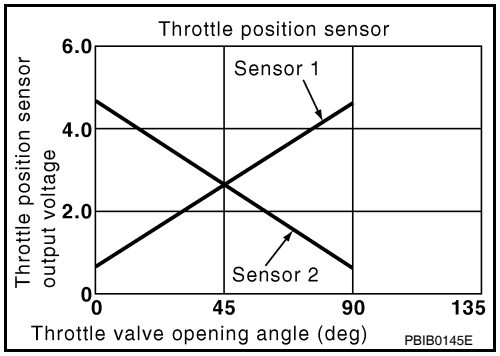
ELECTRIC THROTTLE CONTROL ACTUATOR
Refer to EM-141.

DTC P1226 TP SENSOR

Component Description

INFOID:0000000004501208

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.



On Board Diagnosis Logic

INFOID:0000000004500293

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226 1226	Closed throttle position learning performance	Closed throttle position learning is not performed successfully, repeatedly.	• Electric throttle control actuator (TP sensor 1 and 2)

DTC Confirmation Procedure

INFOID:0000000004500294

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 3 and 4 for 32 times.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to EC-1419, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004501209

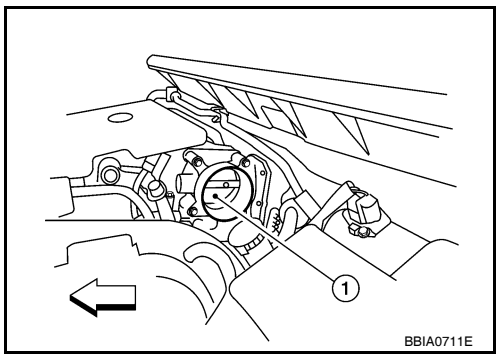
1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

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.

- : Vehicle front

OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-1084, "Throttle Valve Closed Position Learning".

3. Perform EC-1084, "Idle Air Volume Learning".

>> **INSPECTION END**

Removal and Installation

INFOID:0000000004501210

ELECTRIC THROTTLE CONTROL ACTUATOR
Refer to EM-141.

DTC P1421 COLD START CONTROL

Description

INFOID:0000000004500297

ECM controls ignition timing and engine idle speed when engine is started with prewarming up condition. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

On Board Diagnosis Logic

INFOID:0000000004500298

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1421 1421	Cold start emission reduction strategy monitoring	ECM does not control ignition timing and engine idle speed properly when engine is started with prewarming up condition.	• Lack of intake air volume • Fuel injection system • ECM

DTC Confirmation Procedure

INFOID:0000000004500299

NOTE:
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- **If DTC P1421 is displayed with other DTC, first perform the trouble diagnosis for other DTC.**

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Select “DATA MONITOR” mode with CONSULT-III.
4. Check that the “COOLAN TEMP/S” indication is between 4°C (39°F) and 36°C (97°F).
   If “COOLAN TEMP/S” indication is within the specified value, go to the following step.
   If “COOLAN TEMP/S” indication is out of the specified value, cool engine down or warm engine up and go to step 1.
5. Start engine and let it idle for 5 minutes.
6. Check 1st trip DTC.
7. If 1st trip DTC is detected, go to EC-1421, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004500300

1.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-1084, "Idle Air Volume Learning".
Is Idle Air Volume Learning carried out successfully?

Yes or No

Yes >> GO TO 2.
No >> Follow the instruction of Idle Air Volume Learning.

2.CHECK INTAKE SYSTEM

Check for the cause of intake air volume lacking. Refer to the following.
- Crushed intake air passage
- Intake air passage clogging

OK or NG

OK >> GO TO 3.
NG >> Repair or replace malfunctioning part

3.CHECK FUEL INJECTION SYSTEM FUNCTION

Perform EC-1258, "DTC Confirmation Procedure" for DTC P0171.

OK or NG

OK >> GO TO 4.

NG >> Go to EC-1261, "Diagnosis Procedure" for DTC P0171.

4. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. **Perform DTC Confirmation Procedure.**
   See EC-1421, "DTC Confirmation Procedure".
3. Is the 1st trip DTC P1421 displayed again?

Yes or No

Yes >> GO TO 5.
No >> **INSPECTION END**

5. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs.
   Refer to BL-249, "ECM Re-communicating Function".
3. Perform EC-1084, "VIN Registration".
4. Perform EC-1084, "Accelerator Pedal Released Position Learning".
5. Perform EC-1084, "Throttle Valve Closed Position Learning".
6. Perform EC-1084, "Idle Air Volume Learning".

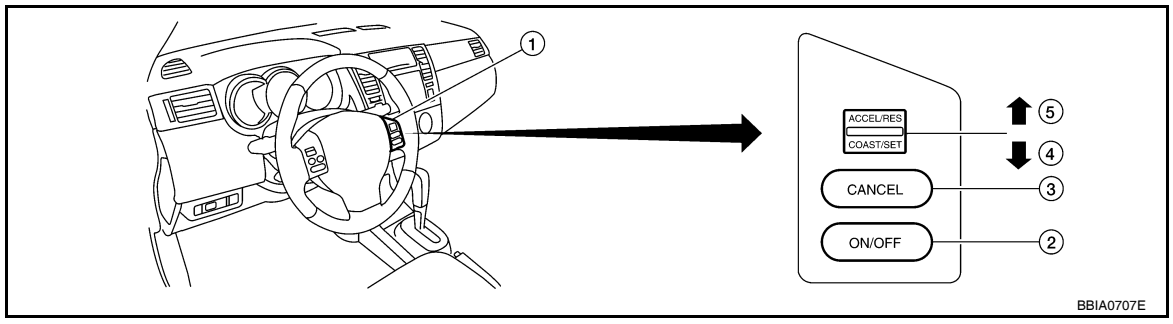
>> **INSPECTION END**

DTC P1564 ASCD STEERING SWITCH

Component Description

INFOID:0000000004500301

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.



1. ASCD steering switch
2. MAIN switch
3. CANCEL switch
4. RESUME/ACCELERATE switch
5. SET/COAST switch

Refer to EC-1033 for the ASCD function.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004500302

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
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

On Board Diagnosis Logic

INFOID:0000000004500303

This self-diagnosis has the one trip detection logic.
The MIL will not light up for this diagnosis.
NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605.
Refer to EC-1393.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1564 1564	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 (ASCD switch circuit is open or shorted.) • ASCD steering switch • ECM

DTC Confirmation Procedure

INFOID:0000000004500304

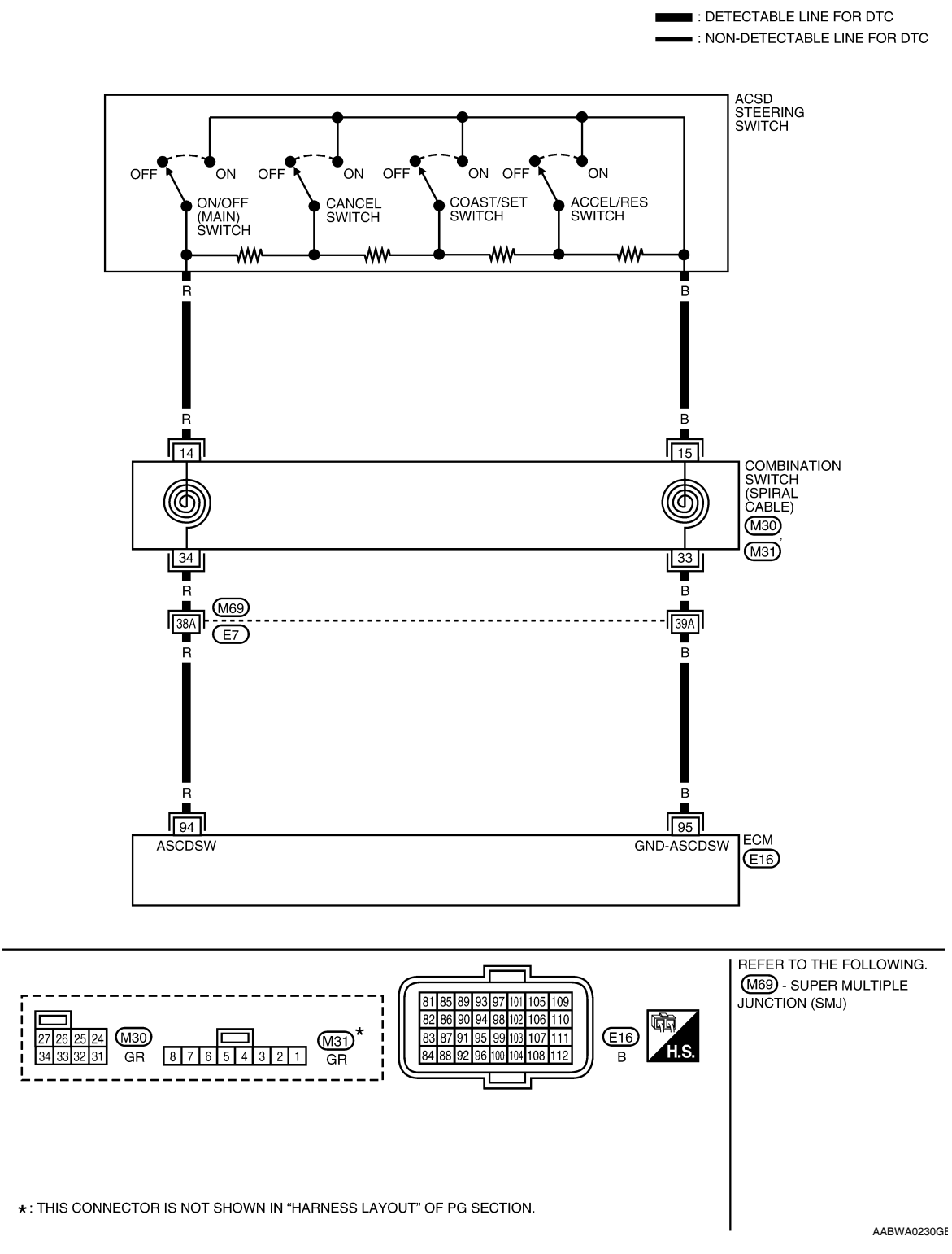
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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.
7. If DTC is detected, go to EC-1426, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004500305

EC-ASC/SW-01



Specification data are reference values and are measured between each terminal 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.

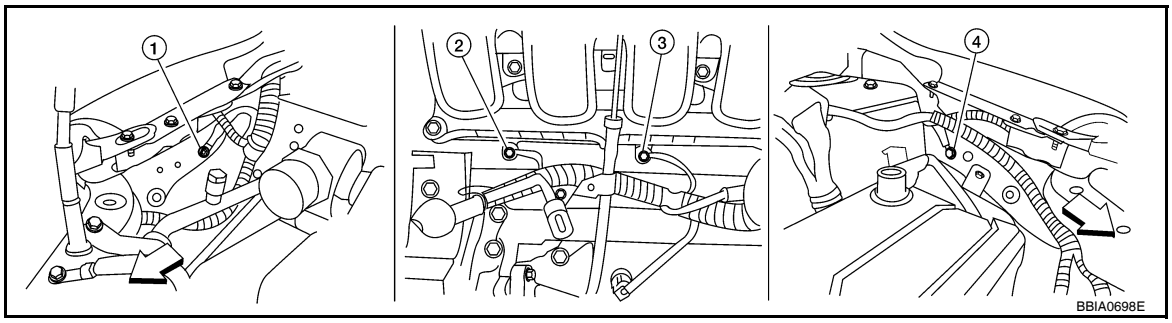
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
94	R	ASCD steering switch	**[Ignition switch: ON]** • ASCD steering switch: OFF	Approximately 4V
			[Ignition switch: ON] • MAIN switch: Pressed	Approximately 0V
			[Ignition switch: ON] • CANCEL switch: Pressed	Approximately 1V
			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	Approximately 3V
			[Ignition switch: ON] • SET/COAST switch: Pressed	Approximately 2V
95	B	Sensor ground	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:0000000004500306

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-III

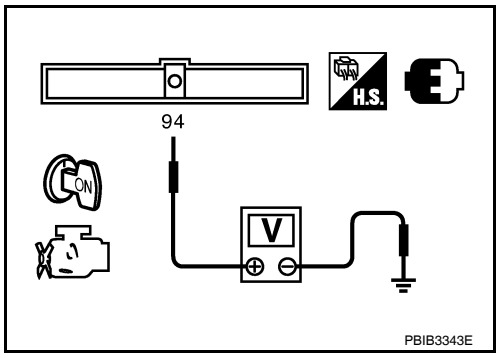
1. Turn ignition switch ON.
2. Select “MAIN SW”, “RESUME/ACC SW”, “SET SW and “CANCEL SW” in “DATA MONITOR” mode with CONSULT-III.
3. Check each item indication under the following conditions.

Switch	Monitor item	Condition	Indication
MAIN switch	MAIN SW	Pressed	ON
		Released	OFF
CANCEL switch	CANCEL SW	Pressed	ON
		Released	OFF

Switch	Monitor item	Condition	Indication
RESUME/ACCELERATE switch	RESUME/ACC SW	Pressed	ON
		Released	OFF
SET/COAST switch	SET SW	Pressed	ON
		Released	OFF

Without CONSULT-III

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 94 and ground with pressing each button.



Switch	Condition	Voltage [V]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4.0
CANCEL switch	Pressed	Approx. 1.0
	Released	Approx. 4.0
RESUME/ACCELERATE switch	Pressed	Approx. 3.0
	Released	Approx. 4.0
SET/COAST switch	Pressed	Approx. 2.0
	Released	Approx. 4.0

OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

3. CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect combination switch harness connector M31.
3. Disconnect ECM harness connector.
4. Check harness continuity between combination switch terminal 15 and ECM terminal 95. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 94 and combination switch terminal 14. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- Combination switch (spiral cable)
- Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD STEERING SWITCH

Refer to EC-1428, "Component Inspection".

OK or NG

OK >> GO TO 8.
NG >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

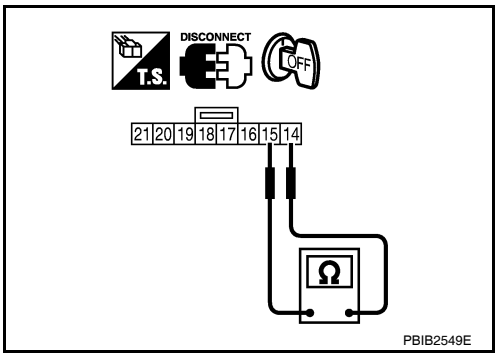
>> **INSPECTION END**

Component Inspection

INFOID:0000000004500307

ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector M31.
2. Check continuity between combination switch (spiral cable) terminals 14 and 15 with pushing each switch.



Switch	Condition	Resistance [Ω]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4,000
CANCEL switch	Pressed	Approx. 250
	Released	Approx. 4,000
RESUME/ACCELERATE switch	Pressed	Approx. 1,480
	Released	Approx. 4,000
SET/COAST switch	Pressed	Approx. 660
	Released	Approx. 4,000

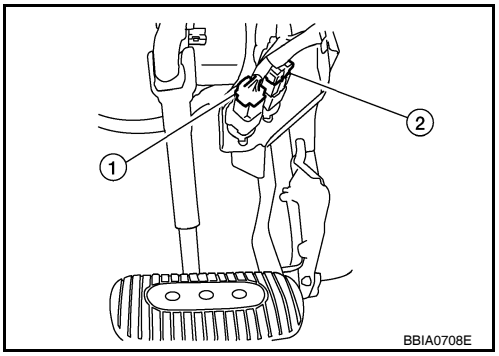
If NG, replace ASCD steering switch.

DTC P1572 ASCD BRAKE SWITCH

Component Description

INFOID:0000000004500308

When the brake pedal is depressed, ASCD brake switch (2) is turned OFF and stop lamp switch (1) is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal). Refer to EC-1033 for the ASCD function.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004500309

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1 (ASCD brake switch)	• Ignition switch: ON	• Brake pedal: Fully released (A/T, CVT) • Brake pedal and clutch pedal: Fully released (M/T)	ON
		• Brake pedal: Slightly depressed (A/T, CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	OFF
BRAKE SW2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

INFOID:0000000004500310

This self-diagnosis has the one trip detection logic.
The MIL will not light up for this diagnosis.
NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1393.**
- **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 1572	ASCD brake switch	A)	When the vehicle speed is above 30km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to ECM at the same time.	• Harness or connectors (Stop lamp switch circuit is shorted.) • Harness or connectors (ASCD brake switch circuit is shorted.) • Harness or connectors (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

INFOID:0000000004500311

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- Procedure for malfunction 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.

TESTING CONDITION:
Steps 3 and 6 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-III

1. Start engine.
2. Press MAIN switch and make sure that CRUISE indicator lights up.
3. Drive the vehicle for at least 5 consecutive seconds under the following condition.

Vehicle speed	More than 30 km/h (19 MPH)
Shift lever	Suitable position

4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to EC-1432, "Diagnosis Procedure".
   If 1st trip DTC is not detected, go to the following step.
6. Drive the vehicle for at least 5 consecutive seconds under the following condition.

Vehicle speed	More than 30 km/h (19 MPH)
Shift lever	Suitable position
Driving location	Depress the brake pedal for more than 5 seconds so as not to come off from the above-mentioned vehicle speed.

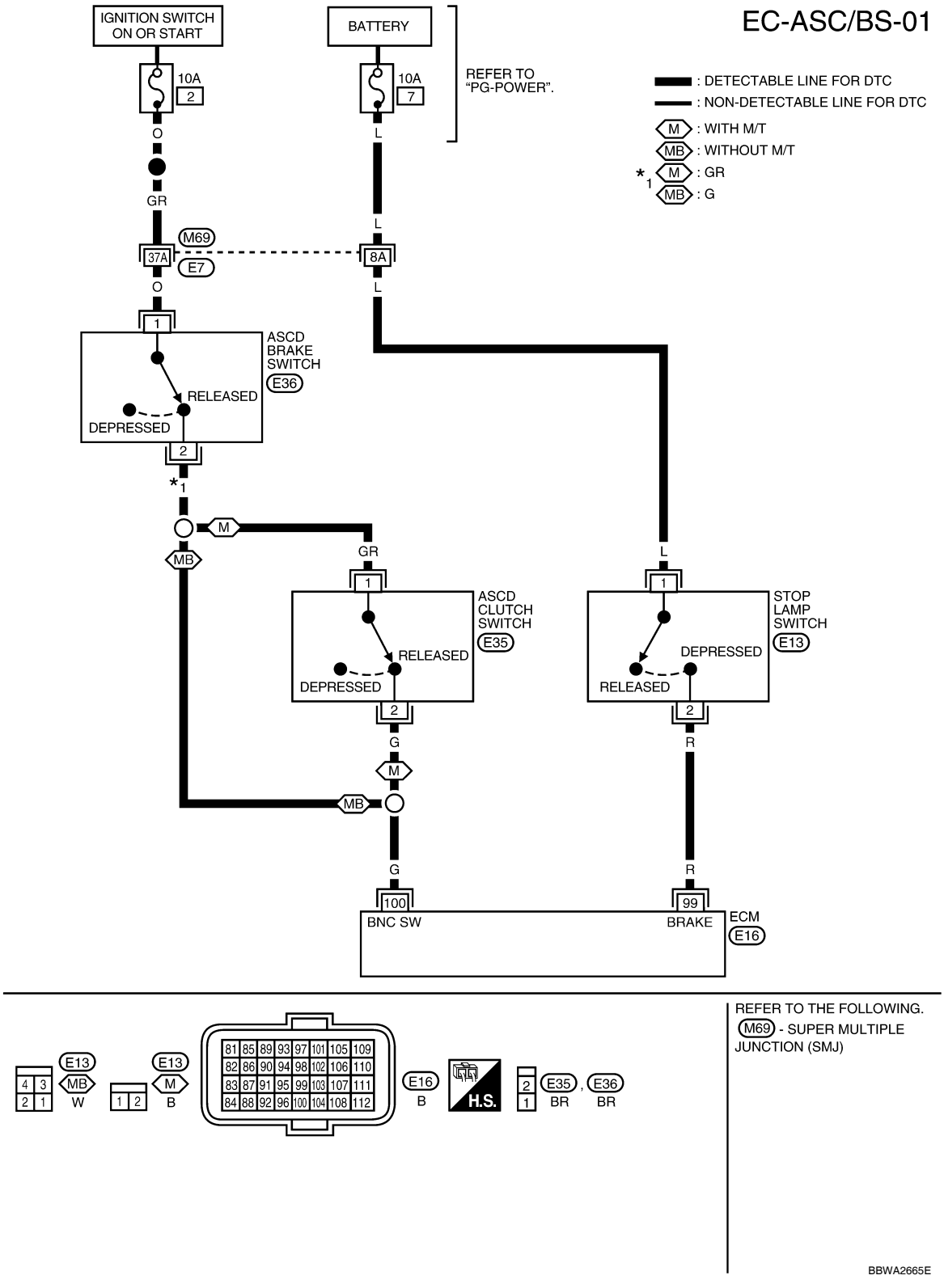
7. Check 1st trip DTC.
8. If 1st trip DTC is detected, go to EC-1432, "Diagnosis Procedure".

WITH GST

Follow the procedure “WITH CONSULT-III” above.

Wiring Diagram

INFOID:0000000004500312



Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
99	R	Stop lamp switch	**[Ignition switch: ON]** • Brake pedal: Fully released	Approximately 0V
			[Ignition switch: ON] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
100	G	ASCD brake switch	• Brake pedal: Slightly depressed (A/T, CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	Approximately 0V
			• Brake pedal: Fully released (A/T, CVT) • Brake pedal and clutch pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:0000000004500313

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.

M/T models

CONDITION	INDICATION
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON

A/T and CVT models

CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON

Without CONSULT-III

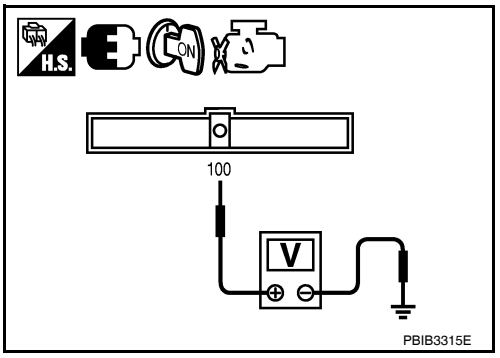
1. Turn ignition switch ON.
2. Check voltage between ECM terminal 100 and ground under the following conditions.

M/T models

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage

A/T and CVT models

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage



OK or NG

OK >> GO TO 2.
NG (M/T models) >>GO TO 3.
NG (A/T and CVT models) >>GO TO 4.

2.CHECK OVERALL FUNCTION-II

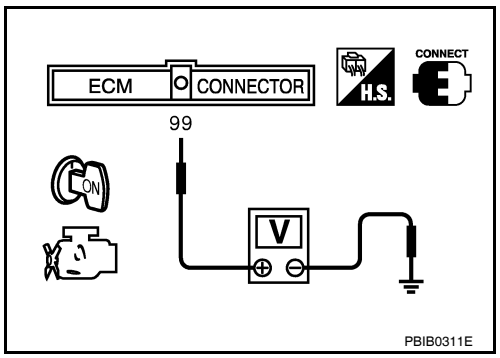
With CONSULT-III

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON

Without CONSULT-III

Check voltage between ECM terminal 99 and ground under the following conditions.



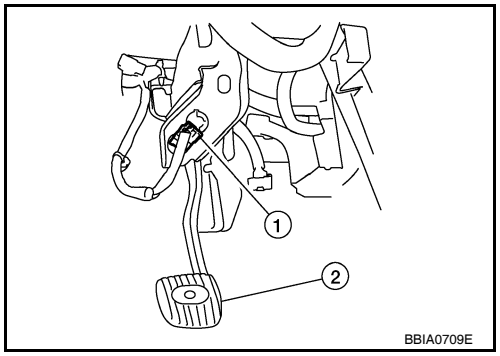
CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

OK or NG

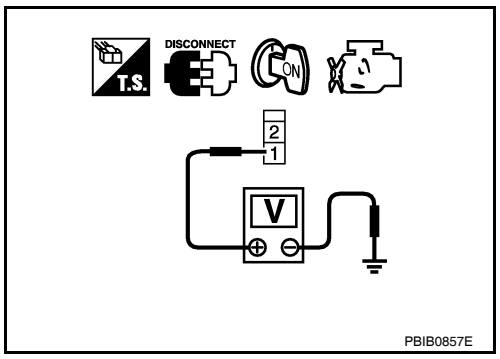
OK >> GO TO 15.
NG >> GO TO 11.

3. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch (1) harness connector.
- Clutch pedal (2)
3. Turn ignition switch ON.



4. Check voltage between ASCD clutch switch terminal 1 and ground under the following conditions with CONSULT-III or tester.



CONDITION	VOLTAGE
Brake pedal: Fully released	Battery voltage
Brake pedal: Slightly depressed	Approx. 0V

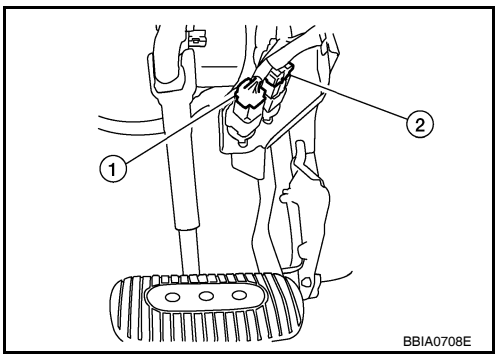
OK or NG

OK >> GO TO 9.
NG >> GO TO 4.

4. CHECK ASCD BRAKE SWITCH POWER SUPPLY

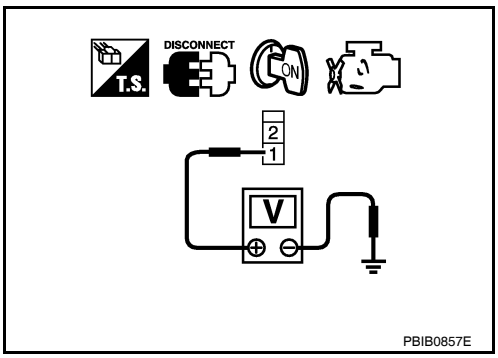
1. Turn ignition switch OFF.

2. Disconnect ASCD brake switch (2) harness connector.
- Stop lamp switch (1)
3. Turn ignition switch ON.



4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK (M/T models) >>GO TO 6.
OK (A/T and CVT models) >>GO TO 7.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 100 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK ASCD BRAKE SWITCH

Refer to EC-1436, "Component Inspection".

OK or NG

OK >> GO TO 15.
NG >> Replace ASCD brake switch.

9. CHECK ASCD CLUTCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 100 and ASCD clutch switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ASCD CLUTCH SWITCH

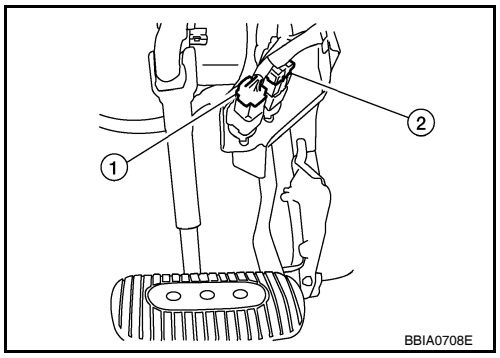
Refer to EC-1436, "Component Inspection"

OK or NG

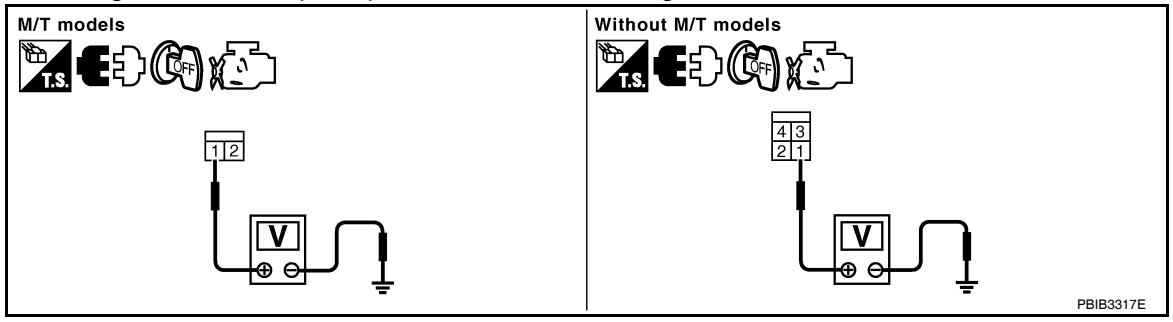
OK >> GO TO 15.
NG >> Replace ASCD clutch switch.

11. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch (1) harness connector.
- ASCD brake switch (2)



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- 10A fuse

• Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 99 and stop lamp switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 14.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK STOP LAMP SWITCH

Refer to EC-1436, "Component Inspection"

OK or NG

OK >> GO TO 15.
NG >> Replace stop lamp switch.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

Component Inspection

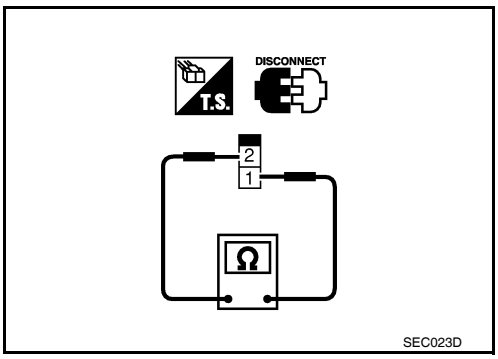
INFOID:0000000004500314

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released.	Should exist.
Brake pedal: Slightly depressed.	Should not exist.

If NG, adjust ASCD brake switch installation, refer to BR-6, and perform step 3 again.



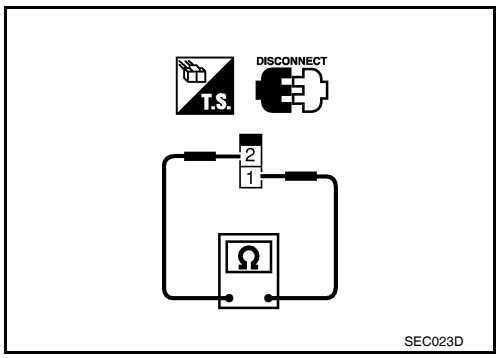
ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.

3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

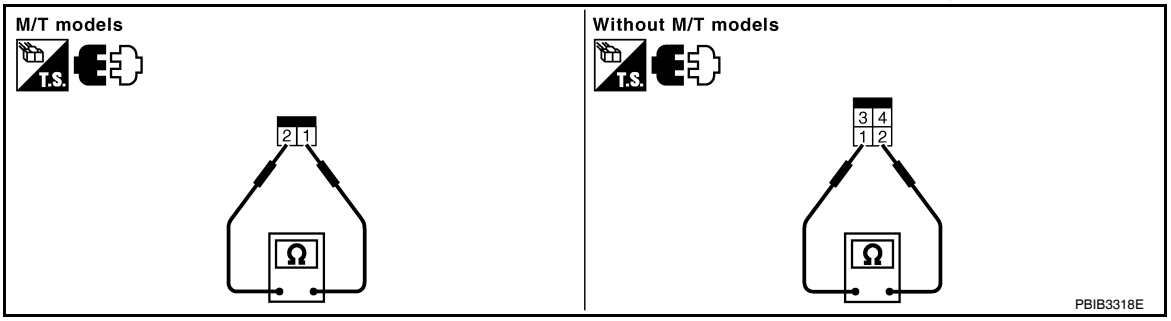
Condition	Continuity
Clutch pedal: Fully released.	Should exist.
Clutch pedal: Slightly depressed.	Should not exist.

If NG, adjust ASCD clutch switch installation, refer to CL-5, and perform step 3 again.



STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released.	Should not exist.
Brake pedal: Slightly depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to BR-6, and perform step 3 again.

DTC P1574 ASCD VEHICLE SPEED SENSOR

Component Description

INFOID:0000000004500315

The ECM receives two vehicle speed signals via CAN communication line. One is sent from "ABS actuator and electric unit (control unit)" or combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-1033 for ASCD functions.

On Board Diagnosis Logic

INFOID:0000000004500316

NOTE:
- **If DTC P1574 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-1387.**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1393.**
- **If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1395.**

This self-diagnosis has the one trip detection logic.
The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1574 1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	• Harness or connectors (CAN communication line is open or shorted.) • Harness or connectors (Combination meter circuit is open or shorted.) • TCM • ABS actuator and electric unit (control unit) • Combination meter • ECM

DTC Confirmation Procedure

INFOID:0000000004500317

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Step 3 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

1. Start engine.
2. Drive the vehicle at more than 40 km/h (25MPH).
3. Check DTC.
4. If DTC is detected, go to EC-1438, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004500318

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-39 (A/T) or CVT-209 (CVT).

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT”

Refer to BRC-8.

OK or NG

OK >> GO TO 3.

NG >> Repair or replace.

3. CHECK COMBINATION METER

Check combination meter function.
Refer to DI-3.

>> **INSPECTION END**

DTC P1715 INPUT SPEED SENSOR (TURBINE REVOLUTION SENSOR)

Description

INFOID:0000000004500319

ECM receives turbine revolution sensor signal from TCM through CAN communication line. ECM uses this signal for engine control.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004500320

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
I/P PULLY SPD	• Vehicle speed: More than 20 km/h (12MPH)	Almost the same speed as the tachometer indication

On Board Diagnosis Logic

INFOID:0000000004500321

NOTE:
- **If DTC P1715 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to EC-1293.**
- **If DTC P1715 is displayed with DTC P0340 first perform the trouble diagnosis for DTC P0340. Refer to EC-1299.**
- **If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1393.**
- **If DTC P1715 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1395.**

The MIL will not lights up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715 1715	Input speed sensor (Turbine revolution sensor) (TCM output)	Turbine revolution sensor signal is different from the theoretical value calculated by ECM from revolution sensor signal and engine rpm signal.	• Harness or connectors (CAN communication line is open or shorted) • Harness or connectors (Turbine revolution sensor circuit is open or shorted) • TCM

Diagnosis Procedure

INFOID:0000000004500322

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-39.

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM. Refer to AT-42.

>> **INSPECTION END**

DTC P1715 INPUT SPEED SENSOR (PRIMARY SPEED SENSOR)

Description

INFOID:0000000004500323

ECM receives primary speed sensor signal from TCM through CAN communication line.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004500324

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
I/P PULLY SPD	• Vehicle speed: More than 20 km/h (12MPH)	Almost the same speed as the tachometer indication

On Board Diagnosis Logic

INFOID:0000000004500325

NOTE:
- **If DTC P1715 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to EC-1293.**
- **If DTC P1715 is displayed with DTC P0340 first perform the trouble diagnosis for DTC P0340. Refer to EC-1299.**
- **If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1393.**
- **If DTC P1715 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1395.**

The MIL will not lights up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715 1715	Input speed sensor (Primary speed sensor) (TCM output)	Primary speed sensor signal is different from the theoretical value calculated by ECM from secondary speed sensor signal and engine rpm signal.	• Harness or connectors (CAN communication line is open or shorted) • Harness or connectors (Primary speed sensor circuit is open or shorted) • TCM

DTC Confirmation Procedure

INFOID:0000000004500326

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

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.
4. If 1st trip DTC is detected, go to EC-1441, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000004500327

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to CVT-209.

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2.REPLACE TCM

Replace TCM. Refer to CVT-340, "Removal and Installation".

>> **INSPECTION END**

DTC P1805 BRAKE SWITCH

Description

INFOID:0000000004500328

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.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004500329

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

INFOID:0000000004500330

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805 1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	• Harness or connectors (Stop lamp switch circuit is open or shorted.) • Stop lamp switch

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters in fail-safe mode.

Engine operation condition in fail-fail safe mode	
ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.	
Vehicle condition	Driving condition
Engine: Idling	Normal
Accelerating	Poor acceleration

DTC Confirmation Procedure

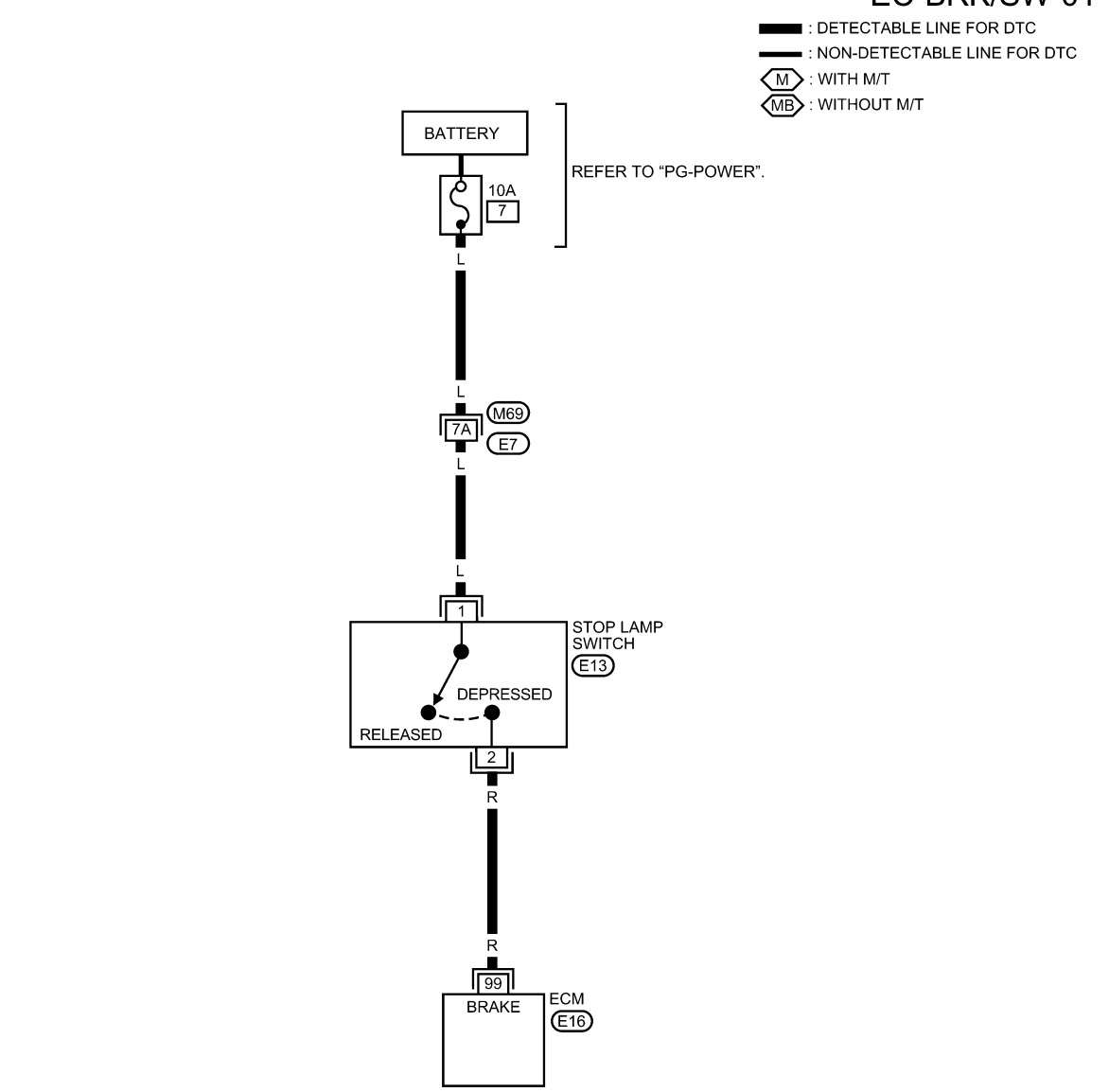
INFOID:0000000004500331

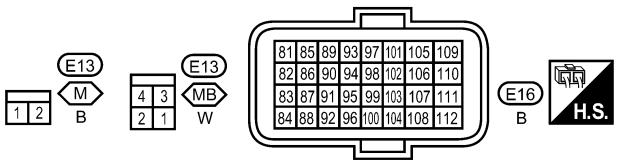
1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC.
4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to EC-1445, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004500332

EC-BRK/SW-01





REFER TO THE FOLLOWING.
M69 - SUPER MULTIPLE JUNCTION (SMJ)

AABWA0322GE

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
99	R	Stop lamp switch	**[Ignition switch: OFF]** • Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:0000000004500333

1.CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

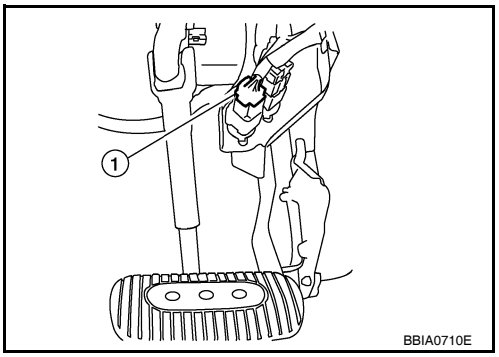
Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

OK or NG

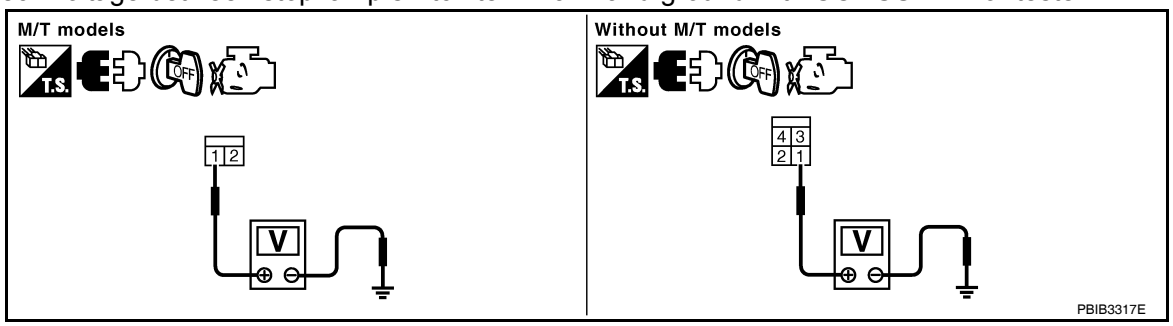
OK >> GO TO 4.
NG >> GO TO 2.

2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch (1) harness connector.
- Brake pedal (2)



2. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- 10A fuse
- Harness for open and 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 stop lamp switch (1) harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between stop lamp switch terminal 2 and ECM terminal 99. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness connectors.

5. CHECK STOP LAMP SWITCH

Refer to EC-1446, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace stop lamp switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

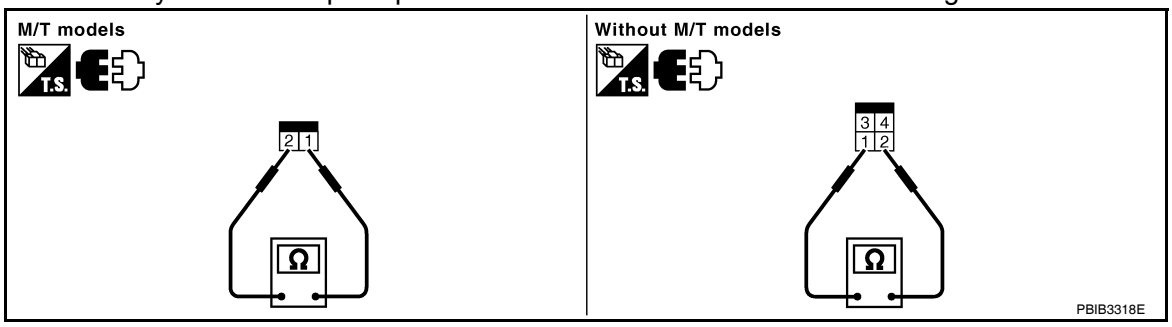
>> **INSPECTION END**

Component Inspection

INFOID:0000000004500334

STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released.	Should not exist.
Brake pedal: Slightly depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to BR-6, and perform step 3 again.

DTC P2100, P2103 THROTTLE CONTROL MOTOR RELAY

Component Description

INFOID:0000000004500335

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.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004500336

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	• Ignition switch: ON	ON

On Board Diagnosis Logic

INFOID:0000000004500337

These self-diagnoses have one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2100 2100	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 2103	Throttle control motor relay circuit short	ECM detects the throttle control motor relay is stuck ON.	• Harness or connectors (Throttle control motor relay circuit is shorted) • Throttle control motor relay

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

INFOID:0000000004500338

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR 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 1st trip DTC.
4. If DTC is detected, go to EC-1449, "Diagnosis Procedure".

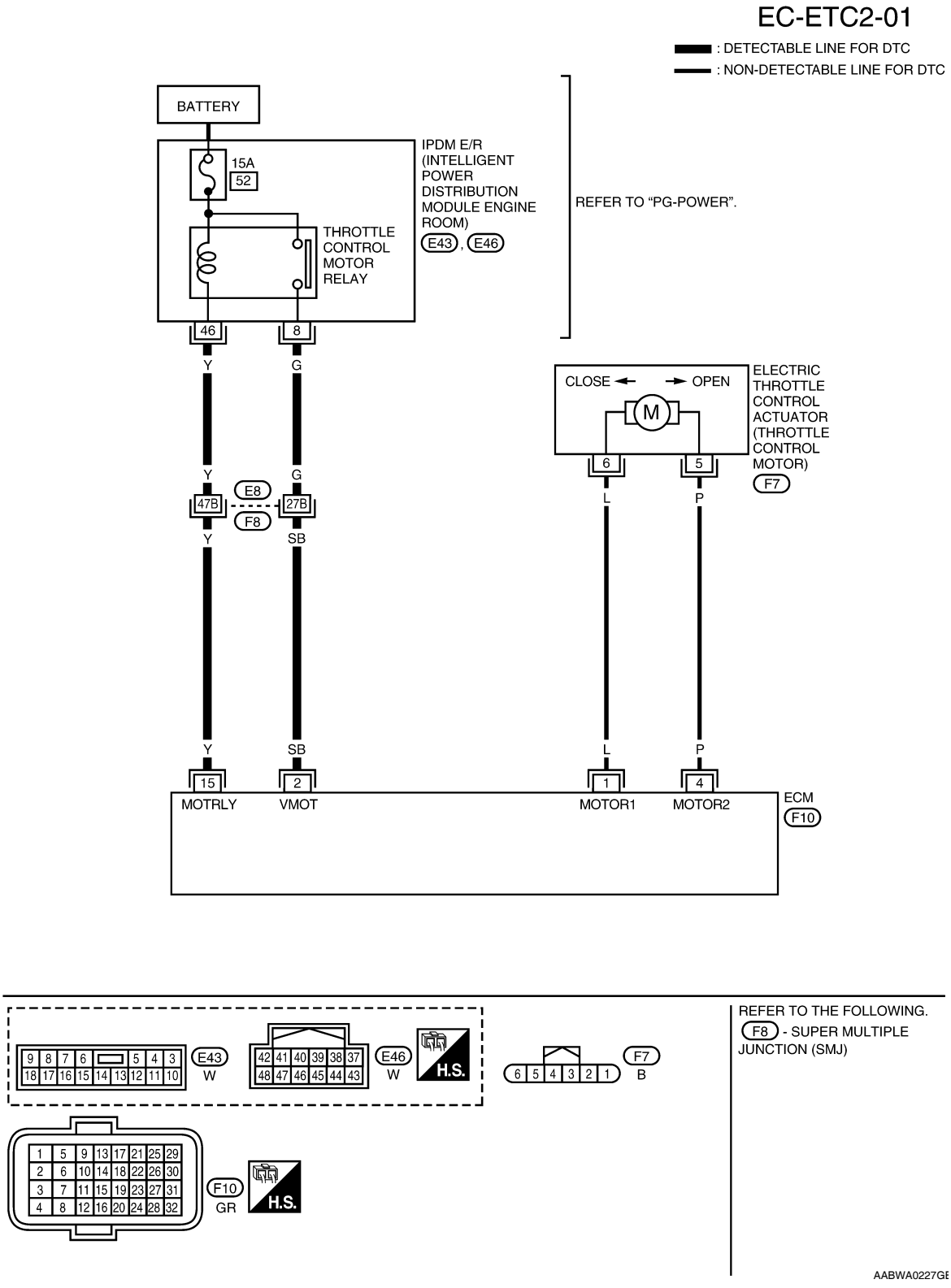
PROCEDURE FOR DTC P2103

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-1449, "Diagnosis Procedure".

Wiring Diagram

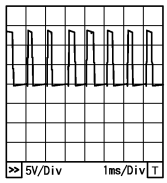
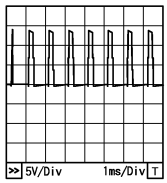
INFOID:0000000004500339



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L	Throttle control motor (Open)	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Approximately 3.2V  PBIA8150J
2	SB	Throttle control motor power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	P	Throttle control motor (Close)	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	Approximately 1.8V  PBIA8149J
15	Y	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004500340

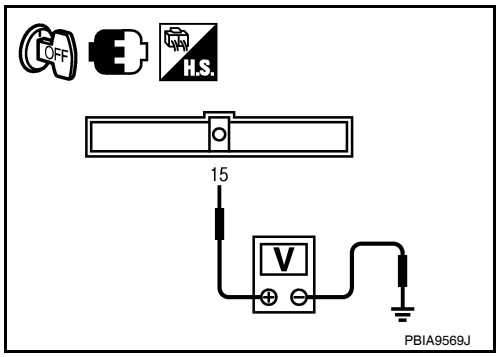
1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Check voltage between ECM terminal 15 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 2.



PBIA9569J

2. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E46.
3. Check continuity between ECM terminal 15 and IPDM E/R terminal 46. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK FUSE

1. Disconnect 15A fuse.
2. Check 15A fuse for blown.

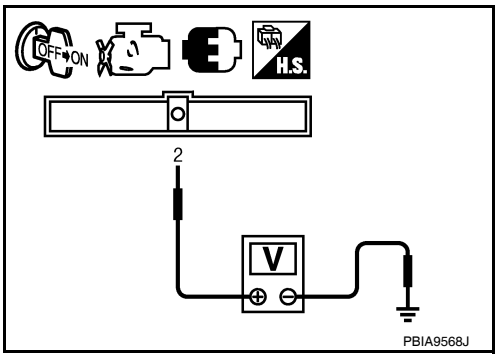
OK or NG

OK >> GO TO 8.
NG >> Replace 15A fuse.

5.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

Check voltage between ECM terminal 2 and ground under the following conditions with CONSULT-III or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)



OK or NG

OK >> GO TO 8.
NG >> GO TO 6.

6.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector E43.
4. Check continuity between ECM terminal 2 and IPDM E/R terminal 8. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

OK or NG

OK >> Replace IPDM E/R. Refer to PG-27, "Removal and Installation of IPDM E/R".
NG >> Repair or replace harness or connectors.

DTC P2101 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:0000000004500341

NOTE:
If DTC P2101 is displayed with DTC P2100 or P2119, first perform the trouble diagnosis for DTC P2100 or P2119. Refer to EC-1447or EC-1462.
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.

On Board Diagnosis Logic

INFOID:0000000004500342

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2101 2101	Electric throttle control performance	Electric throttle control function does not operate properly.	• Harness or connectors (Throttle control motor circuit is open or shorted) • Electric throttle control actuator

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

INFOID:0000000004500343

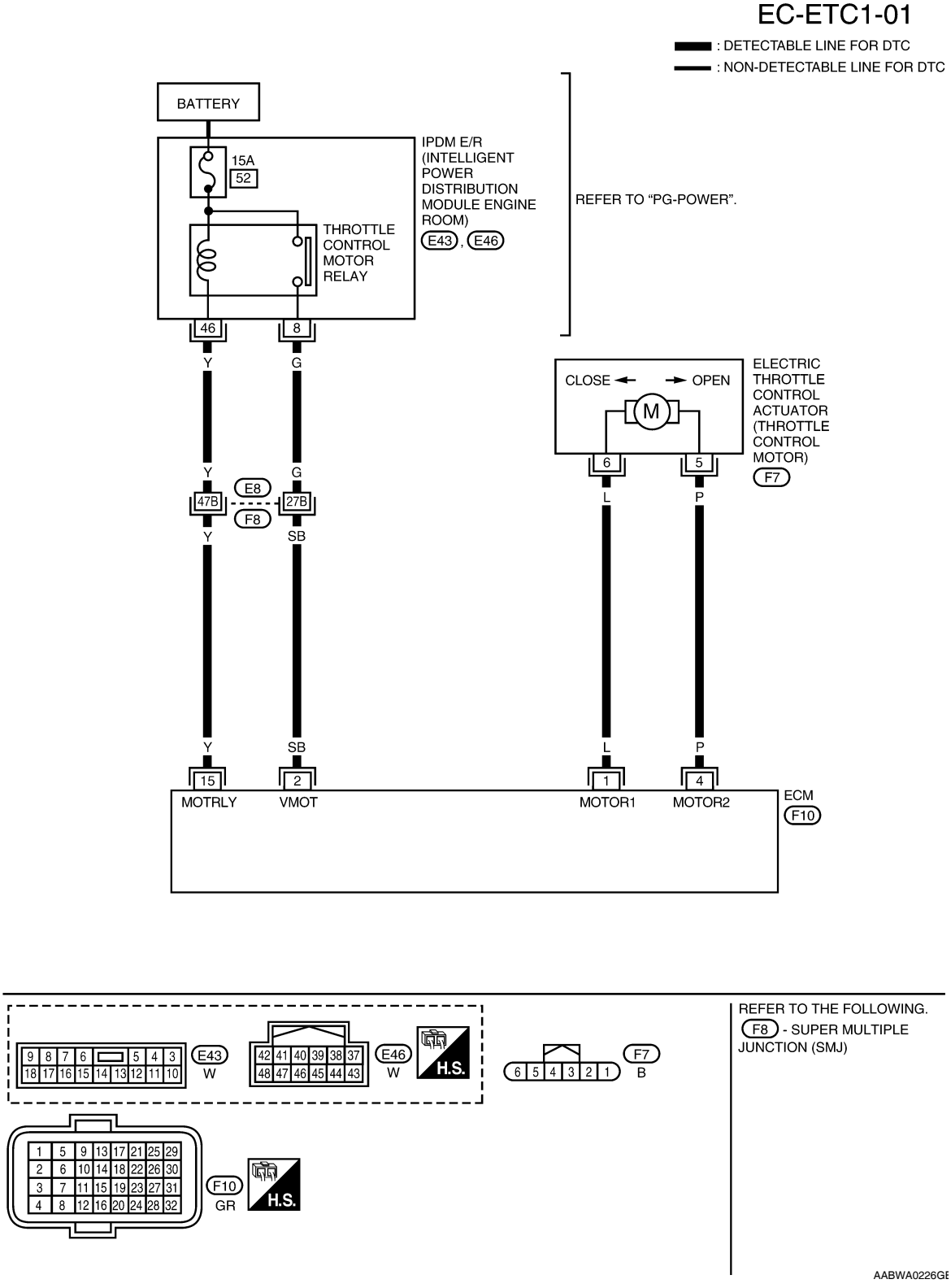
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V when engine is running.

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.
4. If DTC is detected, go to EC-1453, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004500344

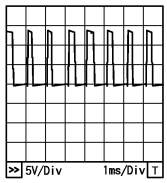
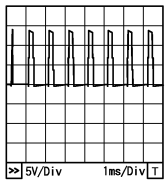
EC-ETC1-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L	Throttle control motor (Open)	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Approximately 3.2V  PBIA8150J
2	SB	Throttle control motor power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	P	Throttle control motor (Close)	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	Approximately 1.8V  PBIA8149J
15	Y	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

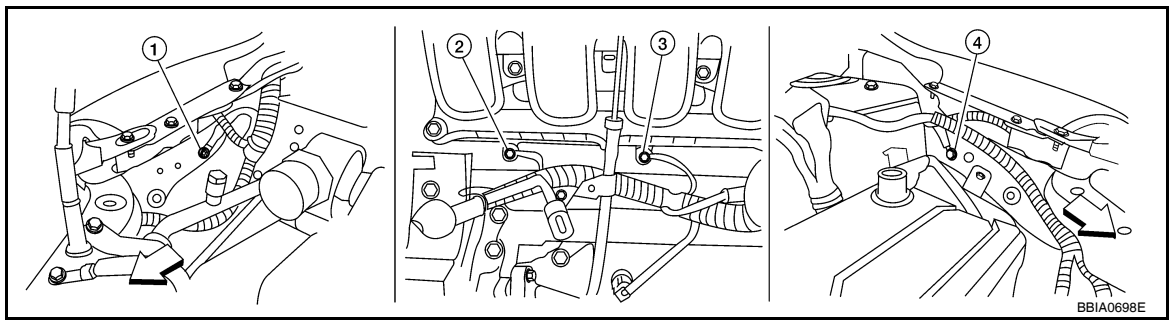
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004500345

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

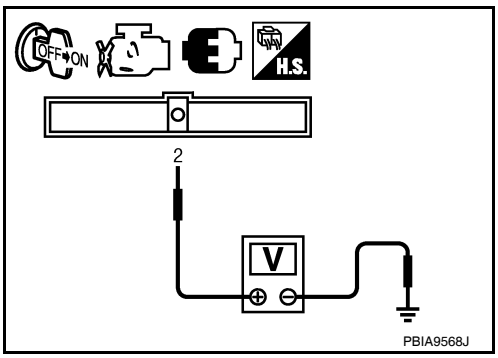
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-I

Check voltage between ECM terminal 2 and ground under the following conditions with CONSULT-III or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)



OK or NG

OK >> GO TO 10.
NG >> GO TO 3.

3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector E43.
4. Check continuity between ECM terminal 2 and IPDM E/R terminal 8. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

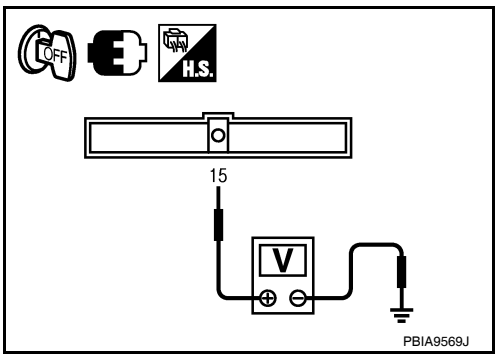
Check the following.
- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Reconnect all harness connectors disconnected.
2. Check voltage between ECM terminal 15 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 9.
NG >> GO TO 6.

6. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E46.
3. Check harness continuity between ECM terminal 15 and IPDM E/R terminal 46. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between ECM and IPDM E/R

>> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK FUSE

1. Disconnect 15A fuse.
2. Check 15A fuse for blown.

OK or NG

OK >> GO TO 9.
NG >> Replace 15A fuse.

9.CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

OK or NG

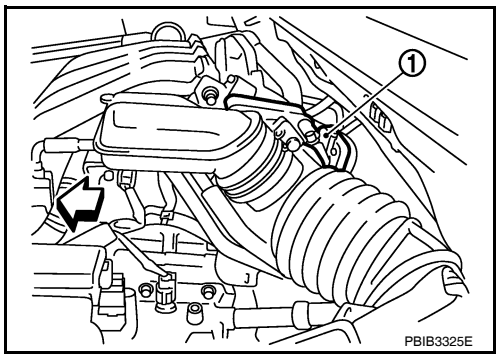
OK >> Replace IPDM E/R. Refer to PG-27, "Removal and Installation of IPDM E/R".
NG >> Repair or replace harness or connectors.

10.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator (1) harness connector.

- : Vehicle front

3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.



Electric throttle control actuator terminal	ECM terminal	Continuity
5	1	Should not exist.
	4	Should exist.
6	1	Should exist.
	4	Should not exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

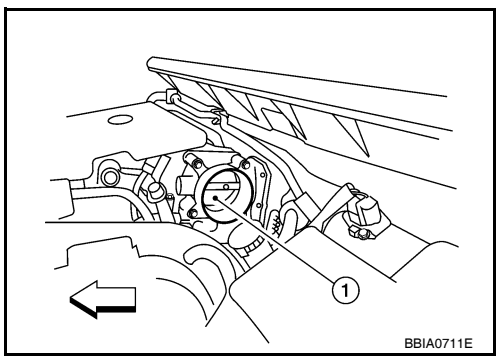
11.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve (1) and the housing.

- : Vehicle front

OK or NG

OK >> GO TO 12.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



12.CHECK THROTTLE CONTROL MOTOR

Refer to EC-1456, "Component Inspection".

OK or NG

OK >> GO TO 13.
NG >> GO TO 14.

13. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

OK or NG

OK >> GO TO 14.
NG >> Repair or replace harness or connectors.

14. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-1084, "Throttle Valve Closed Position Learning".
3. Perform EC-1084, "Idle Air Volume Learning".

>> **INSPECTION END**

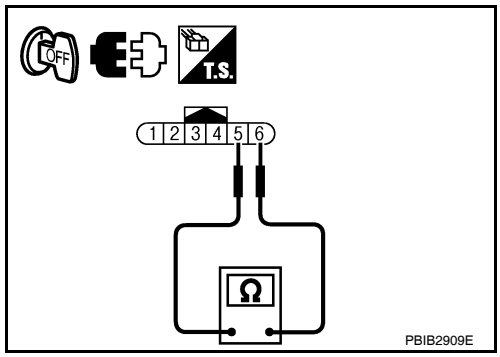
Component Inspection

INFOID:0000000004500346

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 5 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]



3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-1084, "Throttle Valve Closed Position Learning".
5. Perform EC-1084, "Idle Air Volume Learning".

Removal and Installation

INFOID:0000000004500347

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-141.

DTC P2118 THROTTLE CONTROL MOTOR

Component Description

INFOID:0000000004500348

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.

On Board Diagnosis Logic

INFOID:0000000004500349

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2118 2118	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	• Harness or connectors (Throttle control motor circuit is shorted.) • Electric throttle control actuator (Throttle control motor)

FAIL-SAFE MODE
When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

INFOID:0000000004500350

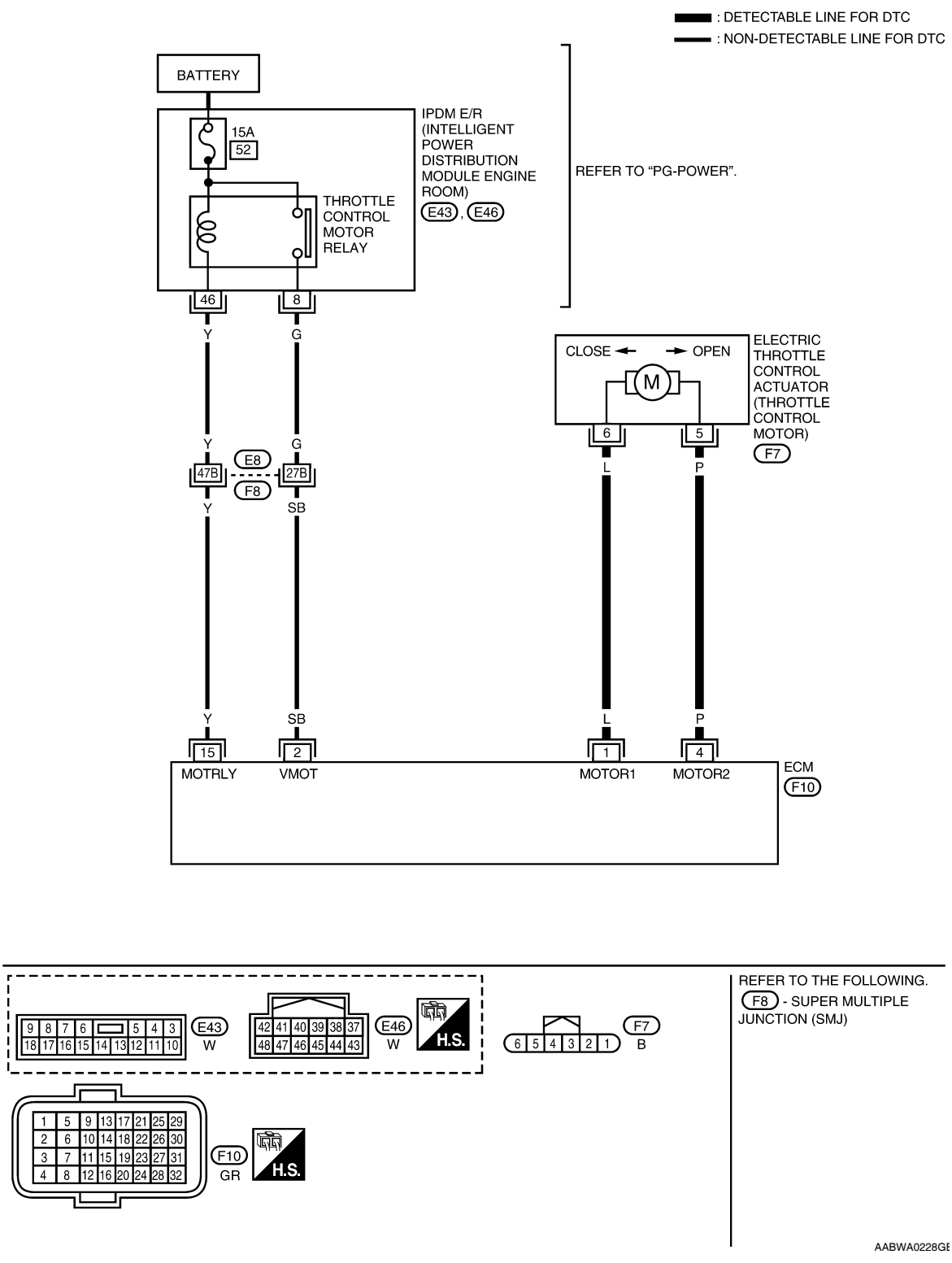
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.
4. If DTC is detected, go to EC-1459, "Diagnosis Procedure".

Wiring Diagram

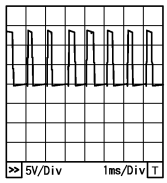
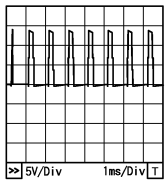
INFOID:0000000004500351

EC-ETC3-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	L	Throttle control motor (Open)	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Approximately 3.2V  PBIA8150J
2	SB	Throttle control motor power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	P	Throttle control motor (Close)	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	Approximately 1.8V  PBIA8149J
15	Y	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

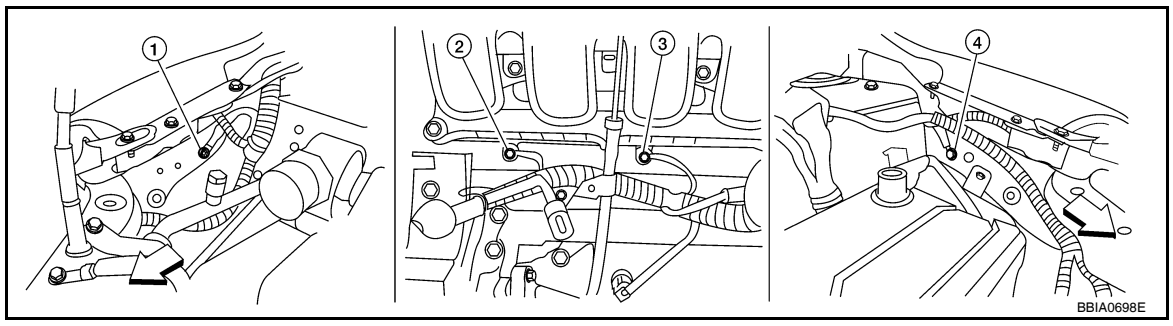
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004500352

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

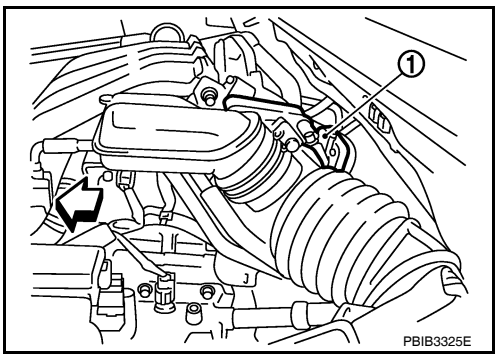
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Disconnect electric throttle control actuator (1) harness connector.
- : Vehicle front
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.



Electric throttle control actuator terminal	ECM terminal	Continuity
5	1	Should not exist.
	4	Should exist.
6	1	Should exist.
	4	Should not exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK THROTTLE CONTROL MOTOR

Refer to EC-1460, "Component Inspection".

OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4.CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5.REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-1084, "Throttle Valve Closed Position Learning".
3. Perform EC-1084, "Idle Air Volume Learning".

>> **INSPECTION END**

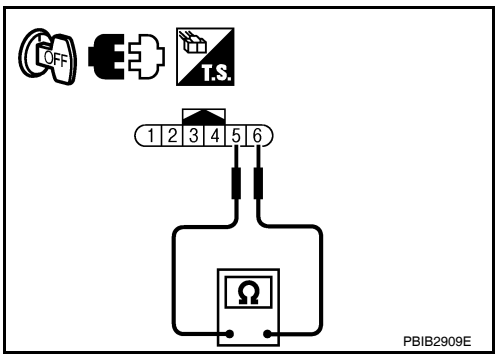
Component Inspection

INFOID:0000000004501214

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 5 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]



3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-1084, "Throttle Valve Closed Position Learning".
5. Perform EC-1084, "Idle Air Volume Learning".

Removal and Installation

INFOID:0000000004501215

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-141.

DTC P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

Component Description

INFOID:0000000004500355

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.

On Board Diagnosis Logic

INFOID:0000000004500356

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P2119 2119	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 detects the throttle valve is stuck open.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Malfunction A	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.
Malfunction B	ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
Malfunction C	While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position (A/T, CVT), neutral (M/T), and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

INFOID:0000000004500357

NOTE:
- **Perform PROCEDURE FOR MALFUNCTION A AND B first. If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION C.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A AND B

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to D position (A/T, CVT) or 1st position (M/T), and wait at least 3 seconds.
3. Set shift lever to P position (A/T, CVT) or Neutral position (M/T).
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 position (A/T, CVT) or 1st position (M/T), and wait at least 3 seconds.
7. Set shift lever to P position (A/T, CVT) or Neutral position (M/T).
8. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
9. Check DTC.
10. If DTC is detected, go to EC-1463, "Diagnosis Procedure".

PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Set shift lever to D position (A/T, CVT) or 1st position (M/T) and wait at least 3 seconds.

3. Set shift lever to N, P position (A/T, CVT) or Neutral (M/T) position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.
6. If DTC is detected, go to EC-1463, "Diagnosis Procedure".

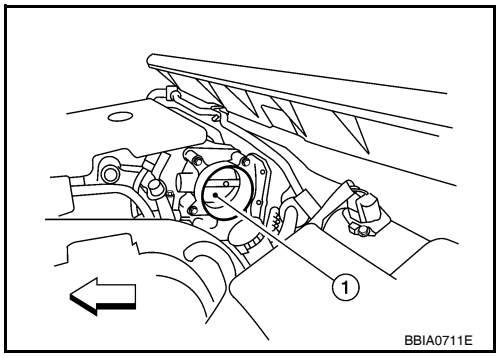
Diagnosis Procedure

INFOID:0000000004500358

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if a foreign matter is caught between the throttle valve (1) and the housing.

- : Vehicle front



OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-1084, "Throttle Valve Closed Position Learning".
3. Perform EC-1084, "Idle Air Volume Learning".

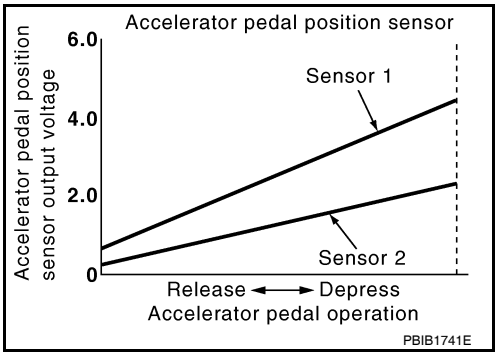
>> **INSPECTION END**

DTC P2122, P2123 APP SENSOR

Component Description

INFOID:0000000004500359

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.

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004500360

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2*	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

INFOID:0000000004500361

These self-diagnoses have the one trip detection logic.
NOTE:
If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-1396.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122 2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	• Harness or connectors (APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1)
P2123 2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:0000000004500362

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

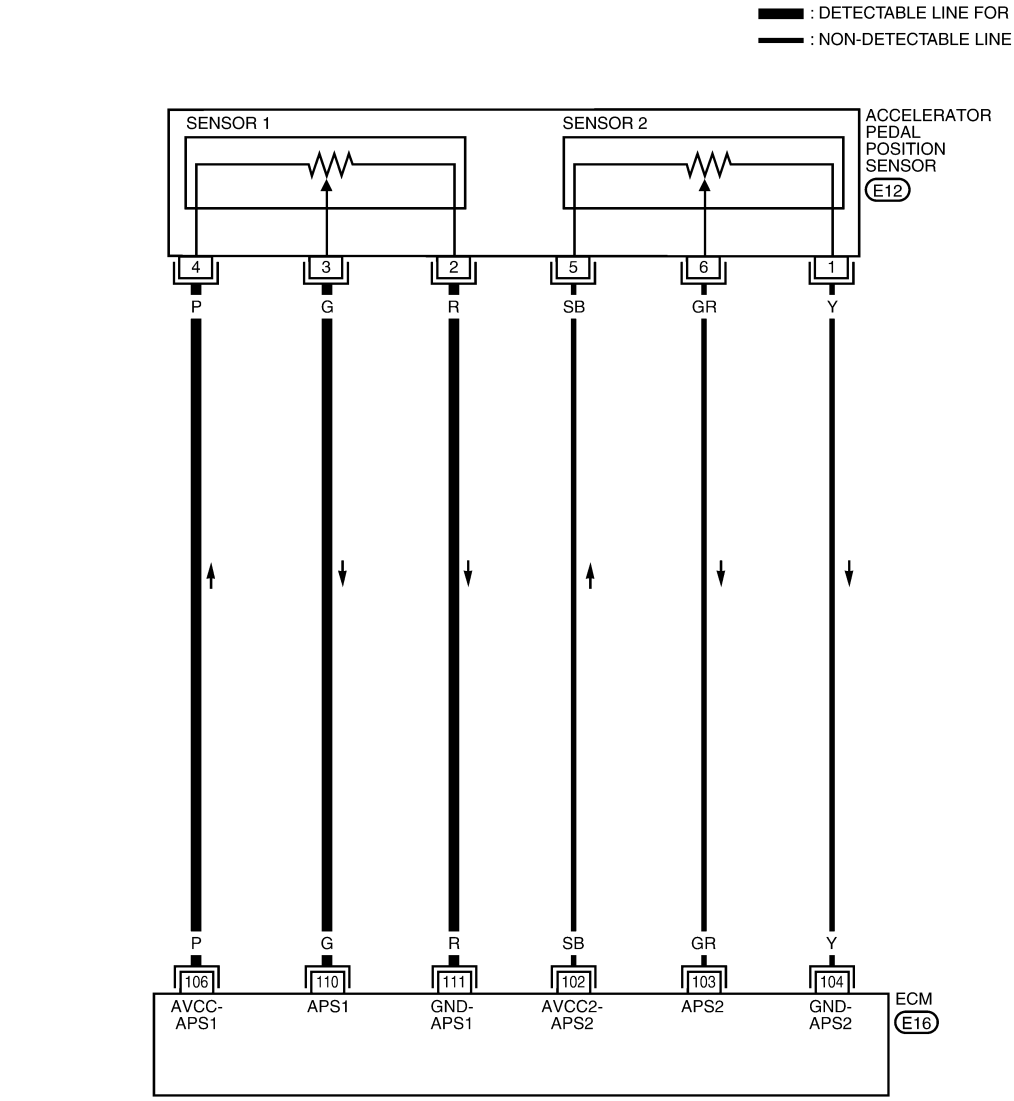
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

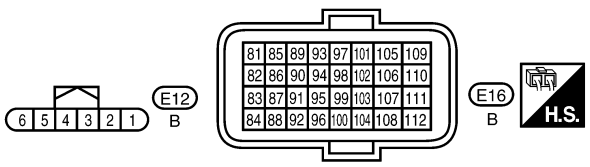
1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-1466, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004500363

EC-APPS1-01





BBWA2652E

Specification data are reference values and are measured between each terminal 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.

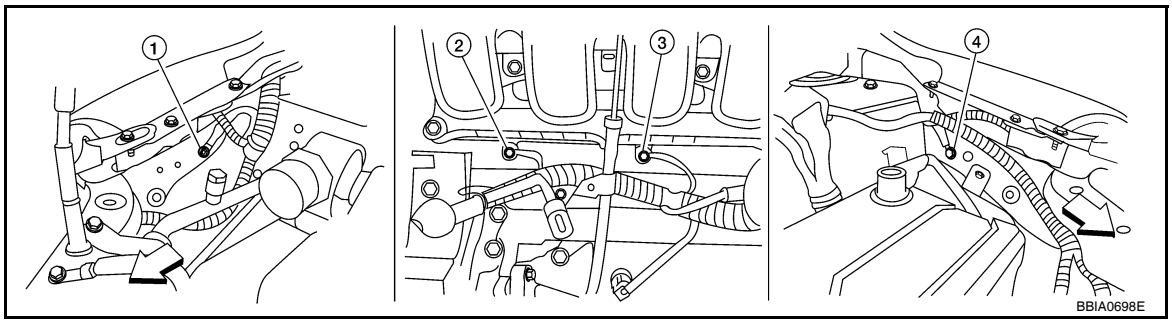
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	SB	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V
103	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4V
104	Y	Sensor ground (APP sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
106	P	Sensor power supply (APP sensor 1)	**[Ignition switch: ON]**	Approximately 5V
110	G	Accelerator pedal position sensor 1	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7V
111	R	Sensor ground (APP sensor 1)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:0000000004500364

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

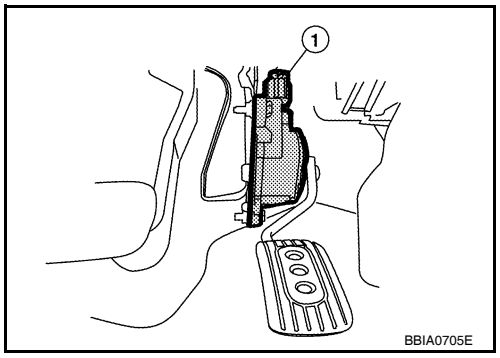
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

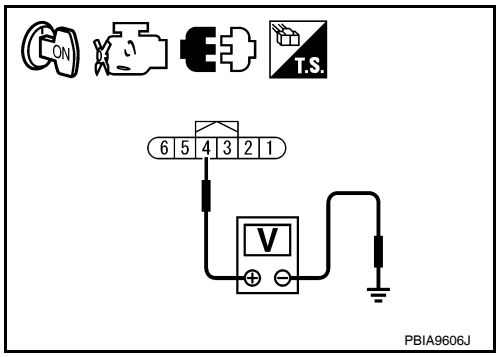
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 4 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 111 and APP sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 110 and APP sensor terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-1468, "Component Inspection".

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.

2. Perform EC-1084, "Accelerator Pedal Released Position Learning".
3. Perform EC-1084, "Throttle Valve Closed Position Learning".
4. Perform EC-1084, "Idle Air Volume Learning".

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

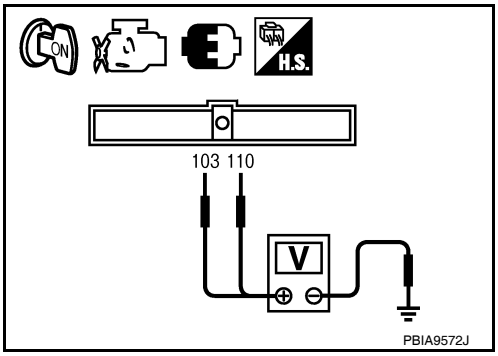
>> **INSPECTION END**

Component Inspection

INFOID:0000000004500365

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 110 (APP sensor 1 signal), 103 (APP sensor 2 signal) and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
110 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.9V
	Fully depressed	3.9 - 4.7V
103 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.6V
	Fully depressed	1.95 - 2.4V

4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-1084, "Accelerator Pedal Released Position Learning".
6. Perform EC-1084, "Throttle Valve Closed Position Learning".
7. Perform EC-1084, "Idle Air Volume Learning".

Removal and Installation

INFOID:0000000004500366

ACCELERATOR PEDAL

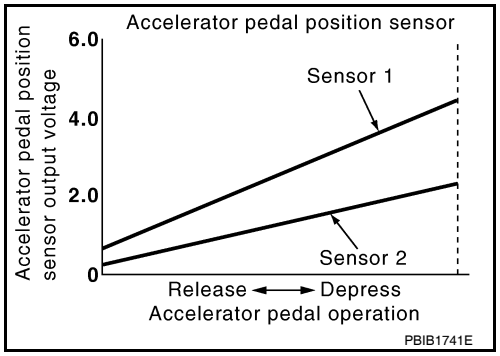
Refer to ACC-3.

DTC P2127, P2128 APP SENSOR

Component Description

INFOID:0000000004501216

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.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004501217

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2*	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

INFOID:0000000004500369

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127 2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	• Harness or connectors (APP sensor 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • EVAP control system pressure sensor • Accelerator pedal position sensor (APP sensor 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor
P2128 2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:0000000004500370

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

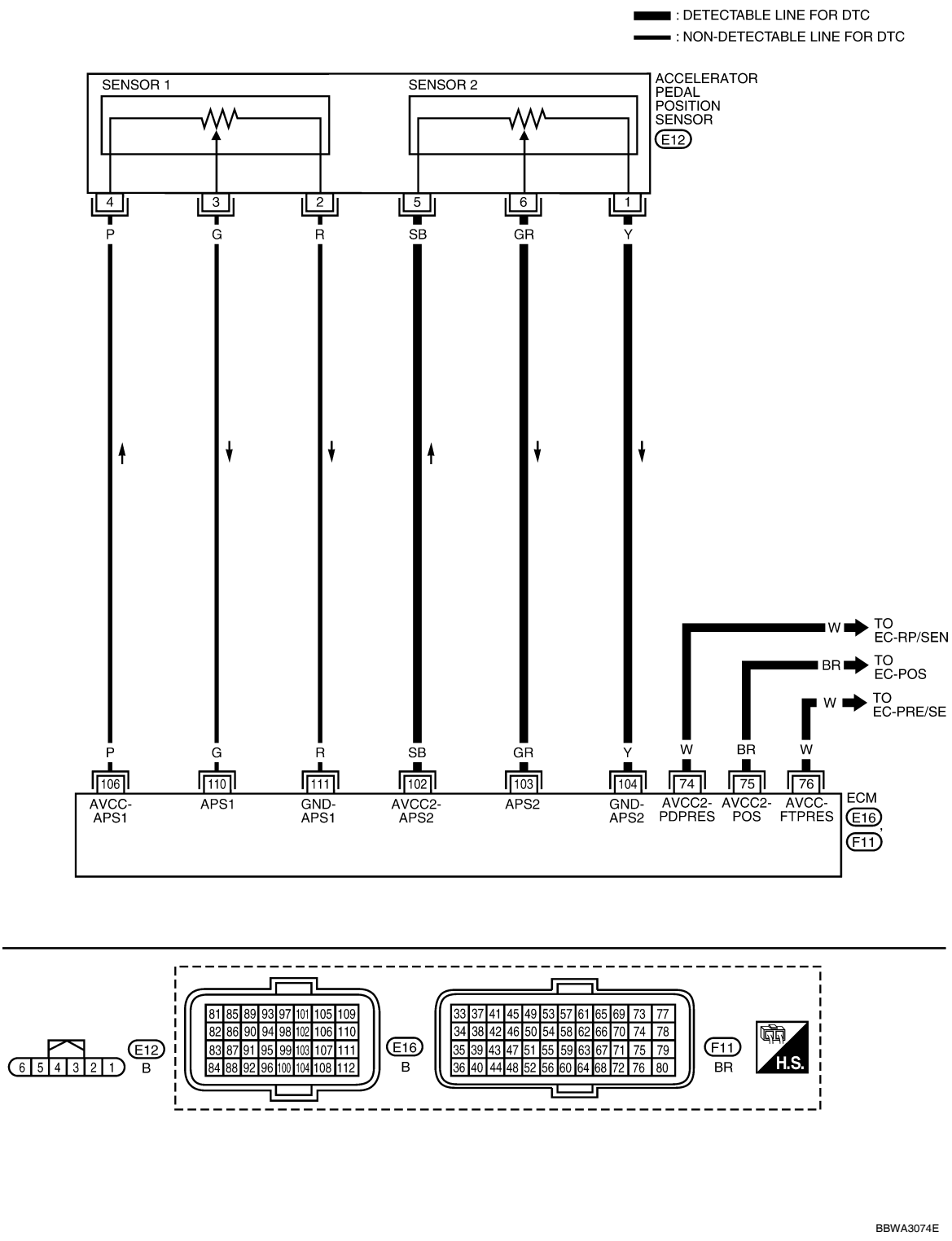
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-1472, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004500371

EC-APPS2-01



BBWA3074E

Specification data are reference values and are measured between each terminal 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.

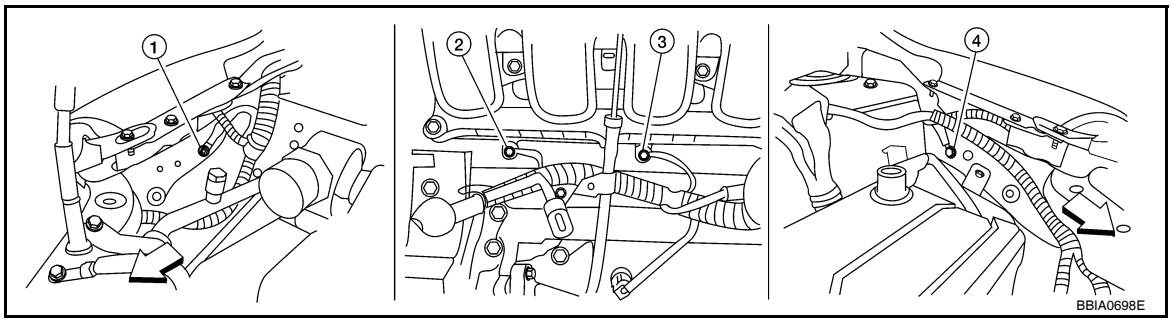
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	W	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
75	BR	Sensor power supply [Crankshaft position sensor (POS)]	**[Ignition switch: ON]**	Approximately 5V
76	W	EVAP control system pressure sensor power supply	**[Ignition switch: ON]**	Approximately 5V
102	SB	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V
103	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4V
104	Y	Sensor ground (APP sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
106	P	Sensor power supply (APP sensor 1)	**[Ignition switch: ON]**	Approximately 5V
110	G	Accelerator pedal position sensor 1	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7V
111	R	Sensor ground (APP sensor 1)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:0000000004500372

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

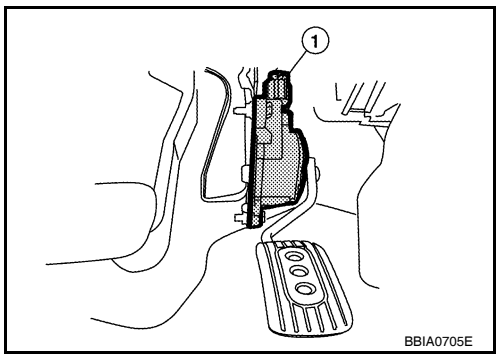
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

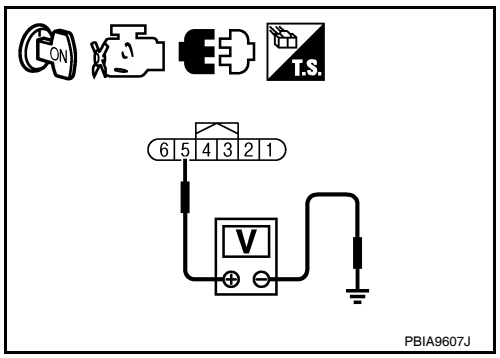
2.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 5 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 6.
NG >> GO TO 3.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 5 and ECM terminal 102. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4.CHECK COMPONENTS POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
74	Refrigerant pressure sensor terminal 3	EC-1528, "Wiring Diagram"
75	Crankshaft position sensor (POS) terminal 1	EC-1294, "Wiring Diagram"
76	EVAP control system pressure sensor terminal 3	EC-1353, "Wiring Diagram"
102	APP sensor terminal 5	EC-1471, "Wiring Diagram"

OK or NG

OK >> GO TO 5.
NG >> 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-1298, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-1350, "Component Inspection".)

• Refrigerant pressure sensor (Refer to MTC-37.)

OK or NG

OK >> GO TO 10.
NG >> 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 harness continuity between ECM terminal 104 and APP sensor terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> 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 harness continuity between ECM terminal 103 and APP sensor terminal 6. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK APP SENSOR

Refer to EC-1474, "Component Inspection".

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-1084, "Accelerator Pedal Released Position Learning".
3. Perform EC-1084, "Throttle Valve Closed Position Learning".
4. Perform EC-1084, "Idle Air Volume Learning".

>> **INSPECTION END**

10.CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

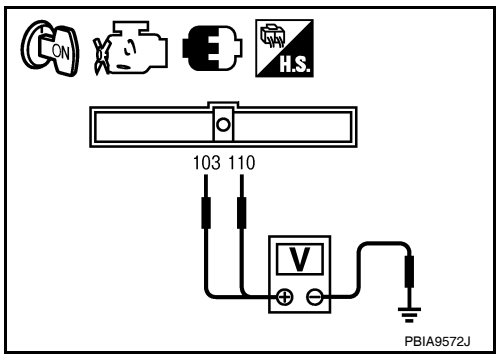
Component Inspection

INFOID:0000000004501221

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.

3. Check voltage between ECM terminals 110 (APP sensor 1 signal), 103 (APP sensor 2 signal) and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
110 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.9V
	Fully depressed	3.9 - 4.7V
103 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.6V
	Fully depressed	1.95 - 2.4V

4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-1084, "Accelerator Pedal Released Position Learning".
6. Perform EC-1084, "Throttle Valve Closed Position Learning".
7. Perform EC-1084, "Idle Air Volume Learning".

Removal and Installation

INFOID:0000000004501222

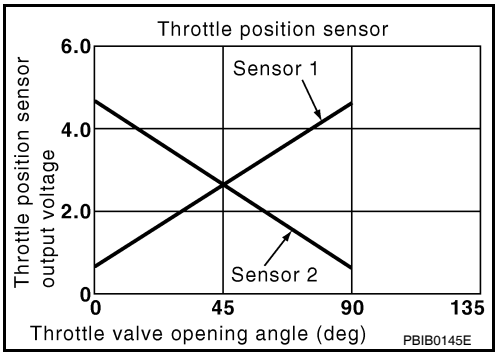
ACCELERATOR PEDAL
Refer to ACC-3.

DTC P2135 TP SENSOR

Component Description

INFOID:0000000004501174

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.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004501175

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
TP SEN 1-B1 TP SEN 2-B1*	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T, CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

INFOID:0000000004500377

This self-diagnosis has the one trip detection logic.
NOTE:
If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.
Refer to EC-1396.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135 2135	Throttle position sensor circuit range/performance	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	• Harness or connector (TP sensor 1 and 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:0000000004500378

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

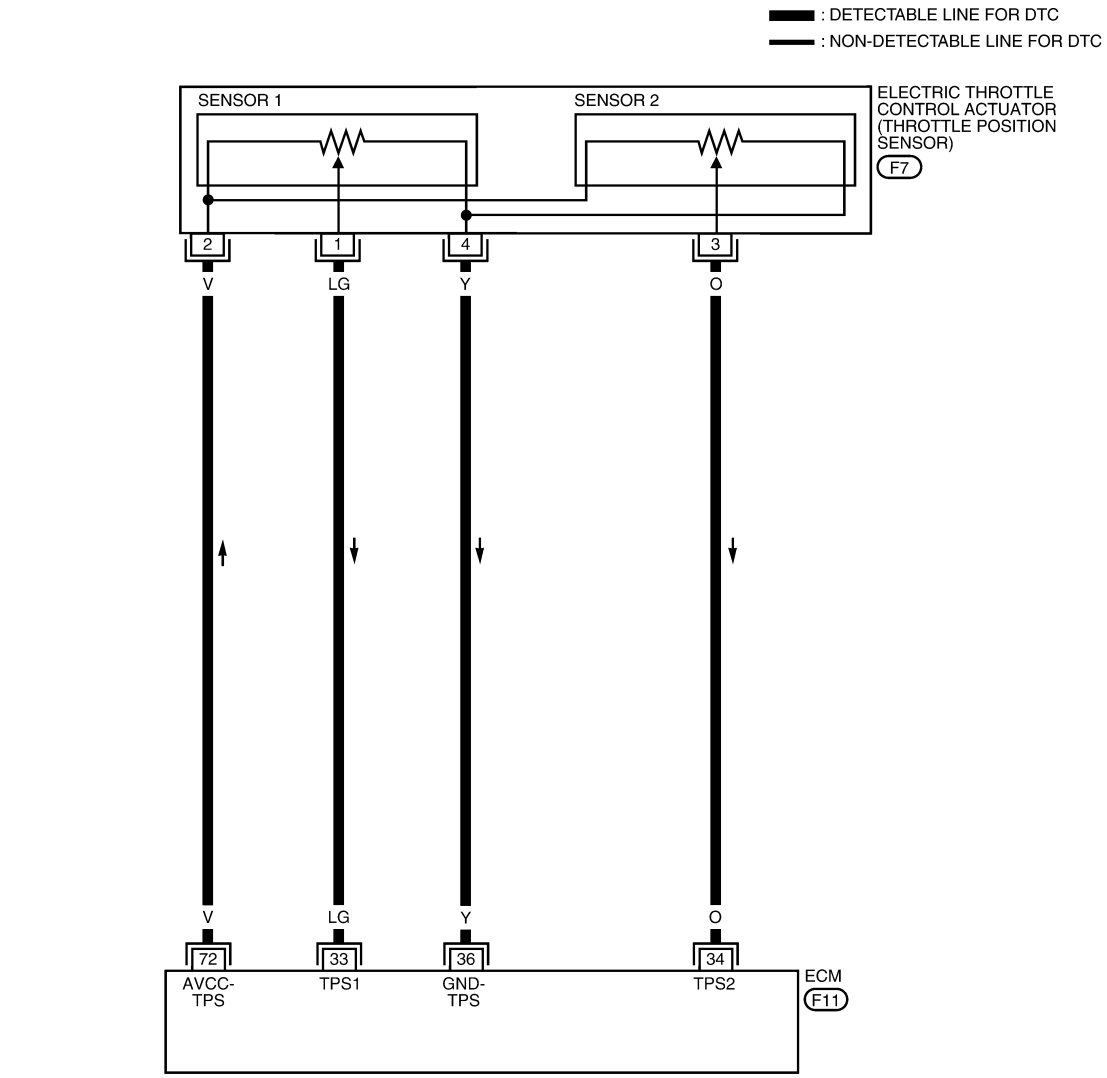
1. Start engine and let it idle for 1 second.
2. Check DTC.

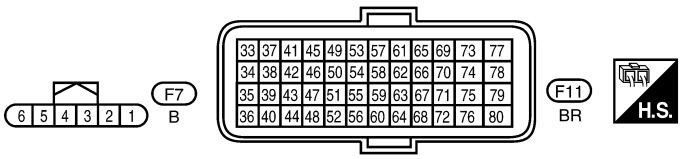
3. If DTC is detected, go to EC-1478, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004500379

EC-TPS3-01





BBWA2657E

Specification data are reference values and are measured between each terminal 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.

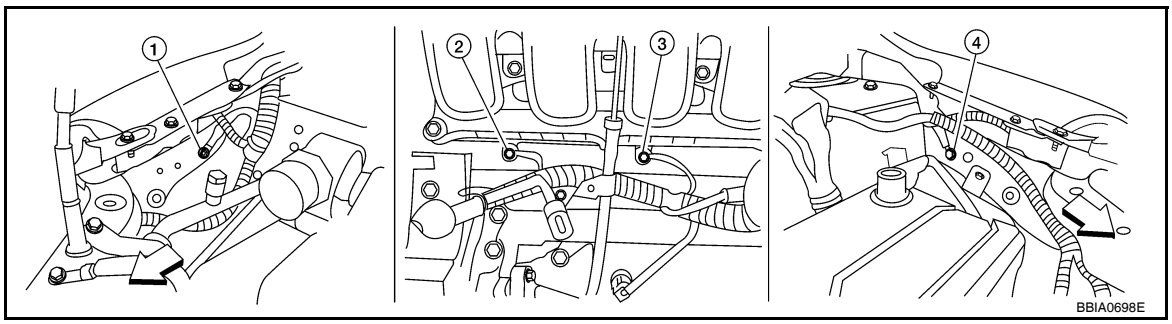
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
33	LG	Throttle position sensor 1	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75V
34	O	Throttle position sensor 2	**[Ignition switch: ON]** • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] • Engine stopped • Shift lever: D (A/T, CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36V
36	Y	Sensor ground (Throttle position sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
72	V	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V

Diagnosis Procedure

INFOID:0000000004500380

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screw on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

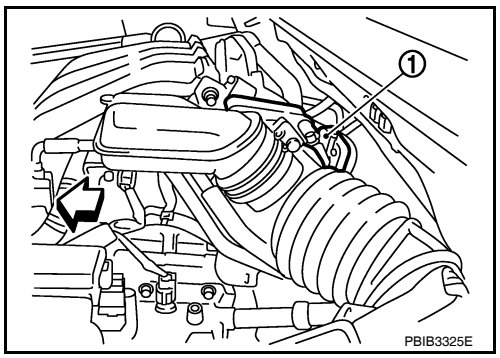
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator (1) harness connector.
- : Vehicle front
2. Turn ignition switch ON.

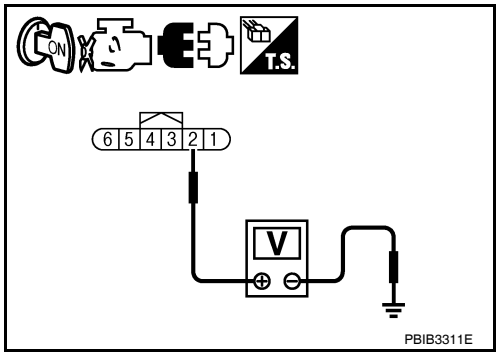


3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT-III or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 36. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following;
electric throttle control actuator terminal 1 and ECM terminal 33,
electric throttle control actuator terminal 3 and ECM terminal 34.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-1480, "Component Inspection".

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-1084, "Throttle Valve Closed Position Learning".

3. Perform EC-1084, "Idle Air Volume Learning".

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

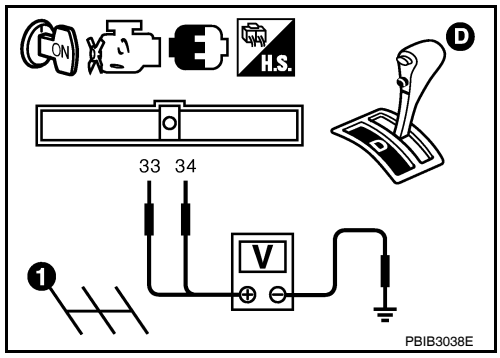
Component Inspection

INFOID:0000000004501176

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-1084, "Throttle Valve Closed Position Learning".
3. Turn ignition switch ON.
4. Set shift lever to D position (A/T, CVT) or 1st position (M/T).
5. Check voltage between ECM terminals 33 (TP sensor 1 signal), 34 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
33 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
34 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-1084, "Throttle Valve Closed Position Learning".
8. Perform EC-1084, "Idle Air Volume Learning".

Removal and Installation

INFOID:0000000004501177

ELECTRIC THROTTLE CONTROL ACTUATOR

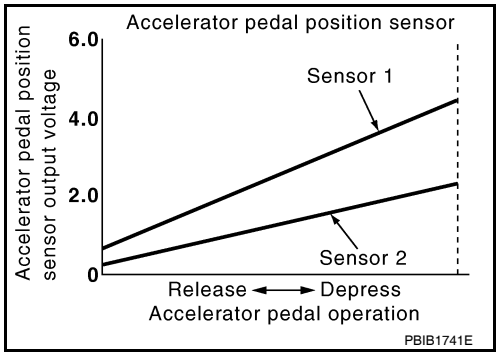
Refer to EM-141, "Removal and Installation".

DTC P2138 APP SENSOR

Component Description

INFOID:0000000004501218

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.



CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004501219

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2*	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
CLSD THL POS	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

INFOID:0000000004500385

This self-diagnosis has the one trip detection logic.
NOTE:
If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.
Refer to EC-1396.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138 2138	Accelerator pedal position sensor circuit range/ performance	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	• Harness or connector (APP sensor 1 and 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (EVAP control system pressure sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1 and 2) • Crankshaft position sensor (POS) • EVAP control system pressure sensor • Refrigerant pressure sensor

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

INFOID:0000000004500386

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

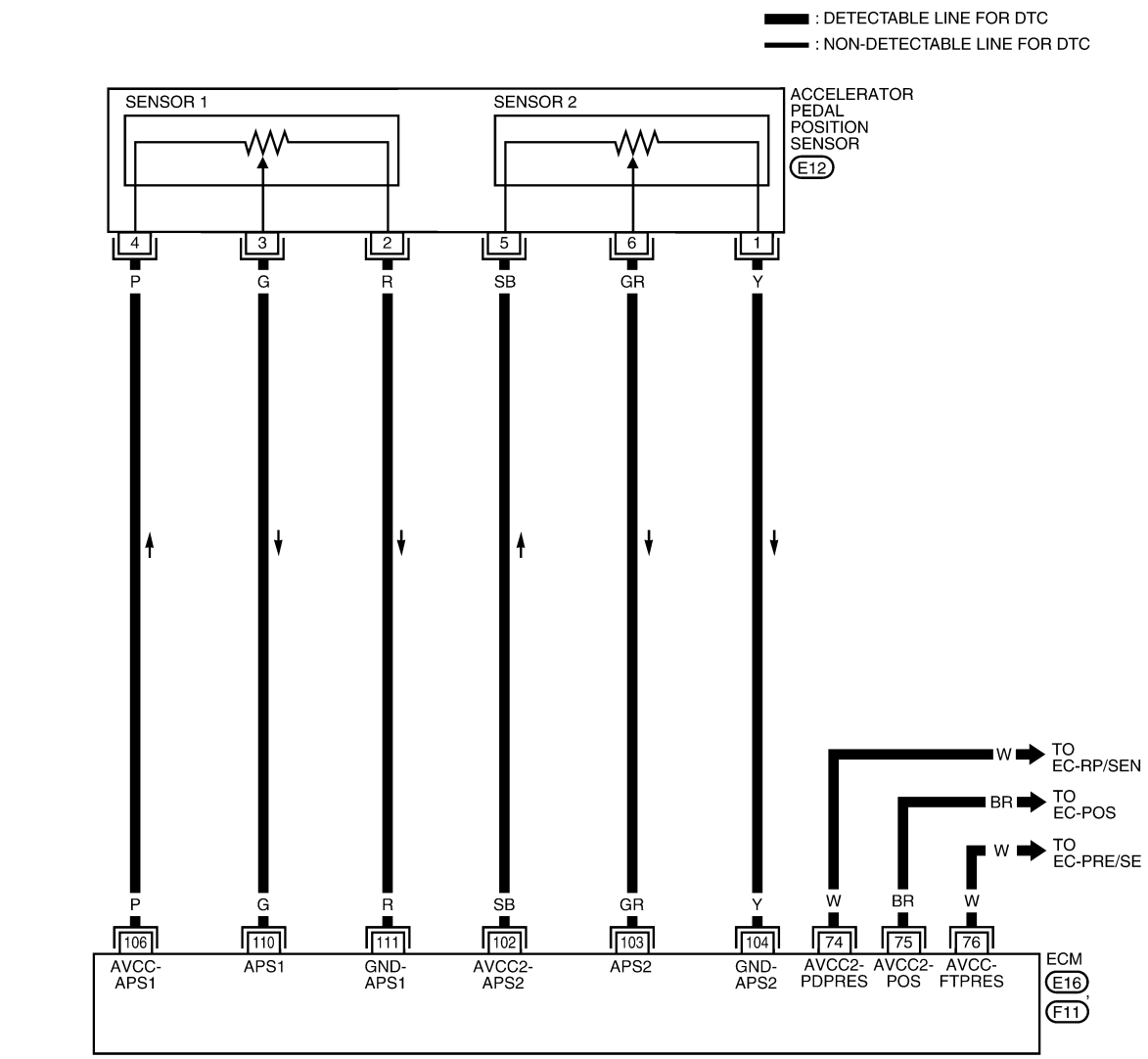
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

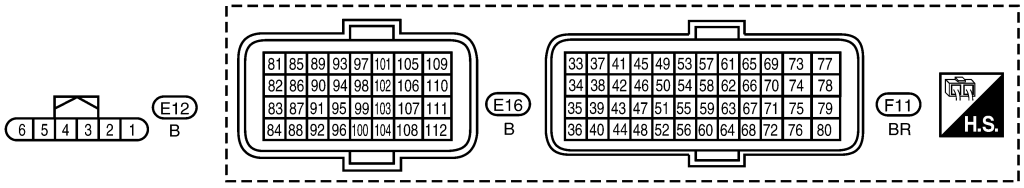
1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-1484, "Diagnosis Procedure".

Wiring Diagram

INFOID:0000000004500387

EC-APPS3-01





BBWA3075E

Specification data are reference values and are measured between each terminal 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.

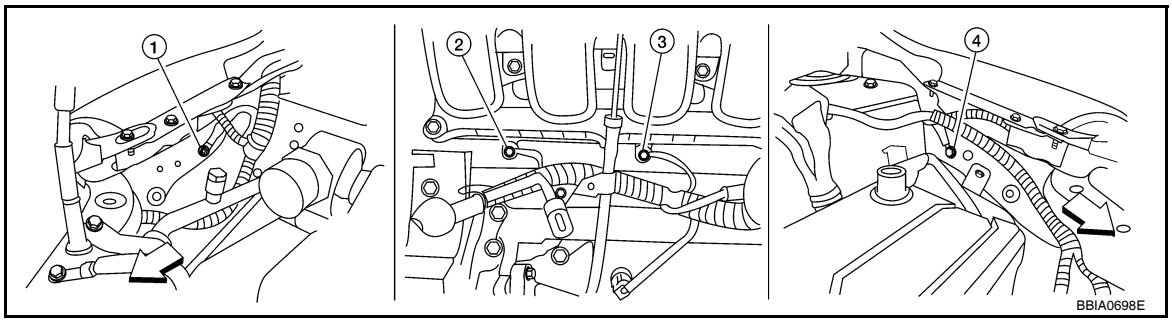
TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	W	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
75	BR	Sensor power supply [Crankshaft position sensor (POS)]	**[Ignition switch: ON]**	Approximately 5V
76	W	EVAP control system pressure sensor power supply	**[Ignition switch: ON]**	Approximately 5V
102	SB	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5V
103	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.3 - 0.6V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 - 2.4V
104	Y	Sensor ground (APP sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
106	P	Sensor power supply (APP sensor 1)	**[Ignition switch: ON]**	Approximately 5V
110	G	Accelerator pedal position sensor 1	**[Ignition switch: ON]** • Engine stopped • Accelerator pedal: Fully released	0.6 - 0.9V
			[Ignition switch: ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 - 4.7V
111	R	Sensor ground (APP sensor 1)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V

Diagnosis Procedure

INFOID:0000000004500388

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
   Refer to EC-1144, "Ground Inspection".



: Vehicle front

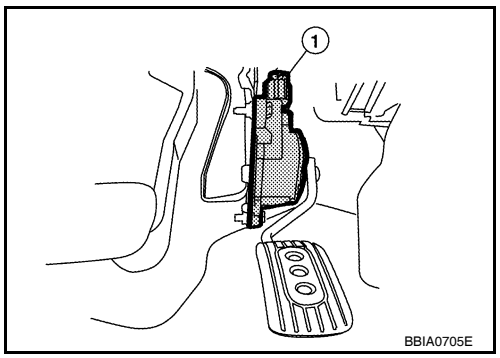
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

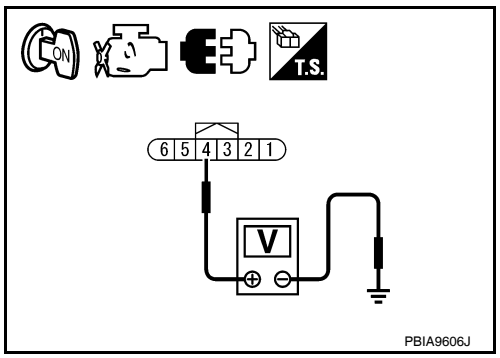
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor (1) harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 4 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



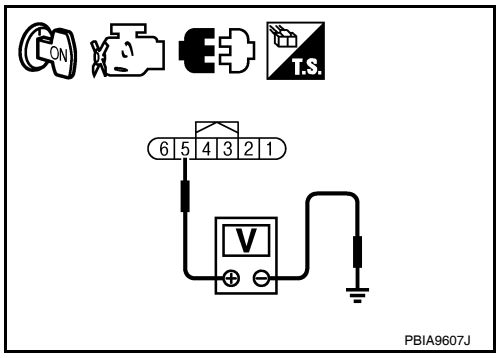
OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between APP sensor terminal 5 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 4.

4. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 5 and ECM terminal 102. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK COMPONENTS POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
74	Refrigerant pressure sensor terminal 3	EC-1528, "Wiring Diagram"
75	Crankshaft position sensor (POS) terminal 1	EC-1294, "Wiring Diagram"
76	EVAP control system pressure sensor terminal 3	EC-1353, "Wiring Diagram"
102	APP sensor terminal 5	EC-1483, "Wiring Diagram"

OK or NG

OK >> GO TO 6.
NG >> 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-1298, "Component Inspection".)
- EVAP control system pressure sensor (Refer to EC-1350, "Component Inspection".)
- Refrigerant pressure sensor (Refer to MTC-37.)

OK or NG

OK >> GO TO 11.
NG >> 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 harness continuity between the following;
   ECM terminal 111 and APP sensor terminal 2,
   ECM terminal 104 and APP sensor terminal 1.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8.CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following;
   ECM terminal 110 and APP sensor terminal 3,
   ECM terminal 103 and APP sensor terminal 6.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK APP SENSOR

Refer to EC-1487, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10.REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-1084, "Accelerator Pedal Released Position Learning".
3. Perform EC-1084, "Throttle Valve Closed Position Learning".
4. Perform EC-1084, "Idle Air Volume Learning".

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

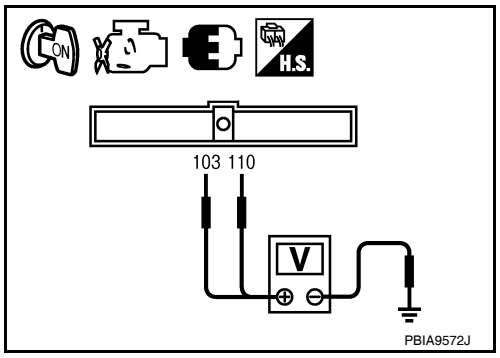
>> **INSPECTION END**

Component Inspection

INFOID:0000000004501223

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 110 (APP sensor 1 signal), 103 (APP sensor 2 signal) and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
110 (Accelerator pedal position sensor 1)	Fully released	0.6 - 0.9V
	Fully depressed	3.9 - 4.7V
103 (Accelerator pedal position sensor 2)	Fully released	0.3 - 0.6V
	Fully depressed	1.95 - 2.4V

4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-1084, "Accelerator Pedal Released Position Learning".
6. Perform EC-1084, "Throttle Valve Closed Position Learning".
7. Perform EC-1084, "Idle Air Volume Learning".

Removal and Installation

INFOID:0000000004501224

ACCELERATOR PEDAL

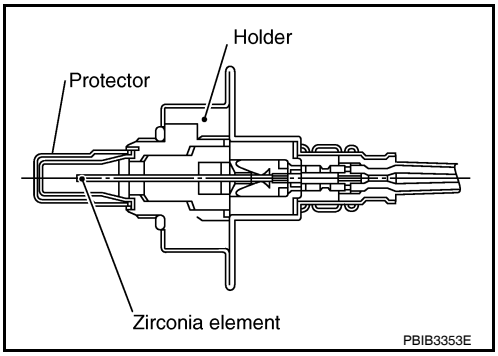
Refer to ACC-3.

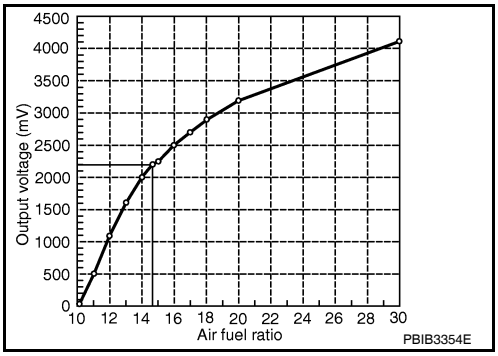
DTC P2A00 A/F SENSOR 1

Component Description

INFOID:0000000004501225

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 = 1, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide 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).





CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004501226

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2V

On Board Diagnosis Logic

INFOID:0000000004500393

To judge the malfunction, the A/F signal computed by ECM from the A/F sensor 1 signal is monitored not to be shifted to LEAN side or RICH side.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P2A00 2A00	Air fuel ratio (A/F) sensor 1 circuit range/performance	• The output voltage computed by ECM from the A/F sensor 1 signal is shifted to the lean side for a specified period. • The A/F signal computed by ECM from the A/F sensor 1 signal is shifted to the rich side for a specified period.	• Air fuel ratio (A/F) sensor 1 • Air fuel ratio (A/F) sensor 1 heater • Fuel pressure • Fuel injector • Intake air leaks

DTC Confirmation Procedure

INFOID:0000000004500394

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

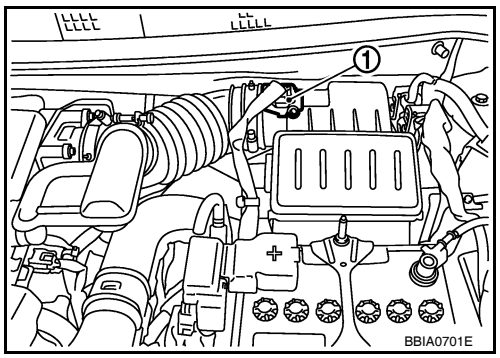
WITH CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.

3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
4. Clear the self-learning coefficient by touching “CLEAR”.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
7. Let engine idle for 1 minute.
8. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
9. Check 1st trip DTC.
10. If 1st trip DTC is detected, go to EC-1491, "Diagnosis Procedure".

WITH GST

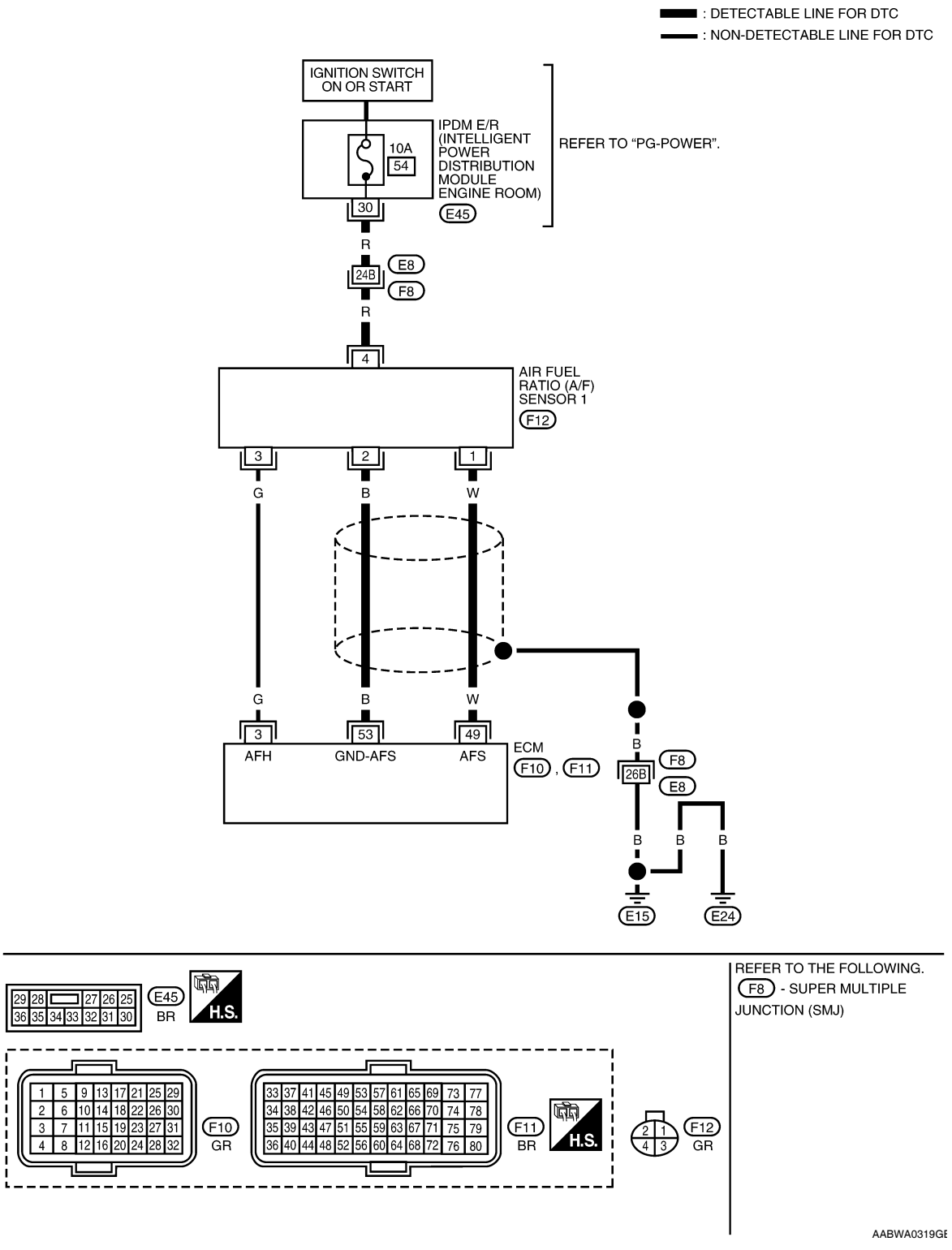
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector.
4. Start engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor (1) harness connector.
6. Select Service $03 with GST and make sure that DTC P0102 is detected.
7. Select Service $04 with GST and erase the DTC P0102.
8. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
9. Let engine idle for 1 minute.
10. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
11. Select Service $07 with GST.
    If 1st trip DTC is detected, go to EC-1491, "Diagnosis Procedure".



Wiring Diagram

INFOID:0000000004501227

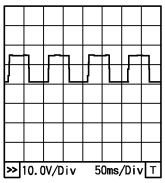
EC-A/F-01



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	G	A/F sensor 1 heater	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8V  PBIA8148J
49	W	A/F sensor 1	**[Engine is running]** • **Warm-up condition** • Engine speed: 2,000 rpm	Approximately 1.8V Output voltage varies with air fuel ratio.
53	B	A/F sensor 1	**[Ignition switch: ON]**	Approximately 2.2V

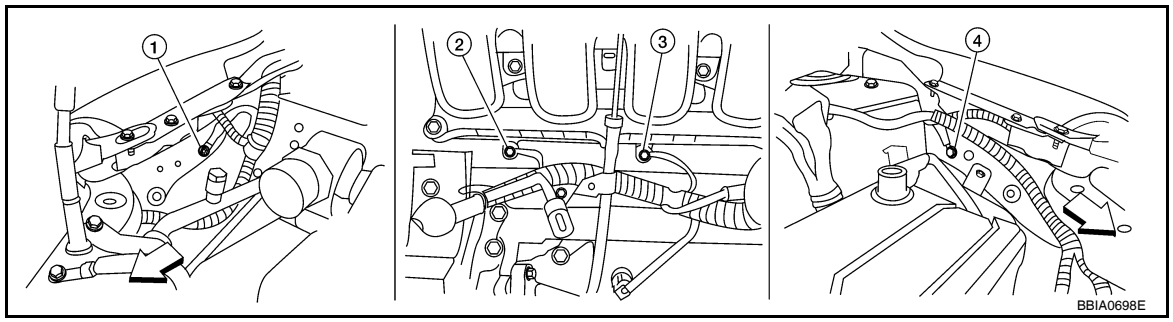
: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004500396

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body.
Refer to EC-1144, "Ground Inspection".



: Vehicle front

1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1. Refer to EM-144, "Removal and Installation".

>> GO TO 3.

3.CHECK FOR INTAKE AIR LEAK

1. Start engine and run it at idle.
2. Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

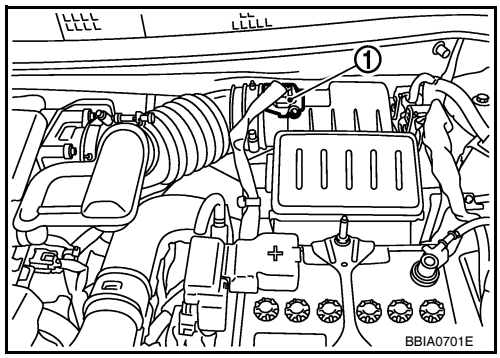
4. CLEAR THE SELF-LEARNING DATA

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 and P0172 detected?
   Is it difficult to start engine?

Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor (1) 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. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to EC-1052, "Emission-related Diagnostic Information".
8. Make sure DTC P0000 is displayed.
9. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 and P0172 detected?
   Is it difficult to start engine?



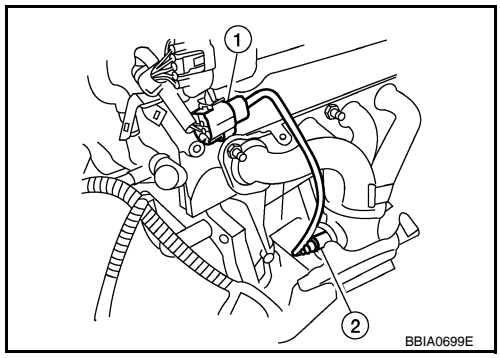
Yes or No

Yes >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-1258 or EC-1264.
No >> GO TO 5.

5. CHECK HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector (1).
- Air fuel ratio (A/F) sensor (2)
3. Check harness connector for water.

Water should no exist.



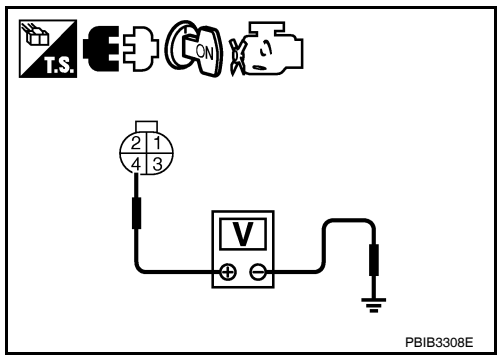
OK or NG

OK >> GO TO 6.
NG >> Repair or replace harness connector.

6. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check voltage between A/F sensor 1 terminal 4 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8

• Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	49
2	53

Continuity should exist.

4. Check harness continuity between ECM terminals 49, 53 or A/F sensor 1 terminals 1, 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK A/F SENSOR 1 HEATER

Refer to EC-1158, "Component Inspection".

OK or NG

OK >> GO TO 10.
NG >> GO TO 11.

10. CHECK INTERMITTENT INCIDENT

Perform EC-1138.

OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

11. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (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 air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

>> GO TO 12.

12. CONFIRM A/F ADJUSTMENT DATA

1. Turn ignition switch ON.
2. Select “A/F ADJ-B1” in “DATA MONITOR” mode with CONSULT-III.
3. Make sure that “0.000” is displayed on CONSULT-III screen.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 13.

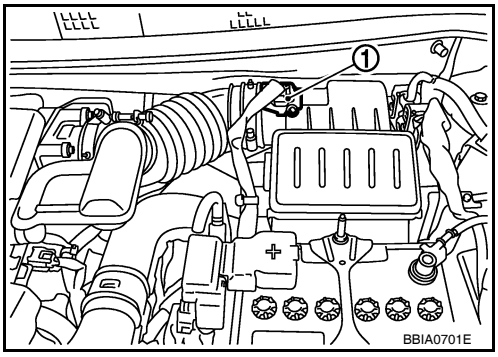
13. CLEAR THE SELF-LEARNGIN DATA

With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-III.
3. Clear the self-learning control coefficient by touching “CLEAR”.

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 (1) 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. Make sure DTC P0102 is displayed.
7. Erase the DTC memory. Refer to EC-1052, "Emission-related Diagnostic Information".
8. Make sure DTC P0000 is displayed.



>> GO TO 14.

14. CONFIRM A/F ADJUSTMENT DATA

1. Turn ignition switch OFF and then ON.
2. Select “A/F ADJ-B1” in “DATA MONITOR” mode with CONSULT-III.
3. Make sure that “0.000” is displayed on CONSULT-III screen.

>> **INSPECTION END**

Removal and Installation

INFOID:0000000004501228

AIR FUEL RATIO SENSOR HEATER

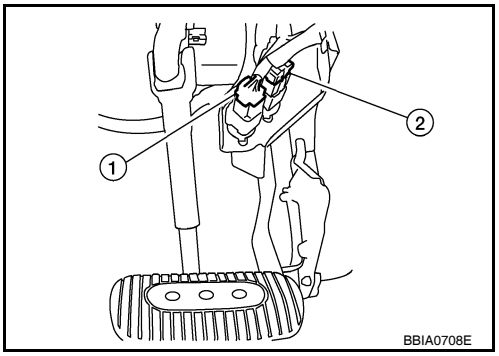
Refer to EM-144, "Removal and Installation".

ASCD BRAKE SWITCH

Component Description

INFOID:0000000004500398

When depress on the brake pedal, ASCD brake switch (2) is turned OFF and stop lamp switch (1) is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal)
Refer to EC-1033 for the ASCD function.



CONSULT-III Reference Value in Data Monitor Mode

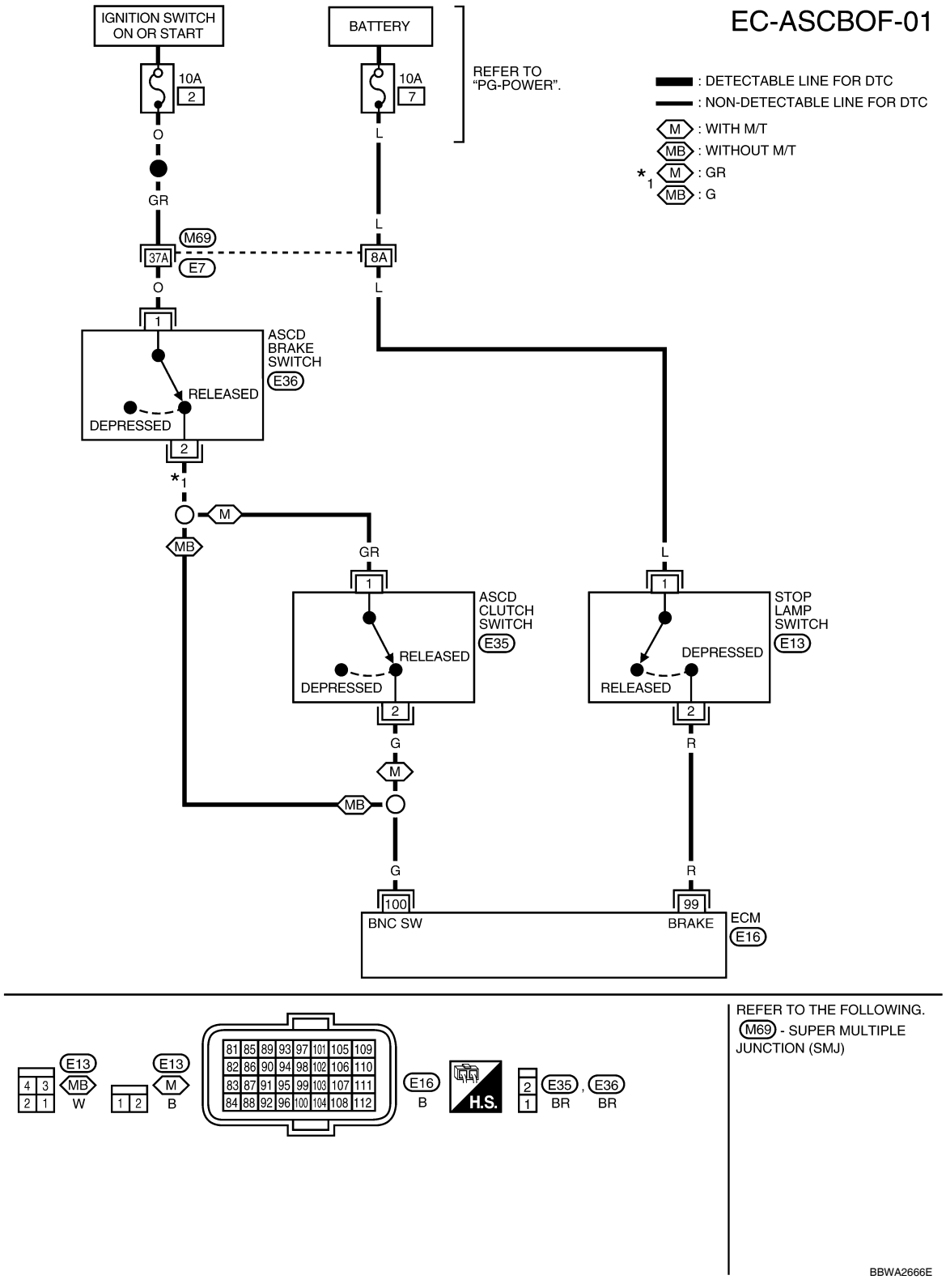
INFOID:0000000004500399

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1 (ASCD brake switch)	• Ignition switch: ON	• Brake pedal: Fully released (A/T, CVT) • Brake pedal and clutch pedal: Fully released (M/T)	ON
		• Brake pedal: Slightly depressed (A/T, CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	OFF
BRAKE SW2 (Stop lamp switch)	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

Wiring Diagram

INFOID:0000000004500400



Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
99	R	Stop lamp switch	**[Ignition switch: ON]** • Brake pedal: Fully released	Approximately 0V
			[Ignition switch: ON] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
100	G	ASCD brake switch	**[Ignition switch: ON]** • Brake pedal: Slightly depressed (A/T, CVT) • Brake pedal and/or clutch pedal: Slightly depressed (M/T)	Approximately 0V
			[Ignition switch: ON] • Brake pedal: Fully released (A/T, CVT) • Brake pedal and clutch pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)

Diagnosis Procedure

INFOID:0000000004500401

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.

M/T models

CONDITION	INDICATION
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON

A/T and CVT models

CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON

Without CONSULT-III

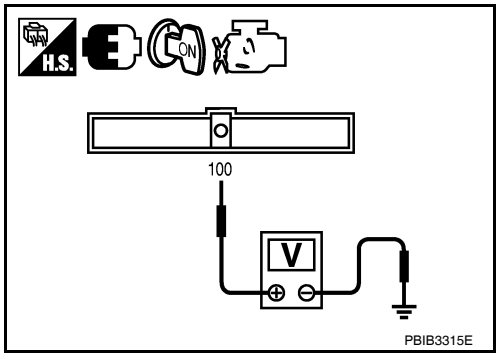
1. Turn ignition switch ON.
2. Check voltage between ECM terminal 100 and ground under the following conditions.

M/T models

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage

A/T and CVT models

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage



OK or NG

OK >> GO TO 2.
NG (M/T models) >>GO TO 3.
NG (A/T and CVT models) >>GO TO 4.

2.CHECK OVERALL FUNCTION-II

With CONSULT-III

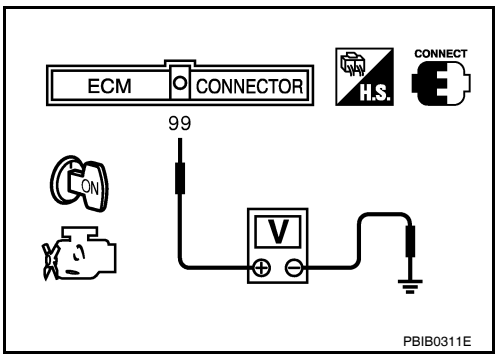
Check “BRAKE SW2” indication in “DATA MONITOR” mode.

CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON

Without CONSULT-III

Check voltage between ECM terminal 99 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

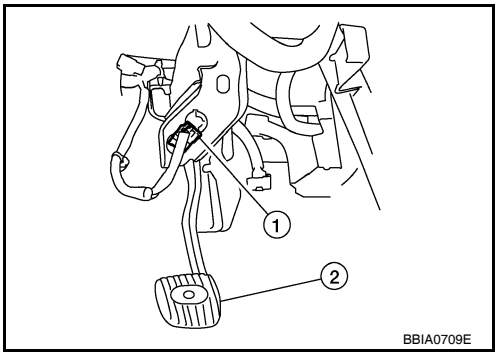


OK or NG

OK >> INSPECTION END.
NG >> GO TO 11.

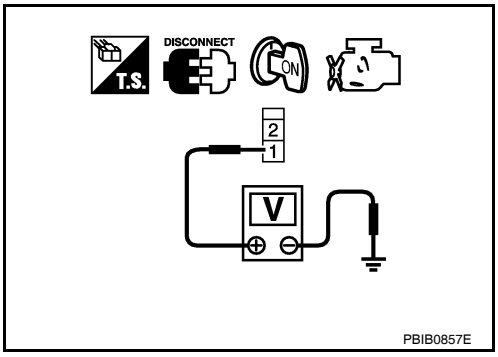
3. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch (1) harness connector.
- Clutch pedal (2)
3. Turn ignition switch ON.



4. Check voltage between ASCD clutch switch terminal 1 and ground under the following conditions with CONSULT-III or tester.

CONDITION	VOLTAGE
Brake pedal: Fully released	Battery voltage
Brake pedal: Slightly depressed	Approx. 0V



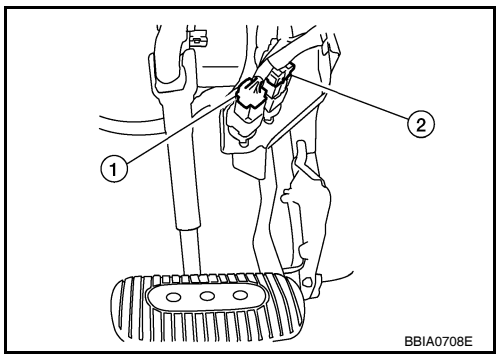
OK or NG

OK >> GO TO 9.
NG >> GO TO 4.

4. CHECK ASCD BRAKE SWITCH POWER SUPPLY

1. Turn ignition switch OFF.

2. Disconnect ASCD brake switch (2) harness connector.
- Stop lamp switch (1)
3. Turn ignition switch ON.

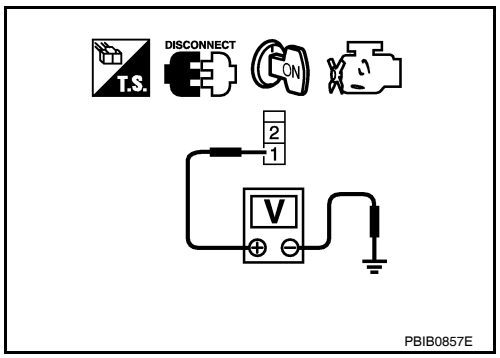


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK (M/T models) >>GO TO 6.
OK (A/T and CVT models) >>GO TO 7.
NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 100 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK ASCD BRAKE SWITCH

Refer to EC-1436, "Component Inspection".

OK or NG

OK >> GO TO 15.
NG >> Replace ASCD brake switch.

9.CHECK ASCD CLUTCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 100 and ASCD clutch switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10.CHECK ASCD CLUTCH SWITCH

Refer to EC-1436, "Component Inspection"

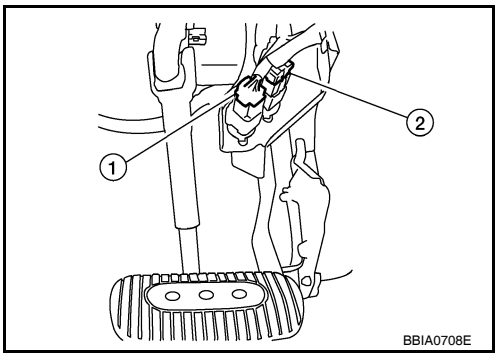
OK or NG

OK >> GO TO 15.
NG >> Replace ASCD clutch switch.

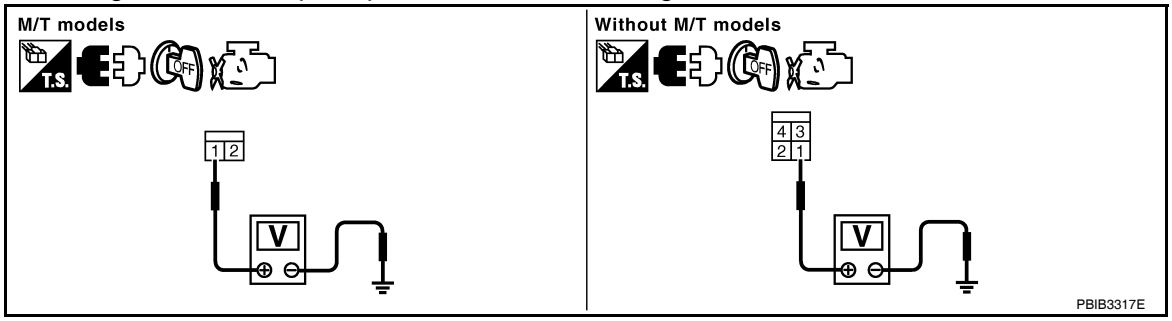
11.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch (1) harness connector.

- ASCD brake switch (2)



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- 10A fuse

- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 99 and stop lamp switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 14.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK STOP LAMP SWITCH

Refer to EC-1436, "Component Inspection".

OK or NG

OK >> GO TO 15.
NG >> Replace stop lamp switch.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

Component Inspection

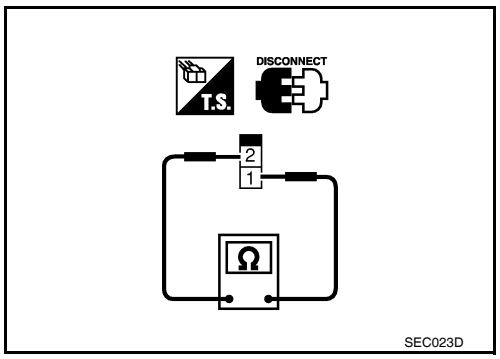
INFOID:0000000004500402

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released.	Should exist.
Brake pedal: Slightly depressed.	Should not exist.

If NG, adjust ASCD brake switch installation, refer to BR-6, and perform step 3 again.



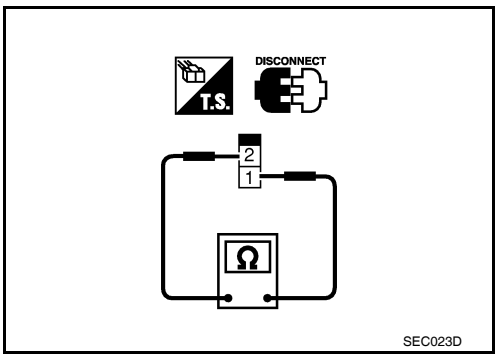
ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.

3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

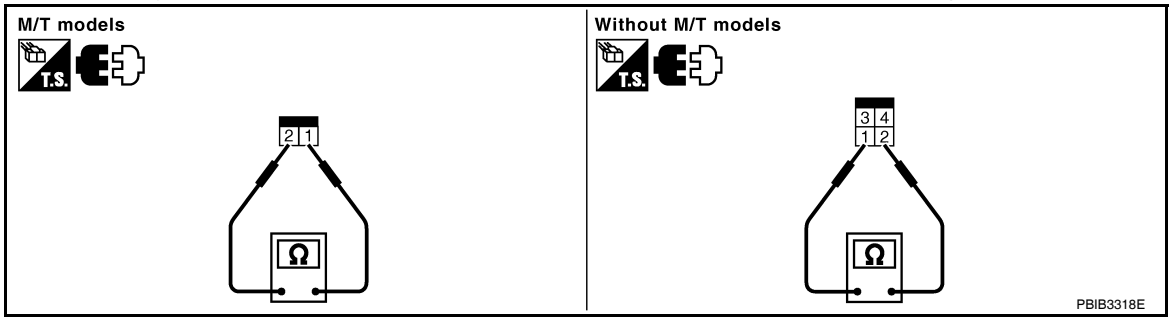
Condition	Continuity
Clutch pedal: Fully released.	Should exist.
Clutch pedal: Slightly depressed.	Should not exist.

If NG, adjust ASCD clutch switch installation, refer to CL-5, and perform step 3 again.



STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released.	Should not exist.
Brake pedal: Slightly depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to BR-6, and perform step 3 again.

ASCD INDICATOR

Component Description

INFOID:0000000004500403

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.
CRUISE indicator illuminates when MAIN switch on ASCD steering switch is turned ON to indicate that ASCD system is ready for operation.
SET indicator illuminates when following conditions are met.
- CRUISE indicator is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET indicator remains lit during ASCD control.
Refer to EC-1033 for the ASCD function.

CONSULT-III Reference Value in Data Monitor Mode

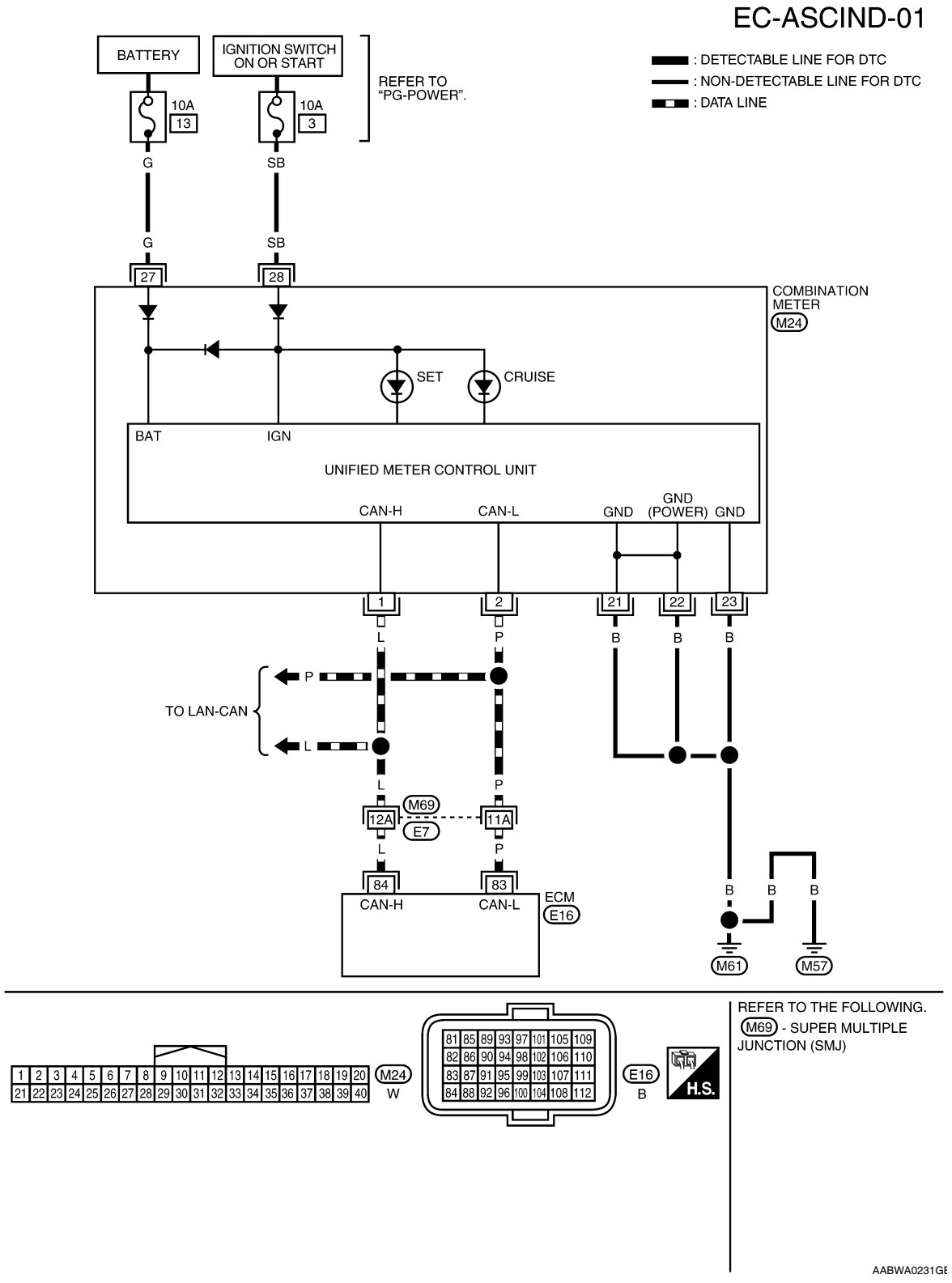
INFOID:0000000004500404

Specification data are reference value.

MONITOR ITEM	CONDITION		SPECIFICATION
CRUISE LAMP	• Ignition switch: ON	MAIN switch: Pressed at 1st time → 2nd	ON → OFF
SET LAMP	• MAIN switch: ON • Vehicle: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

Wiring Diagram

INFOID:0000000004500405



Diagnosis Procedure

INFOID:0000000004500406

1. CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	• Ignition switch: ON	MAIN switch: Pressed at 1st time → 2nd	ON → OFF
SET LAMP	• MAIN switch: ON • Vehicle: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2.CHECK DTC

Check that DTC UXXXX is not displayed.

Yes or No

Yes >> Perform trouble diagnoses for DTC UXXXX.
No >> GO TO 3.

3.CHECK COMBINATION METER OPERATION

Does combination meter operate normally?

Yes or No

Yes >> GO TO 4.
No >> Check combination meter circuit. Refer to DI-3.

4.CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

ELECTRICAL LOAD SIGNAL

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000004500407

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd position.	ON
		Rear window defogger switch is OFF and lighting switch is OFF.	OFF
HEATER FAN SW	• Ignition switch: ON	Heater fan: Operating.	ON
		Heater fan: Not operating.	OFF

Diagnosis Procedure

INFOID:0000000004500408

1.CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCITION-I

1. Turn ignition switch ON.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-III under the following conditions.

Condition	LOAD SIGNAL
Lighting switch: ON at 2nd position	ON
Lighting switch: OFF	OFF

OK or NG

OK >> GO TO 2.
NG >> GO TO 4.

2.CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-III under the following conditions.

Condition	LOAD SIGNAL
Rear window defogger switch: ON	ON
Rear window defogger switch: OFF	OFF

OK or NG

OK >> GO TO 3.
NG >> GO TO 5.

3.CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

Check “HEATER FAN SW” in “DATA MONITOR” mode with CONSULT-III under the following conditions.

Condition	LOAD SIGNAL
Heater fan control switch: ON	ON
Heater fan control switch: OFF	OFF

OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 6.

4.CHECK HEADLAMP SYSTEM

Refer to LT-4 or LT-25.

>> **INSPECTION END**

5.CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to GW-51.

>> **INSPECTION END**

6. CHECK HEATER FAN CONTROL SYSTEM

Refer to MTC-22.

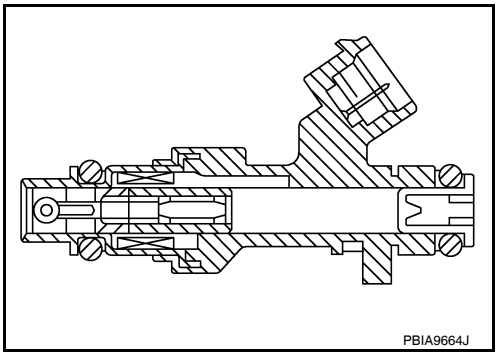
>> **INSPECTION END**

FUEL INJECTOR

Component Description

INFOID:0000000004500409

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.



CONSULT-III Reference Value in Data Monitor Mode

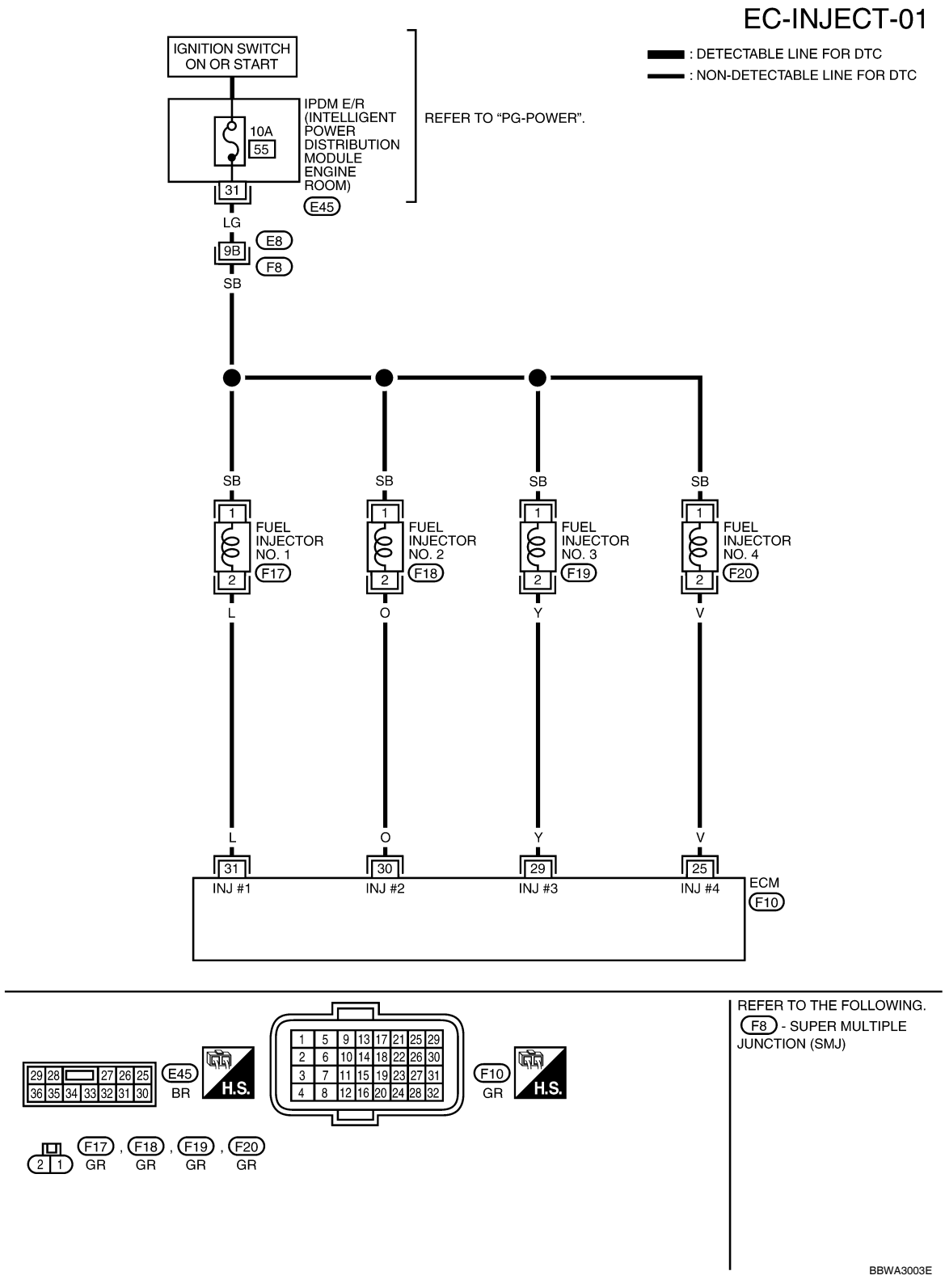
INFOID:0000000004500410

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
B/FUEL SCHDL	See EC-1130.		
INJ PULSE-B1	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: P or N (A/T, CVT), Neutral (M/T) • No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec

Wiring Diagram

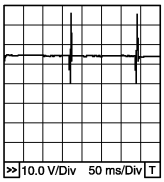
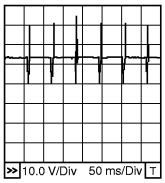
INFOID:0000000004500411



Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25 29 30 31	V Y O L	Fuel injector No. 4 Fuel injector No. 3 Fuel injector No. 2 Fuel injector No. 1	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)  PBIB0529E
			[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14V)  PBIA4943J

: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004500412

1.INSPECTION START

Turn ignition switch to START.
Is any cylinder ignited?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2.CHECK OVERALL FUNCTION

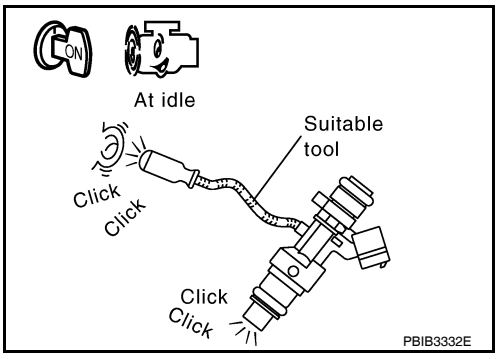
With CONSULT-III

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 noise should be heard.

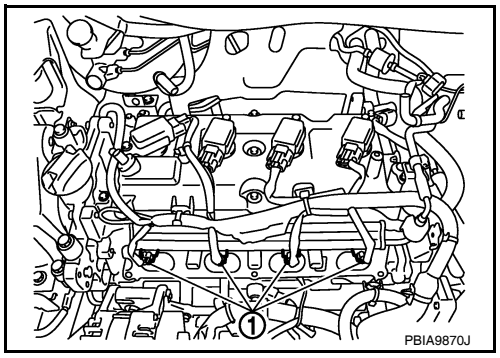


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 3.

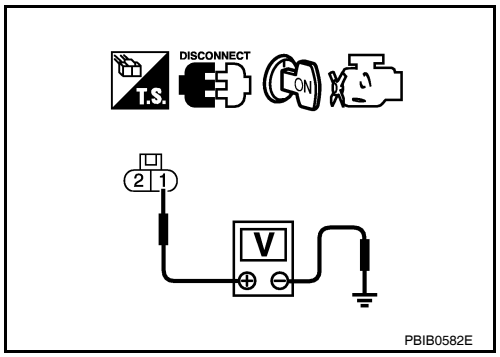
3. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector (1) harness connector.
3. Turn ignition switch ON.



4. Check voltage between fuel injector terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- IPDM E/R harness connector E45
- 10A fuse
- Harness for open or short between fuel injector and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between fuel injector terminal 2 and ECM terminals 25, 29, 30, 31. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK FUEL INJECTOR

Refer to EC-1512, "Component Inspection".

OK or NG

OK >> GO TO 7.
NG >> Replace fuel injector.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> INSPECTION END

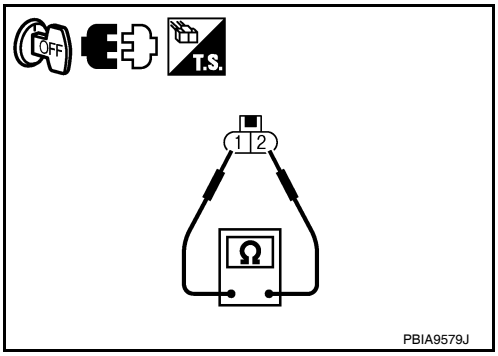
Component Inspection

INFOID:0000000004500413

FUEL INJECTOR

1. Disconnect fuel injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 11.1 - 14.5Ω [at 10 - 60°C (50 - 140°F)]



3. If NG, replace fuel injector.

Removal and Installation

INFOID:0000000004500414

FUEL INJECTOR

Refer to EM-156.

FUEL PUMP

Description

INFOID:0000000004500415

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay
Battery	Battery voltage*		

*: ECM determines the start signal status by the signals of engine speed and battery voltage.

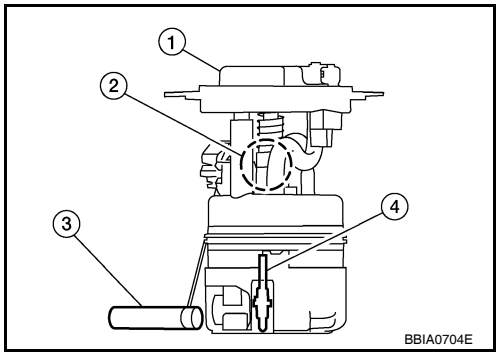
The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine start ability. If the ECM receives a engine speed signal from the crankshaft position sensor (POS) and camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump 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
Engine: Stopped	Stops in 1.5 seconds
Except as shown above	Stops

COMPONENT DESCRIPTION

A turbine type design fuel pump is used in the fuel tank.

- Fuel level sensor unit and fuel pump (1)
- Fuel pressure regulator (2)
- Fuel level sensor (3)
- Fuel tank temperature sensor (4)



CONSULT-III Reference Value in Data Monitor Mode

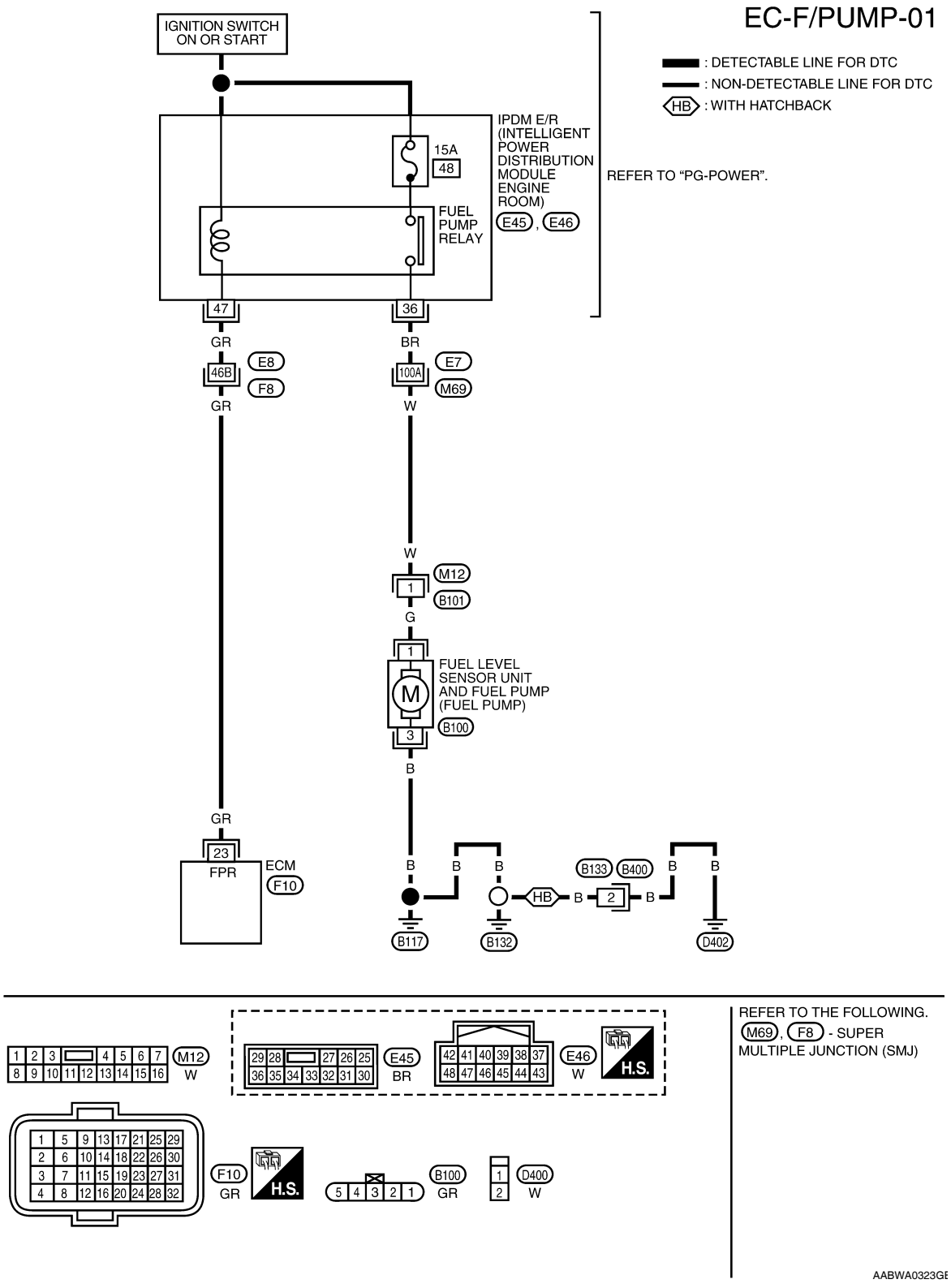
INFOID:0000000004500416

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	• For 1 second after turning ignition switch ON • Engine running or cranking	ON
	• Except above conditions	OFF

Wiring Diagram

INFOID:0000000004500417



Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
23	GR	Fuel pump relay	**[Ignition switch: ON]** • For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.0V
			[Ignition switch: ON] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)

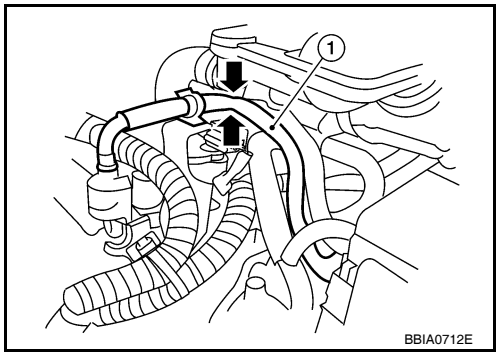
Diagnosis Procedure

INFOID:0000000004500418

1.CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose (1) with two fingers.

- Illustration shows the view with intake air duct removed.



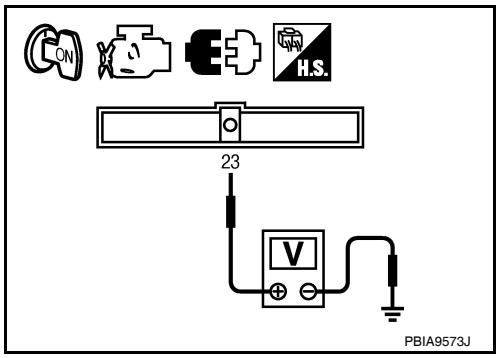
Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check voltage between ECM terminal 23 and ground with CONSULT-III or tester.



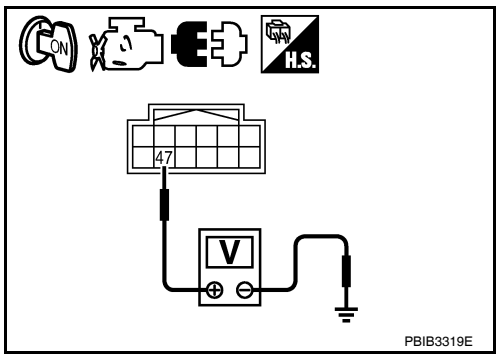
Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 3.

3.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E46.
3. Turn ignition switch ON.
4. Check voltage between IPDM E/R terminal 47 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 11.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between IPDM E/R and ECM

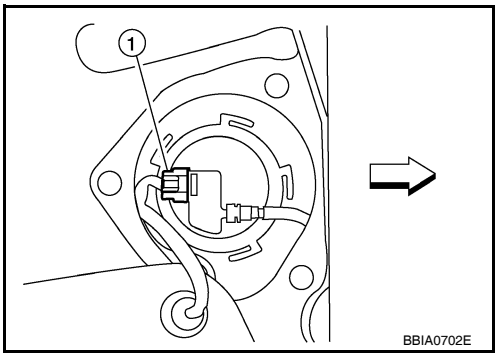
>> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect “fuel level sensor unit and fuel pump” harness connector (1).

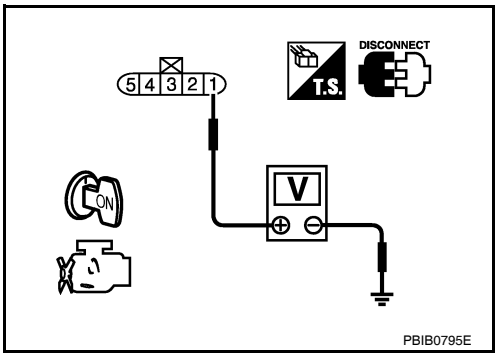
- Illustration shows the view with inspection hole cover removed.

4. Turn ignition switch ON.



5. Check voltage between “fuel level sensor unit and fuel pump” terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage should exist for 1 second after ignition switch is turned ON.



OK or NG

OK >> GO TO 9.
NG >> GO TO 6.

6.CHECK 15A FUSE

1. Turn ignition switch OFF.
2. Disconnect 15A fuse.
3. Check 15A fuse.

OK or NG

OK >> GO TO 7.
NG >> Replace fuse.

7.CHECK FUEL PUMP POWER SUPPLY CIRCUIT-IV

1. Disconnect IPDM E/R harness connector E45.
2. Check harness continuity between IPDM E/R terminal 36 and “fuel level sensor unit and fuel pump” terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M69, E7
- Harness connectors M12, B101

• Harness for open or short between IPDM E/R and “fuel level sensor unit and fuel pump”

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK FUEL PUMP GROUND CIRCUIT

1. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 3 and ground. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair or replace harness or connectors.

10. CHECK FUEL PUMP

Refer to EC-1517, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> Replace fuel pump.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

OK or NG

OK >> Replace IPDM E/R. Refer to PG-27, "Removal and Installation of IPDM E/R".
NG >> Repair or replace harness or connectors.

Component Inspection

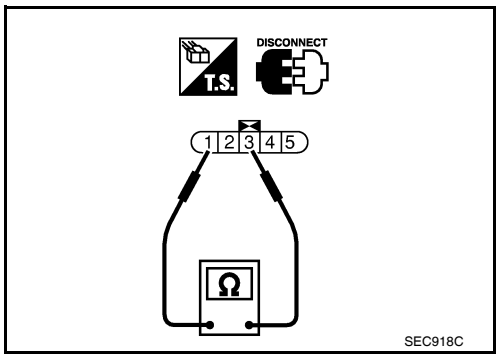
INFOID:0000000004500419

FUEL PUMP

1. Disconnect “fuel level sensor unit and fuel pump” harness connector.
2. Check resistance between “fuel level sensor unit and fuel pump” terminals 1 and 3.

Resistance: Approximately 0.2 - 5.0Ω [at 25°C (77°F)]

3. If NG, replace “fuel level sensor unit and fuel pump”.



Removal and Installation

INFOID:0000000004500420

FUEL PUMP

Refer to FL-5.

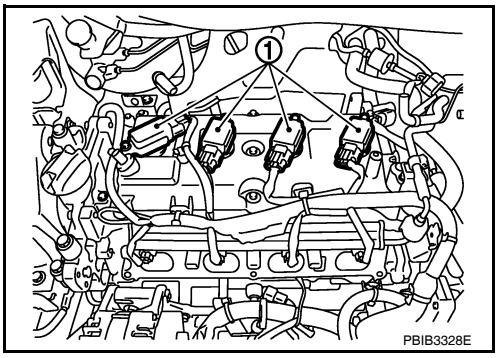
IGNITION SIGNAL

Component Description

INFOID:0000000004500421

IGNITION COIL & POWER TRANSISTOR

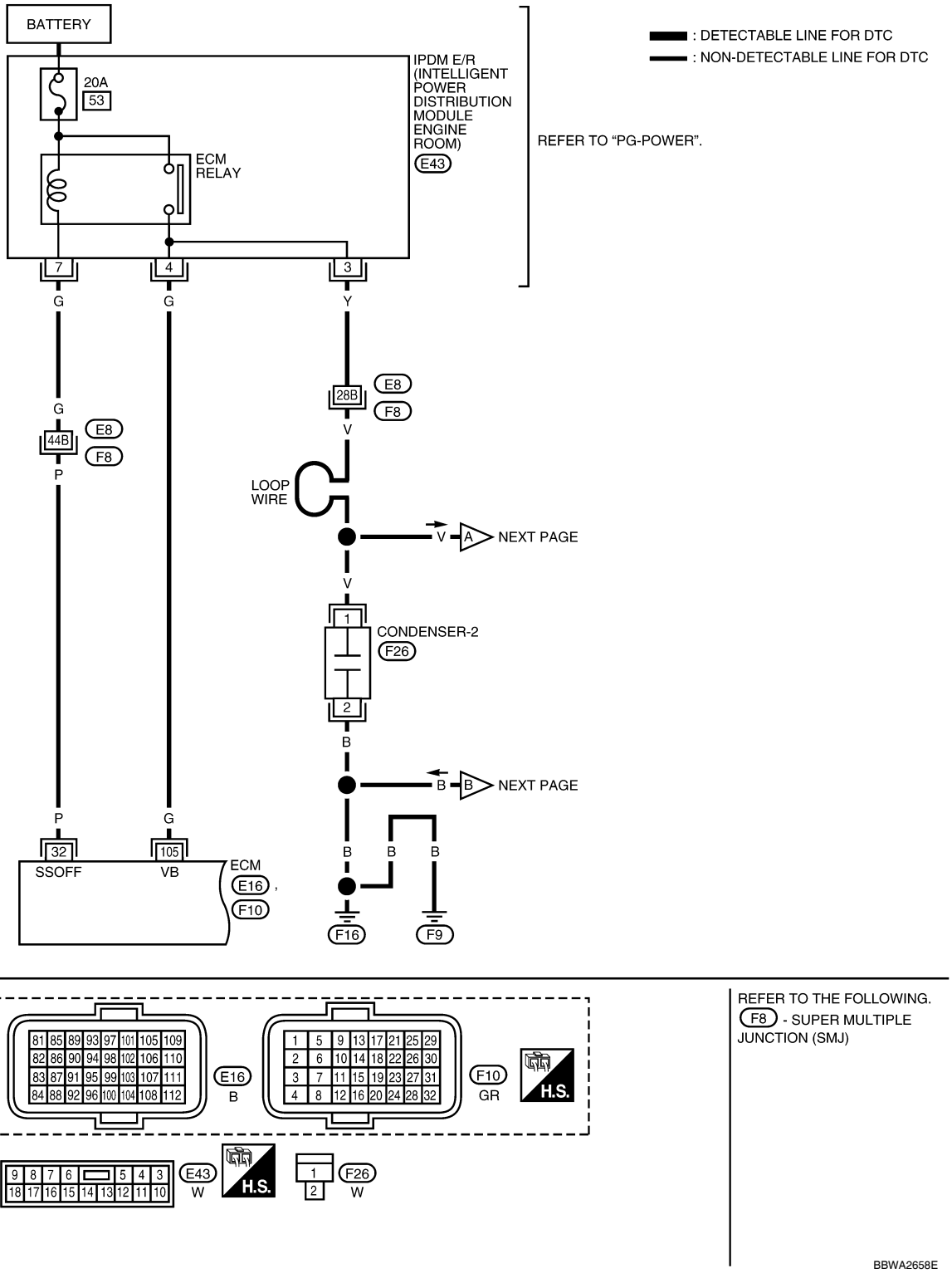
The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil (1) primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.



Wiring Diagram

INFOID:0000000004500422

EC-IGNSYS-01



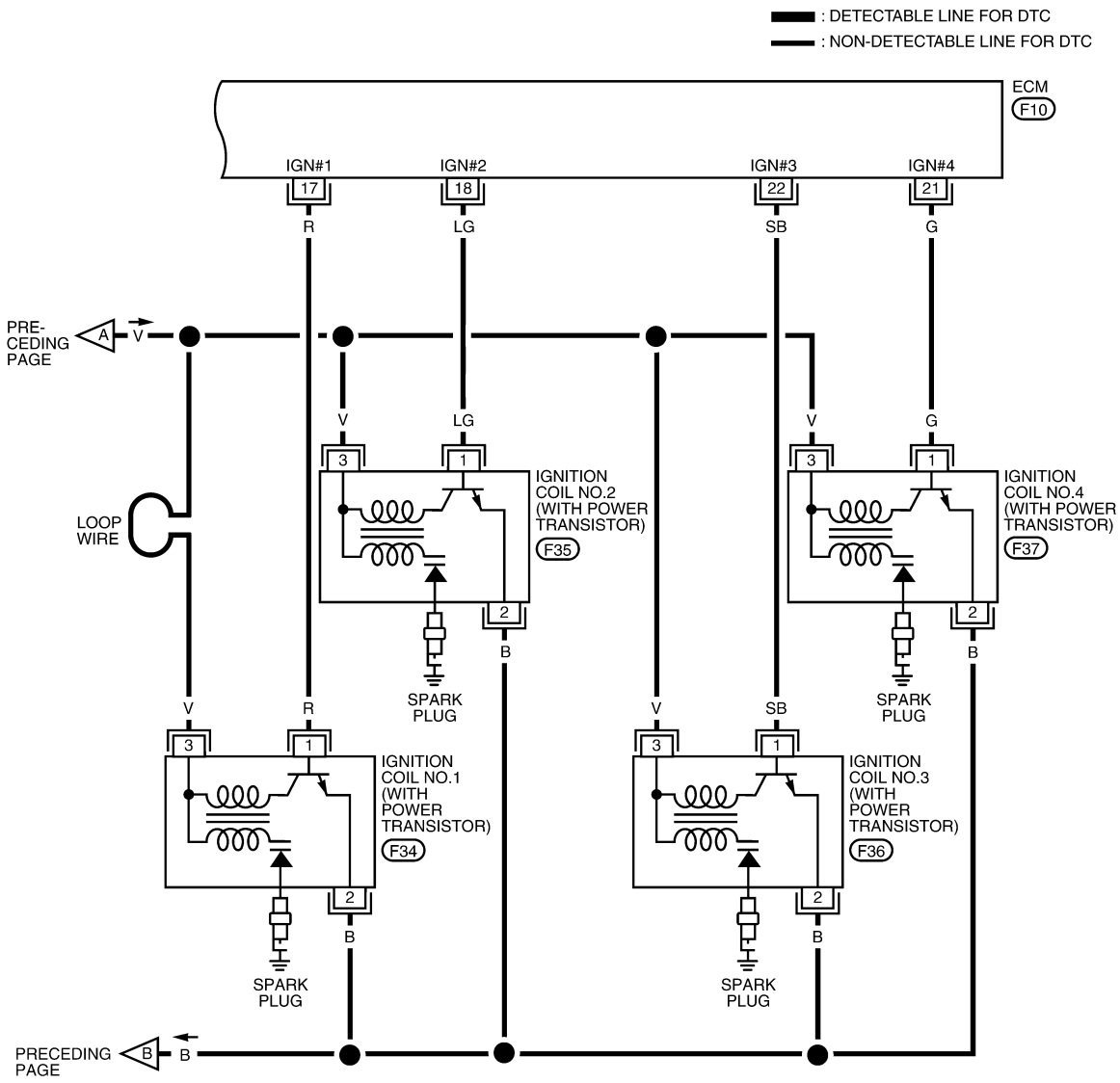
Specification data are reference values and are measured between each terminal and ground.

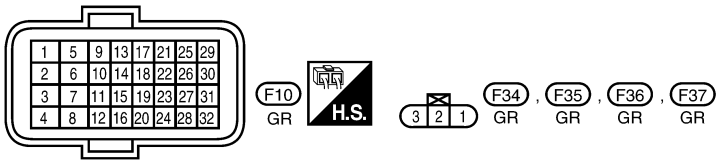
CAUTION:

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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	P	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For 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)
105	G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

EC-IGNSYS-02



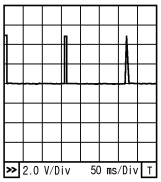
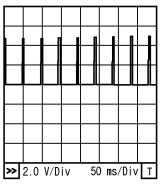


BBWA2659E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TER-MI-NAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
17 18 21 22	R LG G SB	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 4 Ignition signal No. 3	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.3V  PBIA9265J
			[Engine is running] • **Warm-up condition** • Engine speed: 2,500 rpm	0.2 - 0.5V  PBIA9266J

: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnosis Procedure

INFOID:0000000004500423

1.CHECK ENGINE START

Turn ignition switch OFF, and restart engine.
Is engine running?

Yes or No

Yes (With CONSULT-III)>>GO TO 2.
Yes (Without CONSULT-III)>>GO TO 3.
No >> GO TO 4.

2.CHECK OVERALL FUNCTION

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.

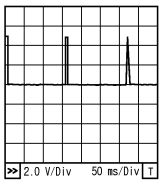
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 10.

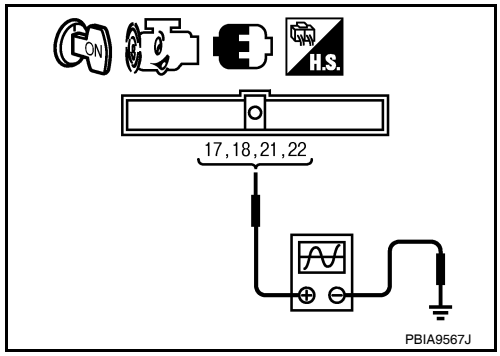
3.CHECK OVERALL FUNCTION

Without CONSULT-III

1. Let engine idle.
2. Read the voltage signal between ECM terminals 17, 18, 21, 22 and ground with an oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown below.
   NOTE:
   The pulse cycle changes depending on rpm at idle.



PBIA9265J



PBIA9567J

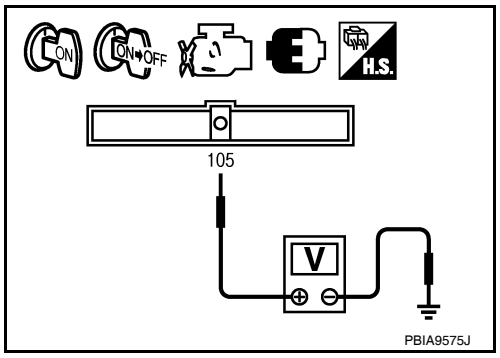
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 10.

4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
2. Check voltage between ECM terminal 105 and ground with CONSULT-III or tester.

Voltage: Battery voltage

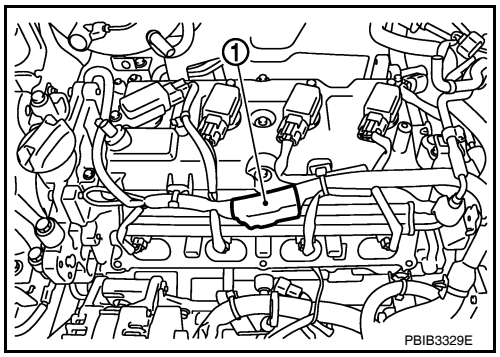


OK or NG

OK >> GO TO 5.
NG >> Go to EC-1139.

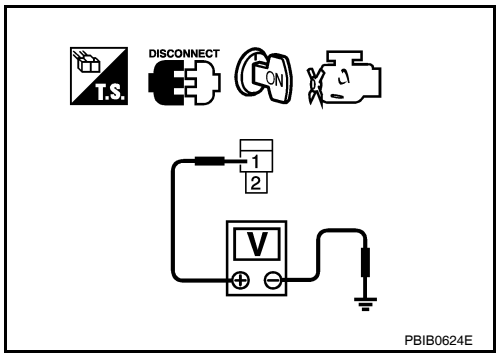
5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser-2 (1) harness connector.
3. Turn ignition switch ON.



4. Check voltage between condenser-2 terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 8.
NG >> GO TO 6.

6. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector E43.
3. Check harness continuity between IPDM E/R terminal 3 and condenser-2 terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> Go to EC-1139.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8

• Harness for open or short between IPDM E/R and condenser-2

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK CONDENSER-2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between condenser-2 terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK CONDENSER-2

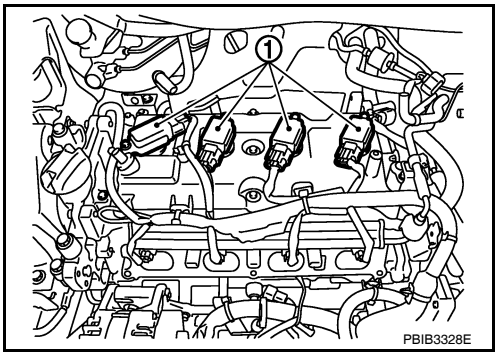
Refer to EC-1525, "Component Inspection"

OK or NG

OK >> GO TO 10.
NG >> Replace condenser-2.

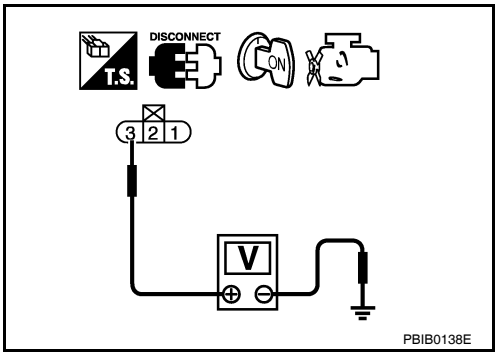
10. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect ignition coil (1) harness connector.
4. Turn ignition switch ON.



5. Check voltage between ignition coil terminal 3 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.
• Harness connector F8
• Harness for open or short between ignition coil and harness connector F8

>> Repair or replace harness or connectors.

12. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.

2. Check harness continuity between ignition coil terminal 2 and ground.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 13.
NG >> Repair open circuit or short to power in harness or connectors.

13. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 17, 18, 21, 22 and ignition coil terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 14.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-1525, "Component Inspection".

OK or NG

OK >> GO TO 15.
NG >> Replace ignition coil with power transistor.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

>> **INSPECTION END**

Component Inspection

INFOID:0000000004500424

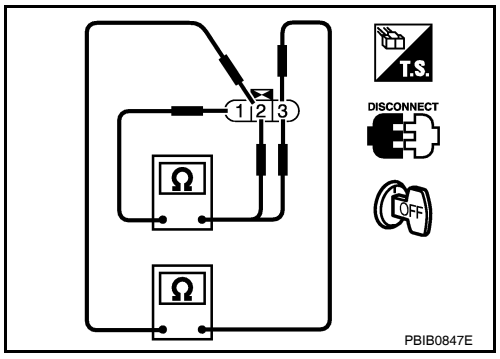
IGNITION COIL WITH POWER TRANSISTOR

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

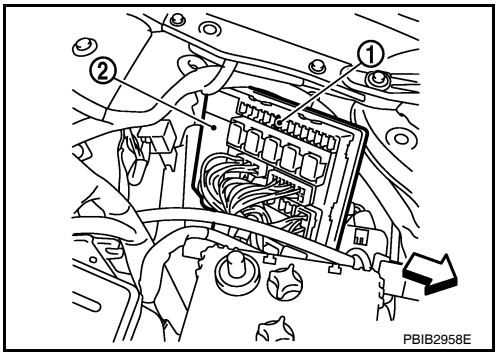
1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 and 2	Except 0 or ∞
1 and 3	Except 0
2 and 3	

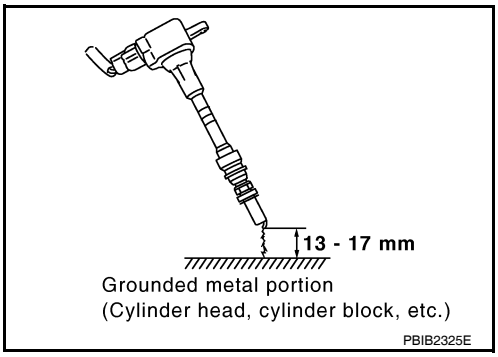


4. If NG, replace ignition coil with power transistor.
If OK, go to next step.
5. Turn ignition switch OFF.
6. Reconnect all harness connectors disconnected.

7. Remove fuel pump fuse (1) in IPDM E/R (2) to release fuel pressure.
   NOTE:
   Do not use CONSULT-III to release fuel pressure, or fuel pressure applies again during the following procedure.



- : Vehicle front
8. Start engine.
9. After engine stalls, crank it two or three times to release all fuel pressure.
10. Turn ignition switch OFF.
11. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
12. Remove ignition coil and spark plug of the cylinder to be checked.
13. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
14. Connect spark plug and harness connector to ignition coil.
15. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
16. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:
- **Do not approach to the spark plug and the ignition coil within 50cm. 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.**

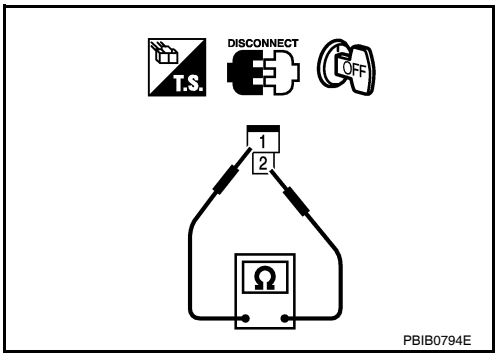
NOTE:
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

17. If NG, replace ignition coil with power transistor.

CONDENSER-2

1. Turn ignition switch OFF.
2. Disconnect condenser-2 harness connector.
3. Check resistance between condenser-2 terminals 1 and 2.

Resistance: Above 1 MΩ [at 25°C (77°F)]



4. If NG, replace condenser-2.

Removal and Installation

INFOID:0000000004500425

IGNITION COIL WITH POWER TRANSISTOR

Refer to EM-153.

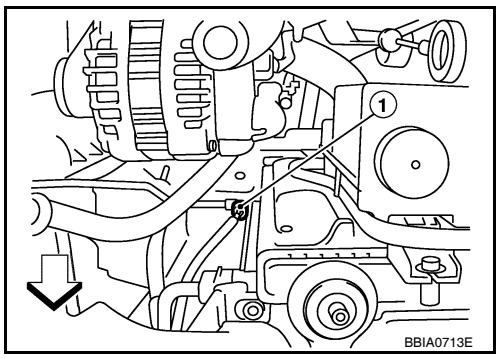
REFRIGERANT PRESSURE SENSOR

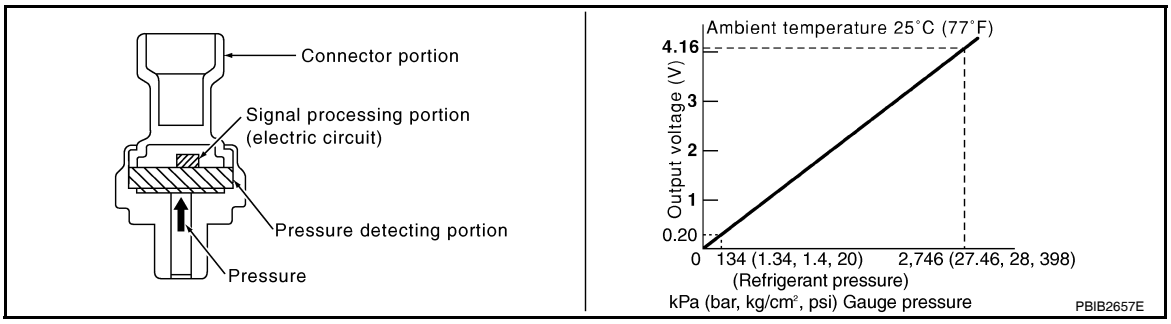
Component Description

INFOID:0000000004500426

The refrigerant pressure sensor (1) is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.

• : Vehicle front

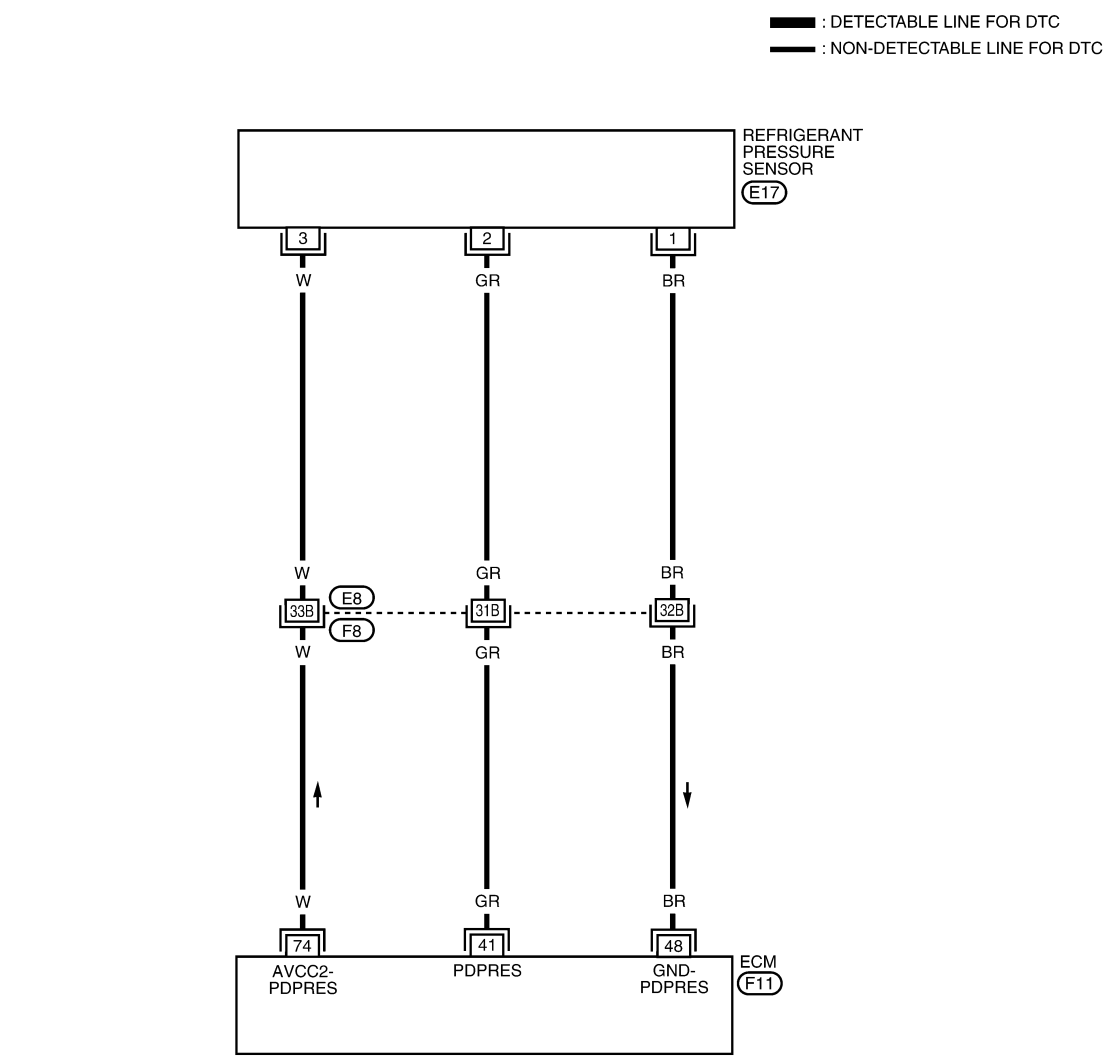


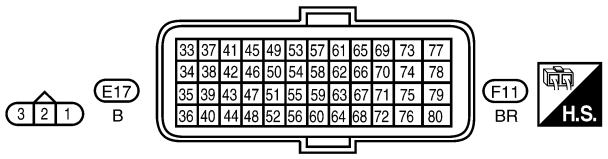


Wiring Diagram

INFOID:0000000004500427

EC-RP/SEN-01





REFER TO THE FOLLOWING.
F8 - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2662E

Specification data are reference values and are measured between each terminal 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.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
41	GR	Refrigerant pressure sensor	**[Engine is running]** • **Warm-up condition** • Both A/C switch and blower fan switch: ON (Compressor operates)	1.0 - 4.0V
48	BR	Sensor ground (Refrigerant pressure sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0V
74	W	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V

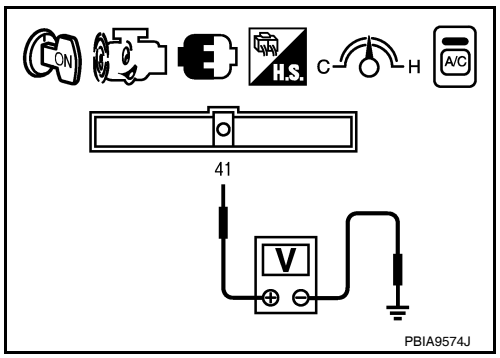
Diagnosis Procedure

INFOID:0000000004500428

1.CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower fan switch ON.
3. Check voltage between ECM terminal 41 and ground with CONSULT-III or tester.

Voltage: 1.0 - 4.0V

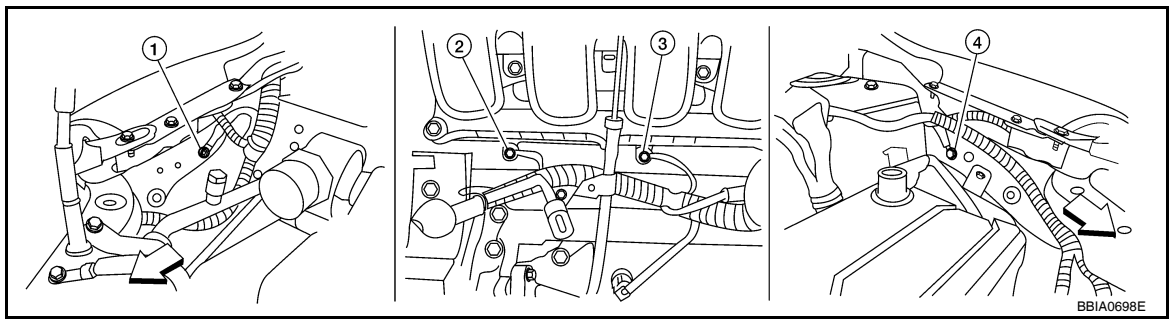


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2.CHECK GROUND CONNECTIONS

1. Turn A/C switch and blower fan switch OFF.
2. Stop engine and turn ignition switch OFF.
3. Loosen and retighten ground screw on the body.
Refer to EC-1144, "Ground Inspection".



: Vehicle front

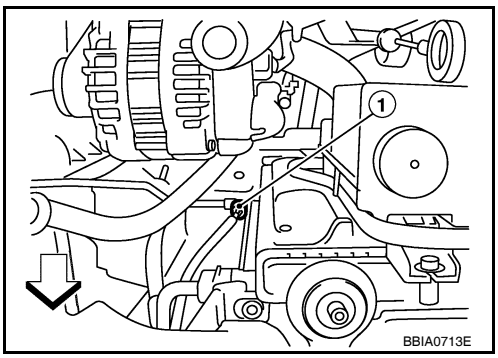
1. Body ground E24
2. Engine ground F9
3. Engine ground F16
4. Body ground E15

OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

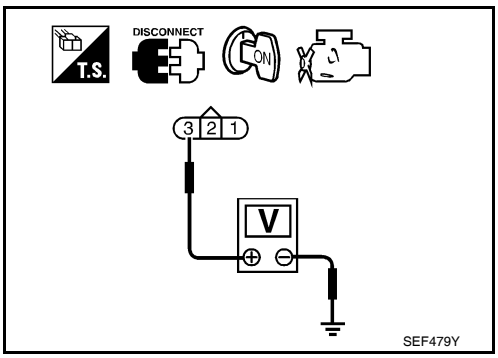
3.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor (1) harness connector.
- : Vehicle front
2. Turn ignition switch ON.



3. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between refrigerant pressure sensor terminal 1 and ECM terminal 48. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between refrigerant pressure sensor terminal 2 and ECM terminal 41. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F8
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1138.

OK or NG

OK >> Replace refrigerant pressure sensor.
NG >> Repair or replace.

Removal and Installation

INFOID:0000000004500429

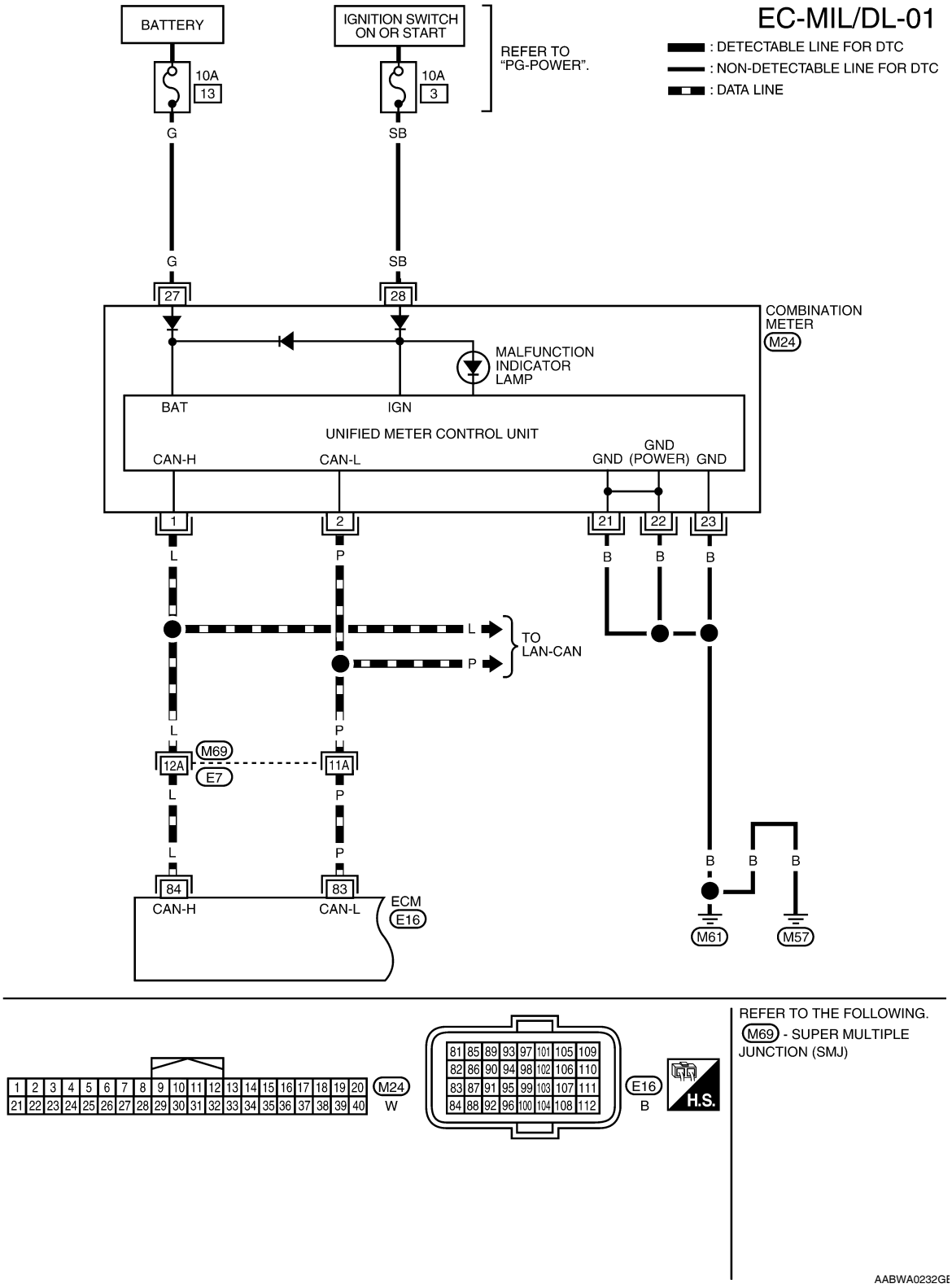
REFRIGERANT PRESSURE SENSOR

Refer to MTC-83, "Removal and Installation of Refrigerant Pressure Sensor".

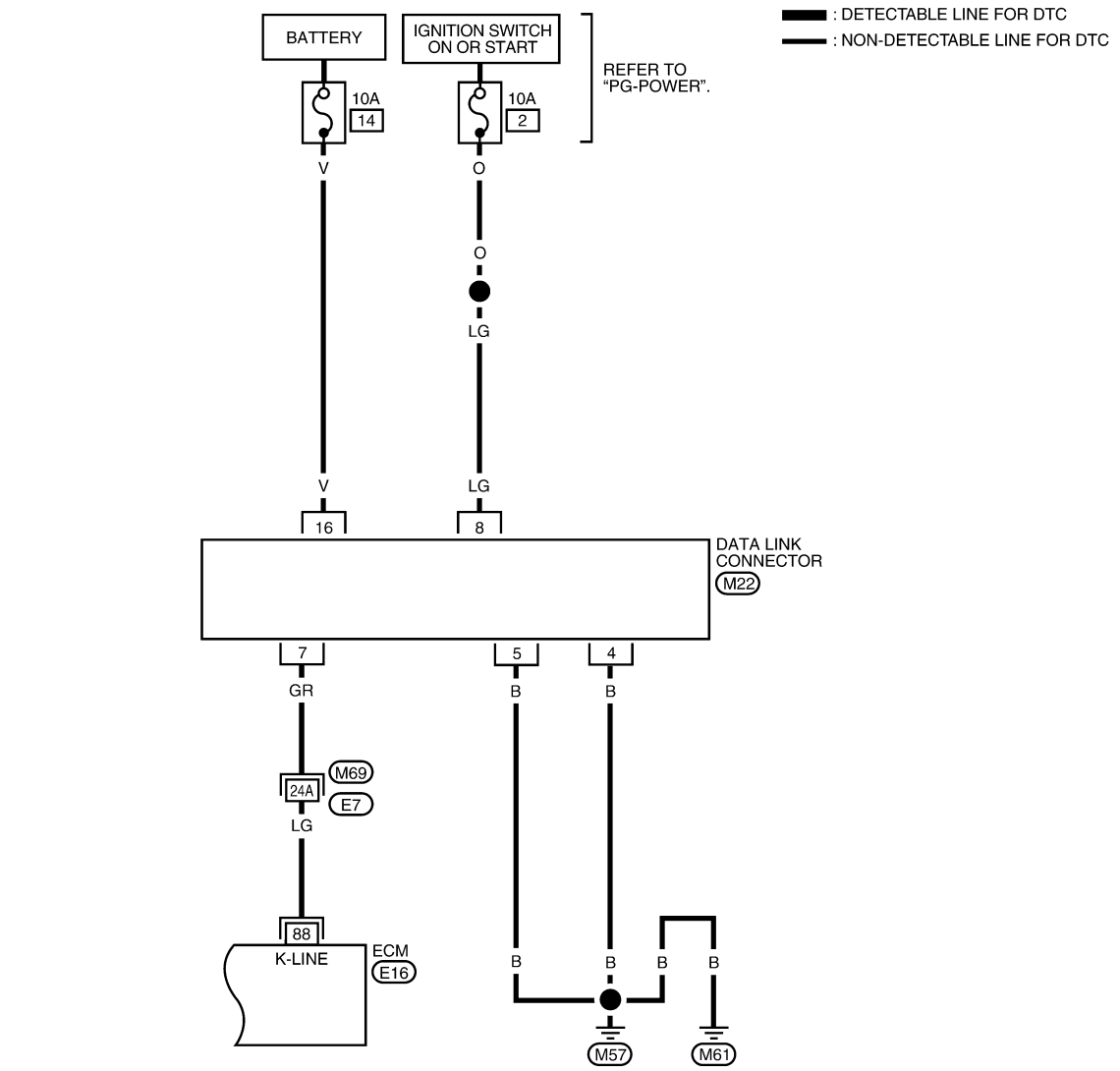
MIL AND DATA LINK CONNECTOR

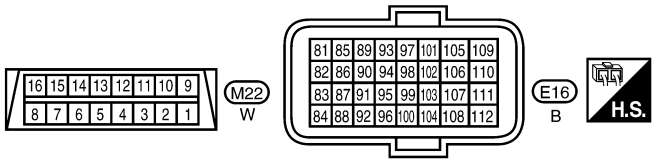
Wiring Diagram

INFOID:0000000004500430



EC-MIL/DL-02





REFER TO THE FOLLOWING.
M69 - SUPER MULTIPLE JUNCTION (SMJ)

BBWA2998E

SERVICE DATA AND SPECIFICATIONS (SDS)

Fuel Pressure

INFOID:0000000004500431

Fuel pressure at idle	Approximately 350 kPa (3.57 kg/cm^2, 51 psi)

Idle Speed and Ignition Timing

INFOID:0000000004500432

Target idle speed	A/T	No load* (in P or N position)	700 ± 50 rpm
	CVT	No load* (In P or N position)	
	M/T	No load* (in Neutral position)	
Air conditioner: ON	A/T	In P or N position	850 rpm or more
	CVT	In P or N position	
	M/T	In Neutral position	
Ignition timing	A/T	In P or N position	13 ± 5° BTDC
	CVT	In P or N position	
	M/T	In Neutral position	

*: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

INFOID:0000000004500433

	Calculated load value% (Using CONSULT-III or GST)
At idle	10 - 35
At 2,500 rpm	10 - 35

Mass Air Flow Sensor

INFOID:0000000004500434

Supply voltage	Battery voltage (11 - 14V)
Output voltage at idle	1.0 - 1.3*V
Mass air flow (Using CONSULT-III or GST)	1.0 - 4.0 g·m/sec at idle* 2.0 - 10.0 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.

Intake Air Temperature Sensor

INFOID:0000000004500435

Temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

Engine Coolant Temperature Sensor

INFOID:0000000004500436

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Air Fuel Ratio (A/F) Sensor 1 Heater

INFOID:0000000004500437

Resistance [at 25°C (77°F)]	1.8 - 2.44Ω

Heated Oxygen sensor 2 Heater

INFOID:0000000004500438

Resistance [at 25°C (77°F)]	3.4 - 4.4Ω

Crankshaft Position Sensor (POS)

INFOID:0000000004500439

Refer to EC-1298, "Component Inspection".

Camshaft Position Sensor (PHASE)

INFOID:0000000004500440

Refer to EC-1303, "Component Inspection".

Throttle Control Motor

INFOID:0000000004500441

Resistance [at 25°C (77°F)]	Approximately 1 - 15Ω

Fuel Injector

INFOID:0000000004500442

Resistance [at 10 - 60°C (50 - 140°F)]	11.4 - 14.5Ω

Fuel Pump

INFOID:0000000004500443

Resistance [at 25°C (77°F)]	Approximately 0.2 - 5.0Ω