SECTION EC
ENGINE CONTROL SYSTEM

CONTENTS

VQ40DE

BASIC INSPECTION

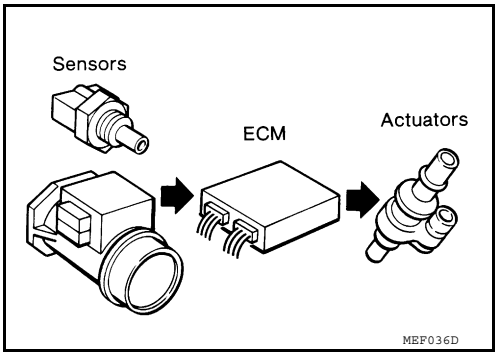
DIAGNOSIS AND REPAIR WORKFLOW

Trouble Diagnosis Introduction

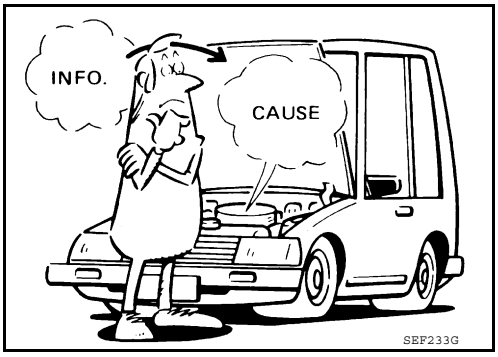
INFOID:0000000005281949

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.



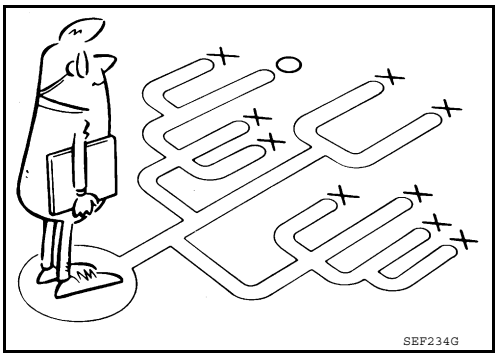
It is much more difficult to diagnose an incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



A visual check only may not find the cause of the incidents. A road test with CONSULT-III or a circuit tester connected should be performed. Follow the Work Flow on “Work Flow”.

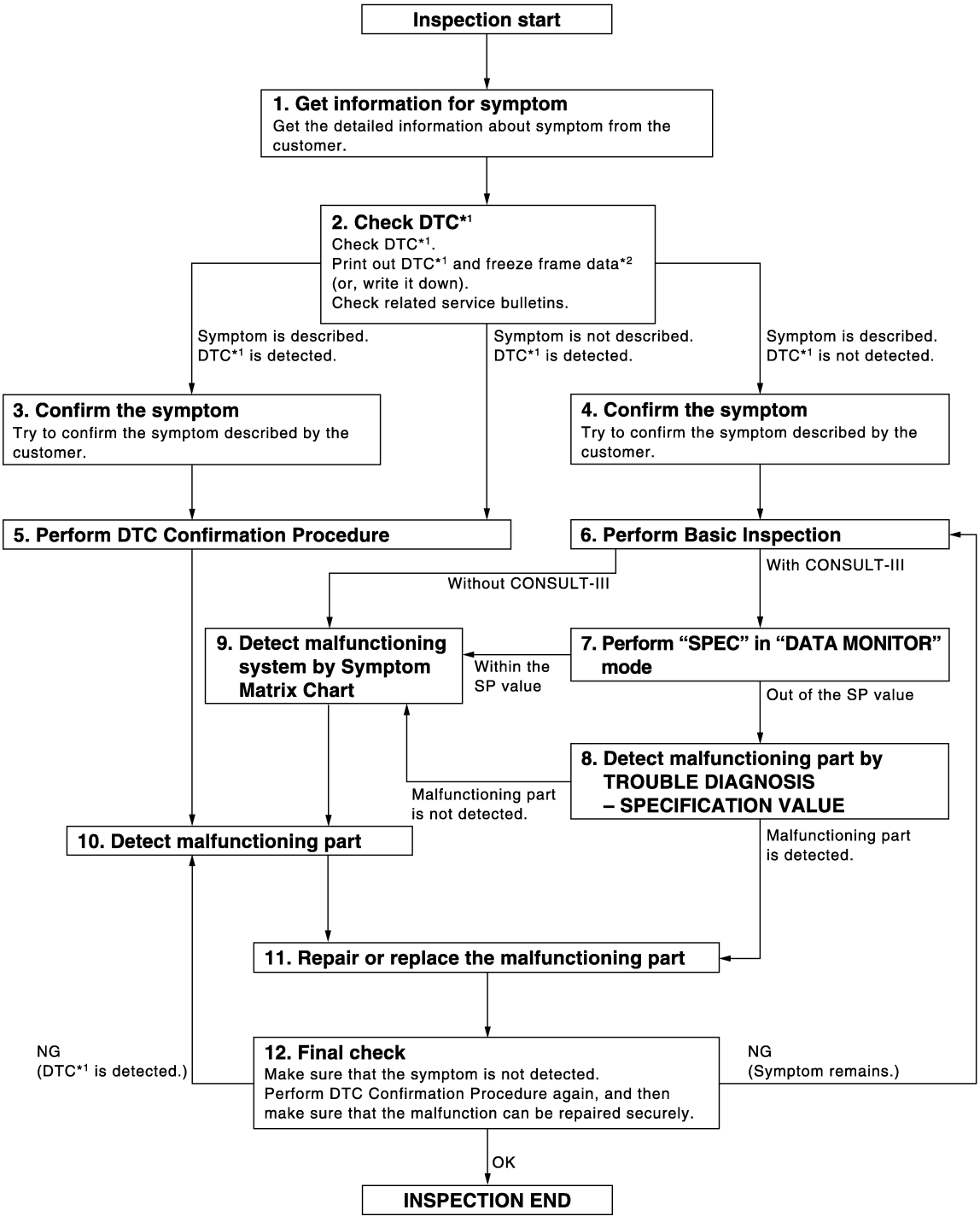
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic 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.

PBIB3637E

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.)
- Erase DTC*1. (Refer to EC-269, "DTC Index".)
- 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-273.)

3. Check related service bulletins for information.

Are any symptoms described and any DTCs 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.
Connect CONSULT-III to the vehicle and check diagnosis results.
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.
Connect CONSULT-III to the vehicle and check diagnosis results.
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 check that DTC*1 is detected again.
If two or more DTCs*1 are detected, refer to EC-269, "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 GI-34, "Work Flow".

6.PERFORM BASIC INSPECTION

Perform EC-12, "Basic Inspection".

With CONSULT-III>>GO TO 7.
Without CONSULT-III>>GO TO 9.

7.PERFORM SPEC IN DATA MONITOR MODE

With CONSULT-III
Check that “MAS A/F SE-B1”, “B/FUEL SCHDL”, and “A/F ALPHA-B1”, “A/F ALPHA-B2” are within the SP value using CONSULT-III “SPEC” in “DATA MONITOR” mode. Refer to EC-55, "Description".

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-55, "Diagnosis Procedure".

Is a 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-273, "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-34, "Work Flow".

Is a 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-235, "CONSULT-III Reference Value in Data Monitor Mode", EC-238, "ECM Terminal and Reference Value".

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnostic Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it, refer to EC-269, "DTC Index".

>> GO TO 12.

12. FINAL CHECK

When DTC was detected in step 2, perform DTC Confirmation Procedure or Overall Function Check again, and then check that the malfunction have been completely repaired.

When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and check 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, always erase unnecessary DTC*1 in ECM. (Refer to EC-44, "Introduction".)
2. **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 symptoms. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

KEY POINTS

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

SEF907L

Worksheet Sample

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Fuel and fuel filler cap		☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
	☐ 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	

LEC031A

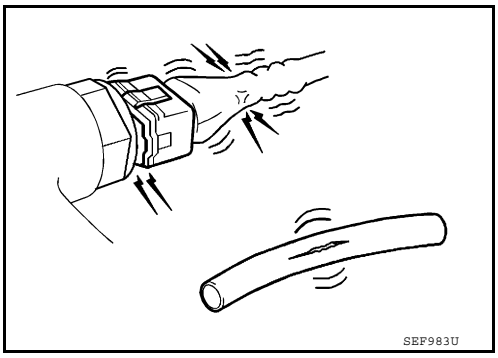
INSPECTION AND ADJUSTMENT

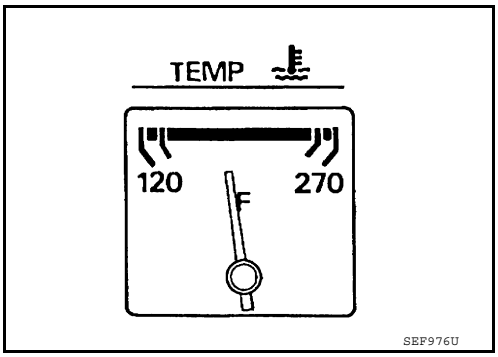
Basic Inspection

INFOID:0000000005281950

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 leakage
- Air cleaner clogging
- Gasket
3. Check 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 to the middle of gauge.
   Ensure engine stays below 1,000 rpm.

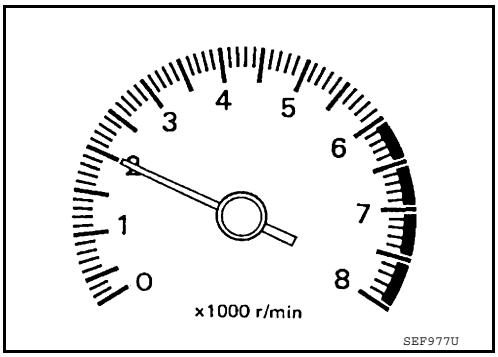




5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Check that no DTC is displayed with CONSULT-III.

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.

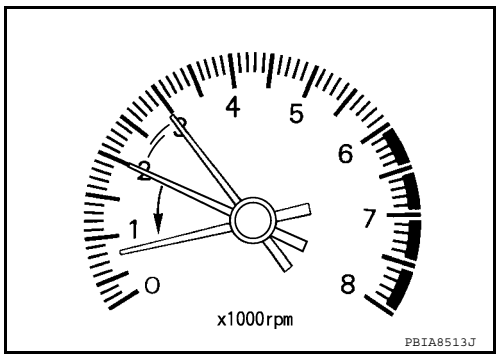
>> GO TO 3.

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-16, "Idle Speed and Ignition Timing Check".

M/T: 625 ± 50 rpm (in Neutral position)
A/T: 625 ± 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-16, "Idle Speed and Ignition Timing Check".

M/T: 625 ± 50 rpm (in Neutral position)
A/T: 625 ± 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-16, "Accelerator Pedal Released Position Learning".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-17, "Throttle Valve Closed Position Learning".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-17, "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-16, "Idle Speed and Ignition Timing Check".

M/T: 625 ± 50 rpm (in Neutral position)
A/T: 625 ± 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-16, "Idle Speed and Ignition Timing Check".

M/T: 625 ± 50 rpm (in Neutral position)
A/T: 625 ± 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 camshaft position sensor (PHASE) and circuit. Refer to EC-95, "Diagnosis Procedure".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-90, "Diagnosis Procedure".

OK or NG

OK >> GO TO 9.
NG >> 1. Repair or replace.
2. GO TO 4.

9. CHECK ECM FUNCTION

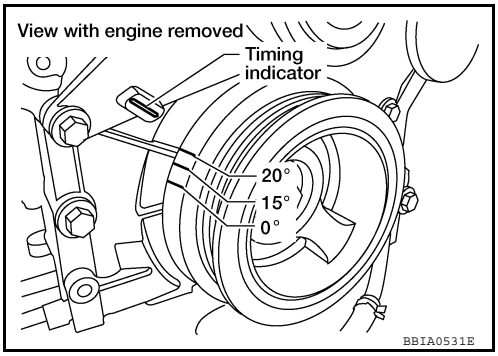
1. Substitute with a non-malfunctioning ECM to check ECM function. (ECM may be the cause of the incident, although this is rare.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-7, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement".

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light.
   Refer to EC-16, "Idle Speed and Ignition Timing Check".

M/T: 15 ± 5° BTDC (in Neutral position)
A/T: 15 ± 5° BTDC (in P or N position)



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-16, "Accelerator Pedal Released Position Learning".

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-17, "Throttle Valve Closed Position Learning".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-17, "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-16, "Idle Speed and Ignition Timing Check".

M/T: 625 ± 50 rpm (in Neutral position)
A/T: 625 ± 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-16, "Idle Speed and Ignition Timing Check".

M/T: 625 ± 50 rpm (in Neutral position)
A/T: 625 ± 50 rpm (in P or N position)

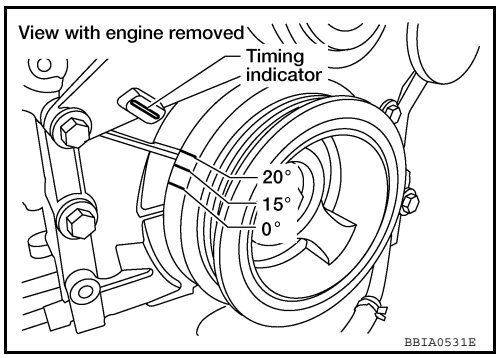
OK or NG

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-16, "Idle Speed and Ignition Timing Check".

M/T: 15 ± 5° BTDC (in Neutral position)
A/T: 15 ± 5° BTDC (in P or N position)



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-58, "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 camshaft position sensor (PHASE) and circuit. Refer to EC-95, "Diagnosis Procedure".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-90, "Diagnosis Procedure".

OK or NG

OK >> GO TO 18.
NG >> 1. Repair or replace.
2. GO TO 4.

18. CHECK ECM FUNCTION

1. Substitute with non-malfunctioning ECM to check ECM function. (ECM may be the cause of the incident, although this is rare.)

2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-7, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement".

>> GO TO 4.

Idle Speed and Ignition Timing Check

INFOID:0000000005281951

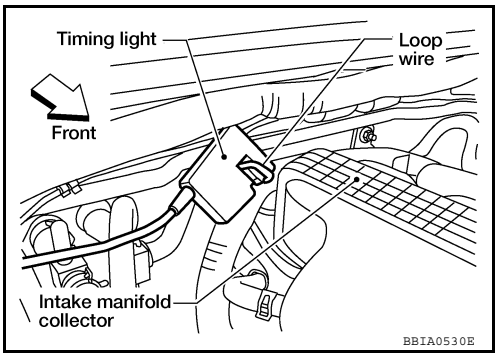
IDLE SPEED

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

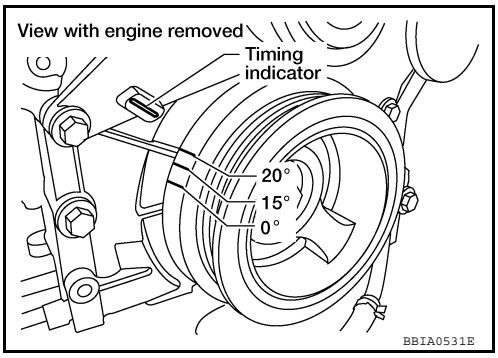
Without CONSULT-III
Check idle speed by installing the pulse type tachometer clamp on the loop wire which or on suitable high-tension wire with installed between No,1 ignition coil and No,1 spark plug.
NOTE:
For the method of installing the tachometer refer to “IGNITION TIMING” below.

IGNITION TIMING

1. Attach timing light to loop wire as shown.



2. Check ignition timing.



Procedure After Replacing ECM

INFOID:0000000005281952

When replacing ECM, the following procedure must be performed.

1. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-7, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement".
2. Perform EC-16, "Accelerator Pedal Released Position Learning".
3. Perform EC-17, "Throttle Valve Closed Position Learning".
4. Perform EC-17, "Idle Air Volume Learning".

Accelerator Pedal Released Position Learning

INFOID:0000000005281953

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:0000000005281954

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:0000000005281955

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 - 100°C (158 - 212°F)
- PNP signal: ON (M/T models)
- Selector lever: P or N (A/T models)
- 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

- With CONSULT-III: Drive vehicle until “ATF TEMP SE 1” in “DATA MONITOR” mode of “A/T” system indicates less than 0.9V.
- Without CONSULT-III: Drive vehicle for 10 minutes.

OPERATION PROCEDURE

With CONSULT-III

1. Perform EC-16, "Accelerator Pedal Released Position Learning".
2. Perform EC-17, "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.

ITEM	SPECIFICATION
Idle speed	M/T: 625 ± 50 rpm (in Neutral position) A/T: 625 ± 50 rpm (in P or N position)
Ignition timing	M/T: 15 ± 5° BTDC (in Neutral position) A/T: 15 ± 5° BTDC (in P or N position)

Without CONSULT-III

NOTE:

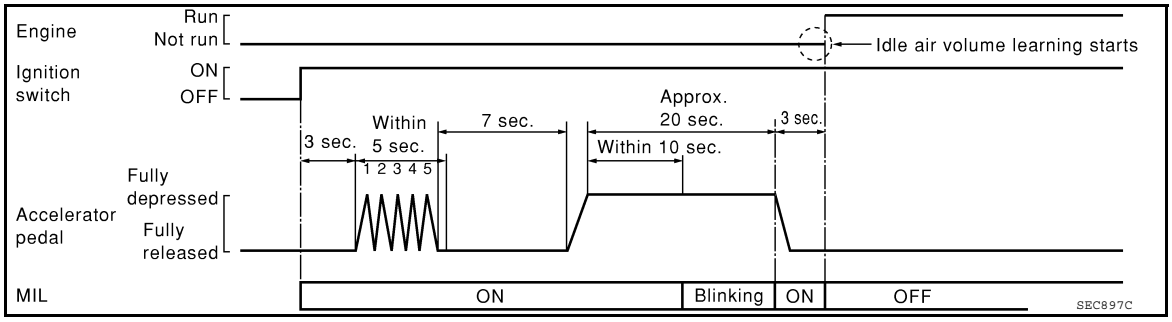
- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**

1. Perform EC-16, "Accelerator Pedal Released Position Learning".
2. Perform EC-17, "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, then 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 it for approx. 20 seconds until the MIL stops blinking and turns ON.
9. Fully release the accelerator pedal within 3 seconds after the MIL turns 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.

ITEM	SPECIFICATION
Idle speed	M/T: 625 ± 50 rpm (in Neutral position) A/T: 625 ± 50 rpm (in P or N position)
Ignition timing	M/T: 15 ± 5° BTDC (in Neutral position) A/T: 15 ± 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.**

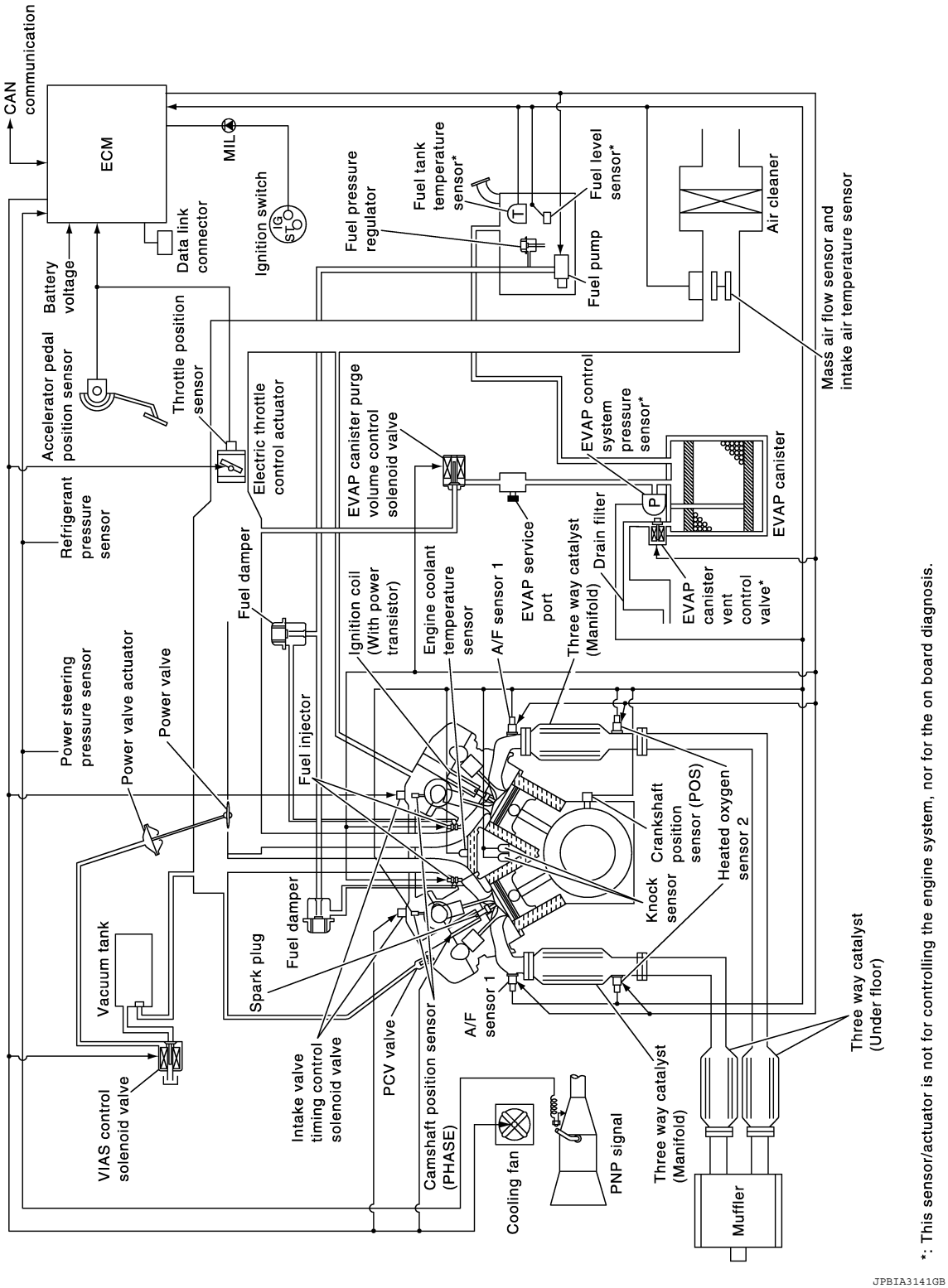
3. **Check that downstream of throttle valve is free from air leakage.**
4. **When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.**
   It is useful to perform "TROUBLE DIAGNOSIS - SPECIFICATION VALUE". Refer to EC-55.
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.**
   - **Incorrect idle.**

FUNCTION DIAGNOSIS

ENGINE CONTROL SYSTEM

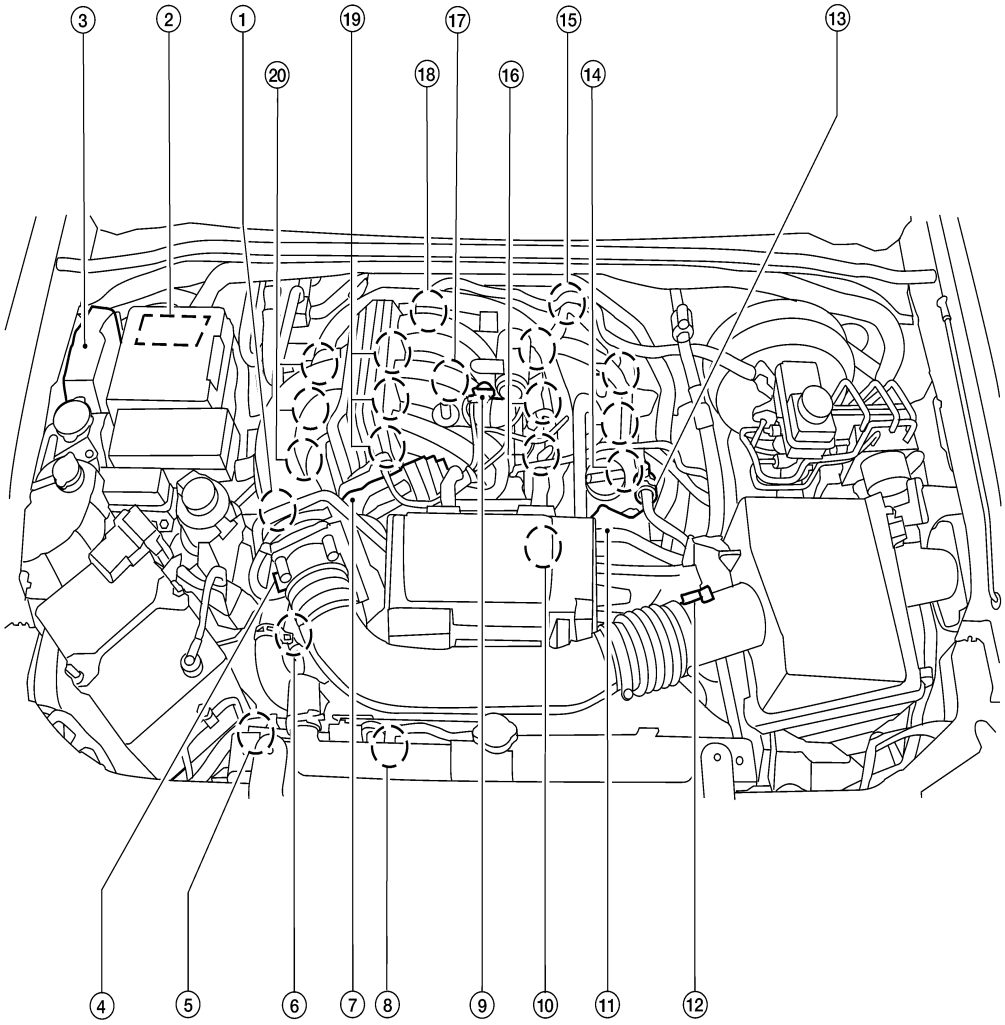
System Diagram

INFOID:0000000005281956



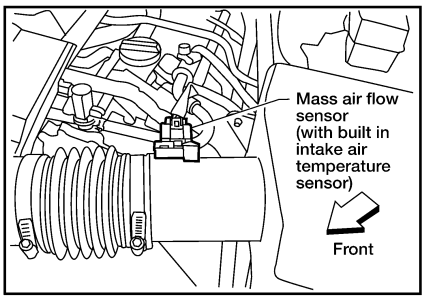
Engine Control Component Parts Location

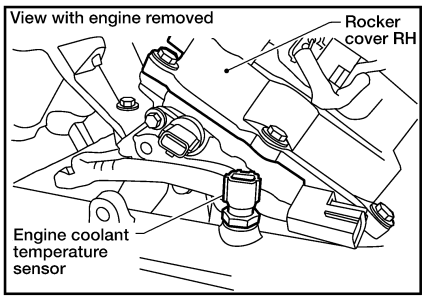
INFOID:0000000005281957

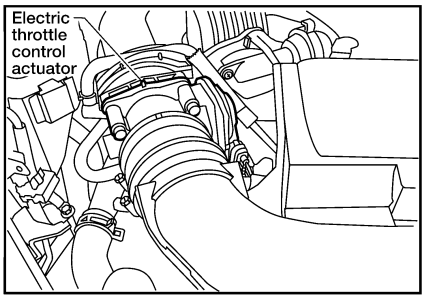


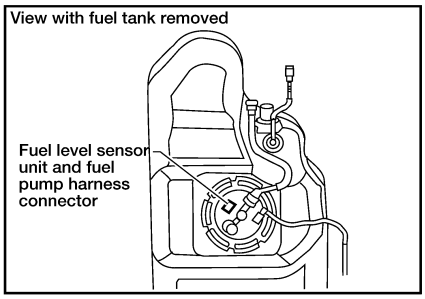
BBIA0680E

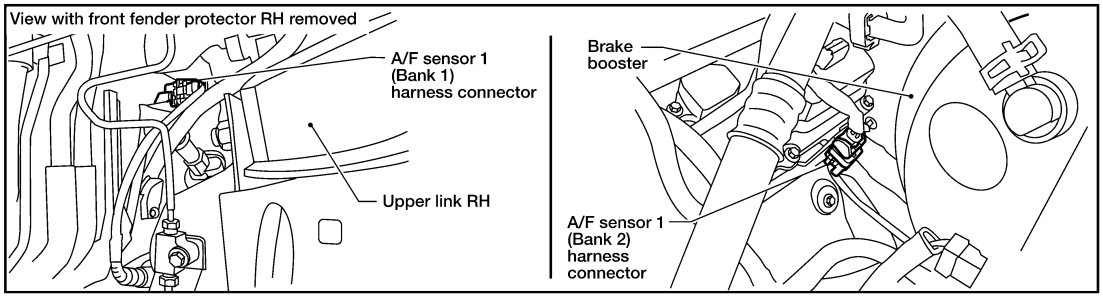
1. Intake valve timing control solenoid valve (Bank 1)	2. IPDM E/R	3. ECM
4. Electric throttle control actuator	5. Refrigerant pressure sensor	6. Power steering pressure sensor
7. Power valve actuator	8. Cooling fan motor	9. VIAS control solenoid valve
10. EVAP canister purge volume control solenoid valve	11. Intake valve timing control solenoid valve (Bank 2)	12. Mass air flow sensor (with intake air temperature sensor)
13. EVAP service port	14. Ignition coil (with power transistor) and spark plug (Bank 2)	15. Camshaft position sensor (PHASE) (Bank 1)
16. Fuel injector (Bank 2)	17. Knock sensors	18. Engine coolant temperature sensor, Camshaft position sensor (PHASE) (Bank 1)
19. Fuel injector (Bank 1)	20. Ignition coil (with power transistor) and spark plug (Bank 1)	

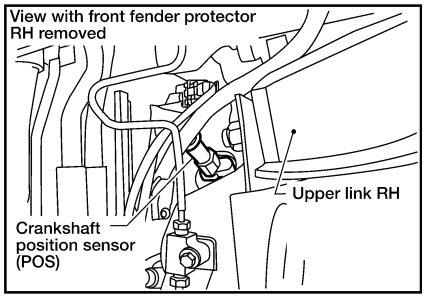

Mass air flow sensor (with built in intake air temperature sensor)
Front

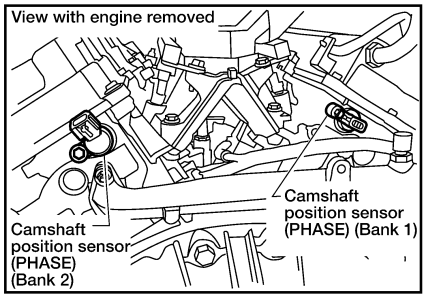

View with engine removed
Rocker cover RH
Engine coolant temperature sensor


Electric throttle control actuator

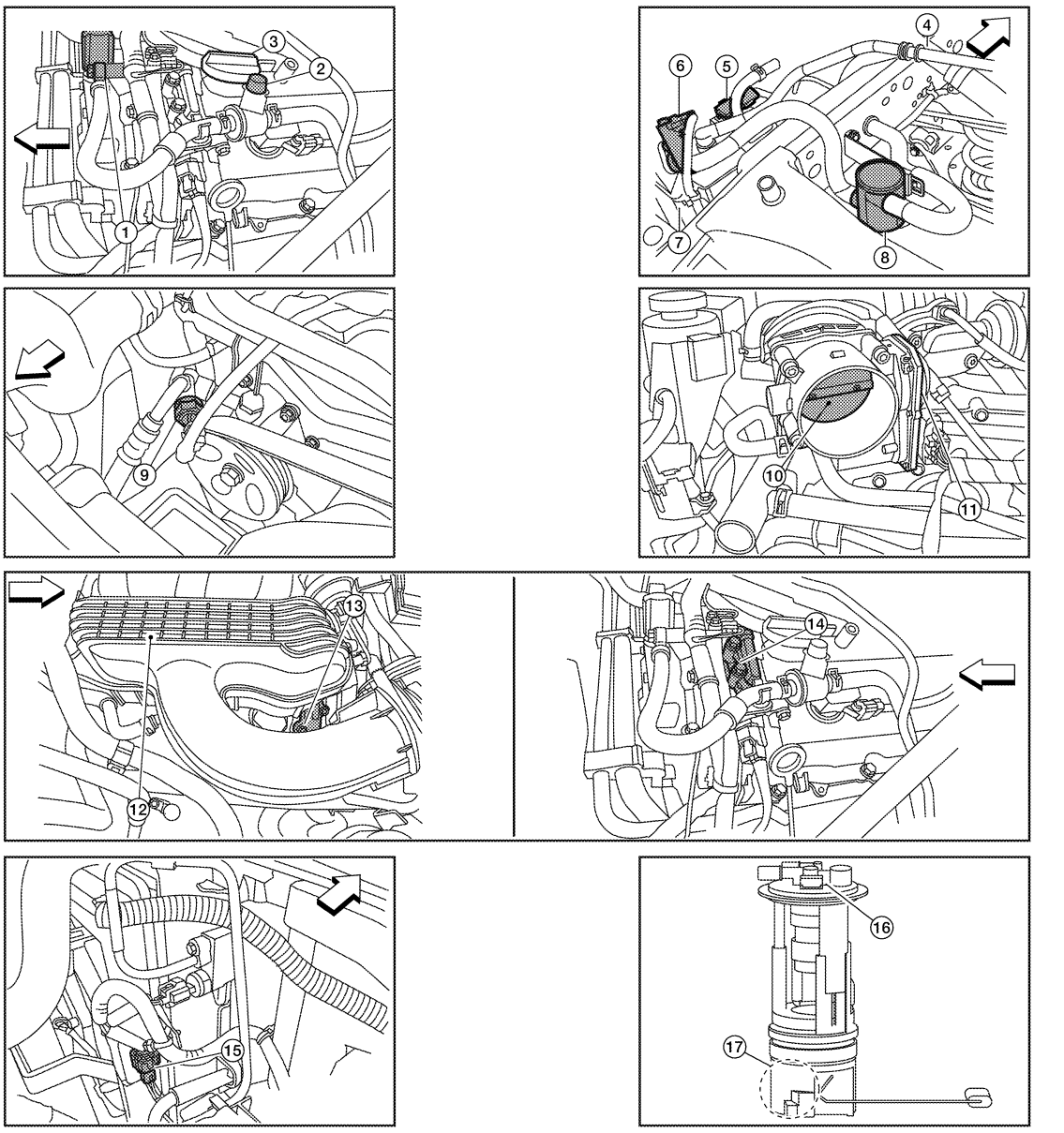

View with fuel tank removed
Fuel level sensor unit and fuel pump harness connector


View with front fender protector RH removed
A/F sensor 1 (Bank 1) harness connector
Upper link RH
Brake booster
A/F sensor 1 (Bank 2) harness connector


View with front fender protector RH removed
Upper link RH
Crankshaft position sensor (POS)

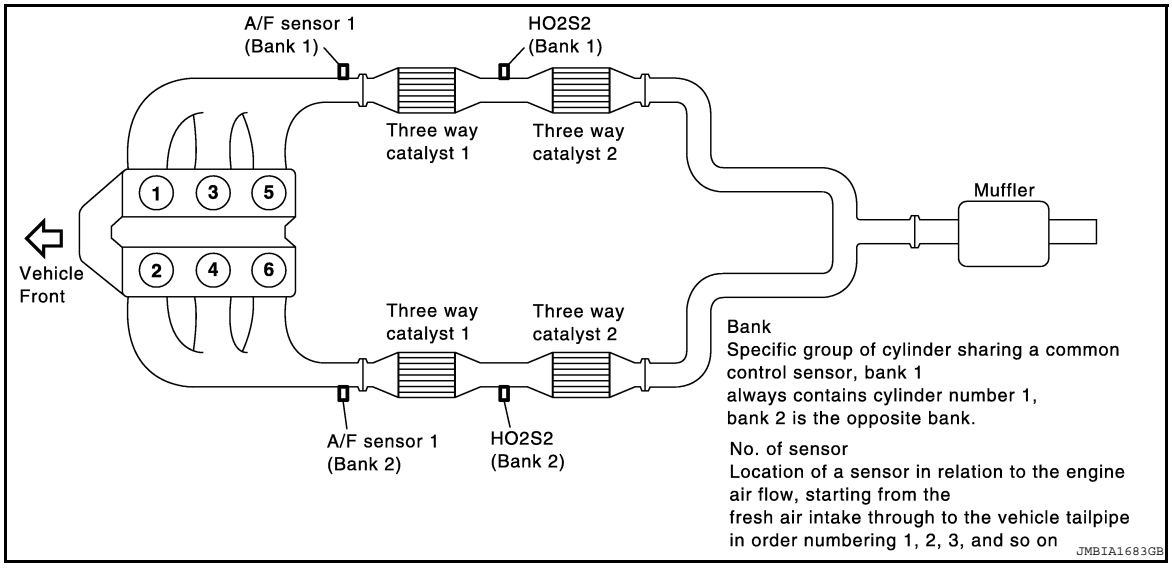

View with engine removed
Camshaft position sensor (PHASE) (Bank 1)
Camshaft position sensor (PHASE) (Bank 2)

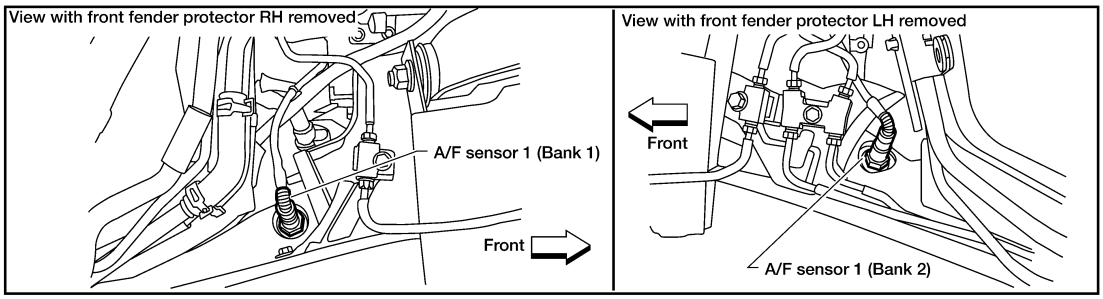
BBIA0578E

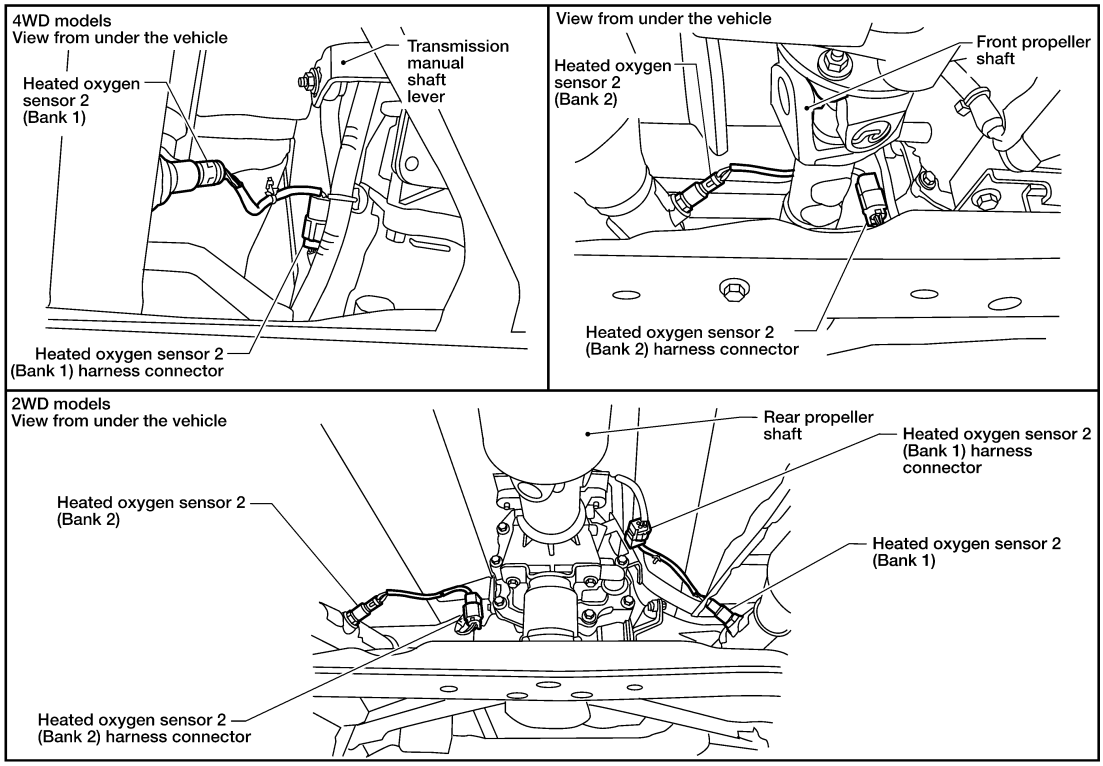


1. EVAP canister purge volume control solenoid valve (view with engine cover removed)
2. EVAP service port
3. Oil filler cap
4. Fuel filler pipe (top of frame view)
5. EVAP control system pressure sensor
6. EVAP canister vent control valve
7. EVAP canister
8. Drain filter
9. Power steering pressure sensor
10. Throttle valve (view with intake air duct removed)
11. Electric throttle control actuator
12. Intake manifold collector
13. Intake valve timing control solenoid valve (bank 1)
14. Intake valve timing control solenoid valve (bank 2) (view with engine cover and intake air duct removed)
15. Cooling fan motor harness connector (view with battery removed)
16. Fuel pump, fuel level sensor unit and fuel filter
17. Fuel pressure regulator

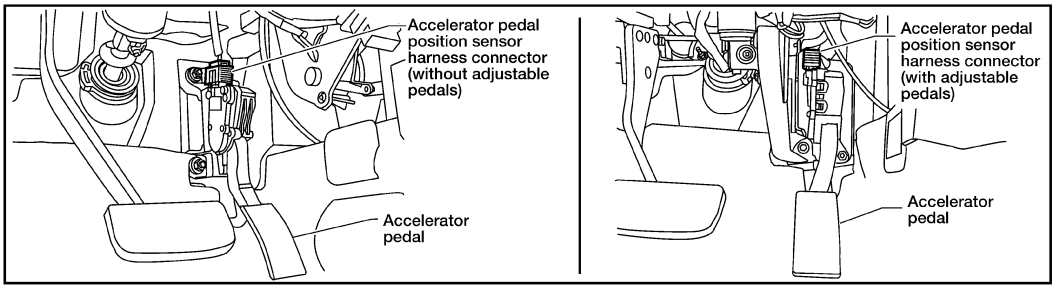
⇦ : Front

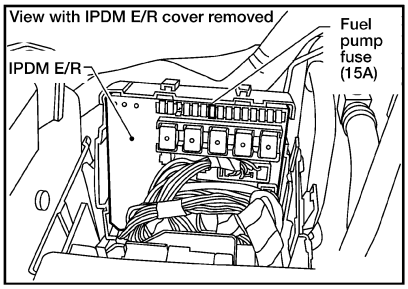

A/F sensor 1
(Bank 1)
HO2S2
(Bank 1)
Three way
catalyst 1
Three way
catalyst 2
Muffler
1
3
5
2
4
6
Vehicle
Front
Three way
catalyst 1
Three way
catalyst 2
A/F sensor 1
(Bank 2)
HO2S2
(Bank 2)
Bank
Specific group of cylinder sharing a common control sensor, bank 1 always contains cylinder number 1, bank 2 is the opposite bank.
No. of sensor
Location of a sensor in relation to the engine air flow, starting from the fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on
JMBIA1683GB

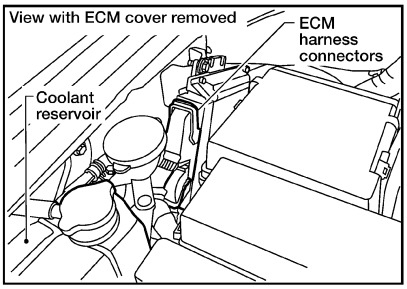

View with front fender protector RH removed
A/F sensor 1 (Bank 1)
Front
View with front fender protector LH removed
Front
A/F sensor 1 (Bank 2)

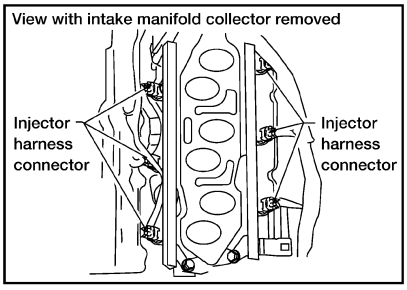

4WD models
View from under the vehicle
Heated oxygen sensor 2 (Bank 1)
Transmission manual shaft lever
Heated oxygen sensor 2 (Bank 1) harness connector
View from under the vehicle
Heated oxygen sensor 2 (Bank 2)
Front propeller shaft
Heated oxygen sensor 2 (Bank 2) harness connector
2WD models
View from under the vehicle
Rear propeller shaft
Heated oxygen sensor 2 (Bank 1) harness connector
Heated oxygen sensor 2 (Bank 2)
Heated oxygen sensor 2 (Bank 1)
Heated oxygen sensor 2 (Bank 2) harness connector

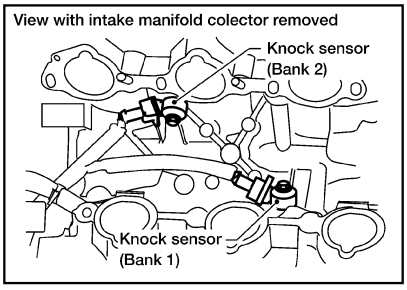
BBIA0577E

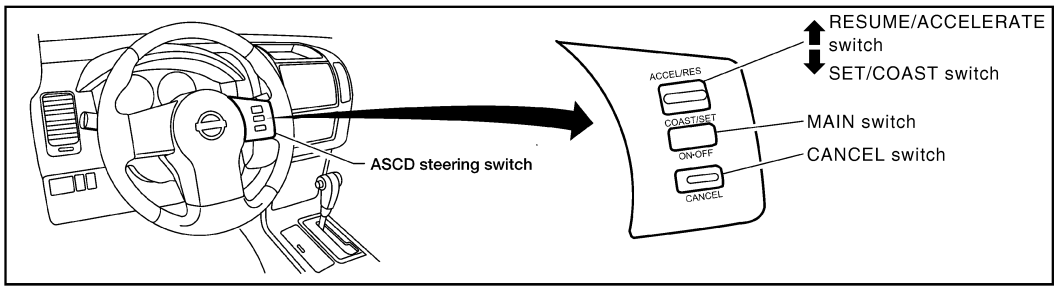

Accelerator pedal position sensor harness connector (without adjustable pedals)
Accelerator pedal
Accelerator pedal position sensor harness connector (with adjustable pedals)
Accelerator pedal


View with IPDM E/R cover removed
IPDM E/R
Fuel pump fuse (15A)

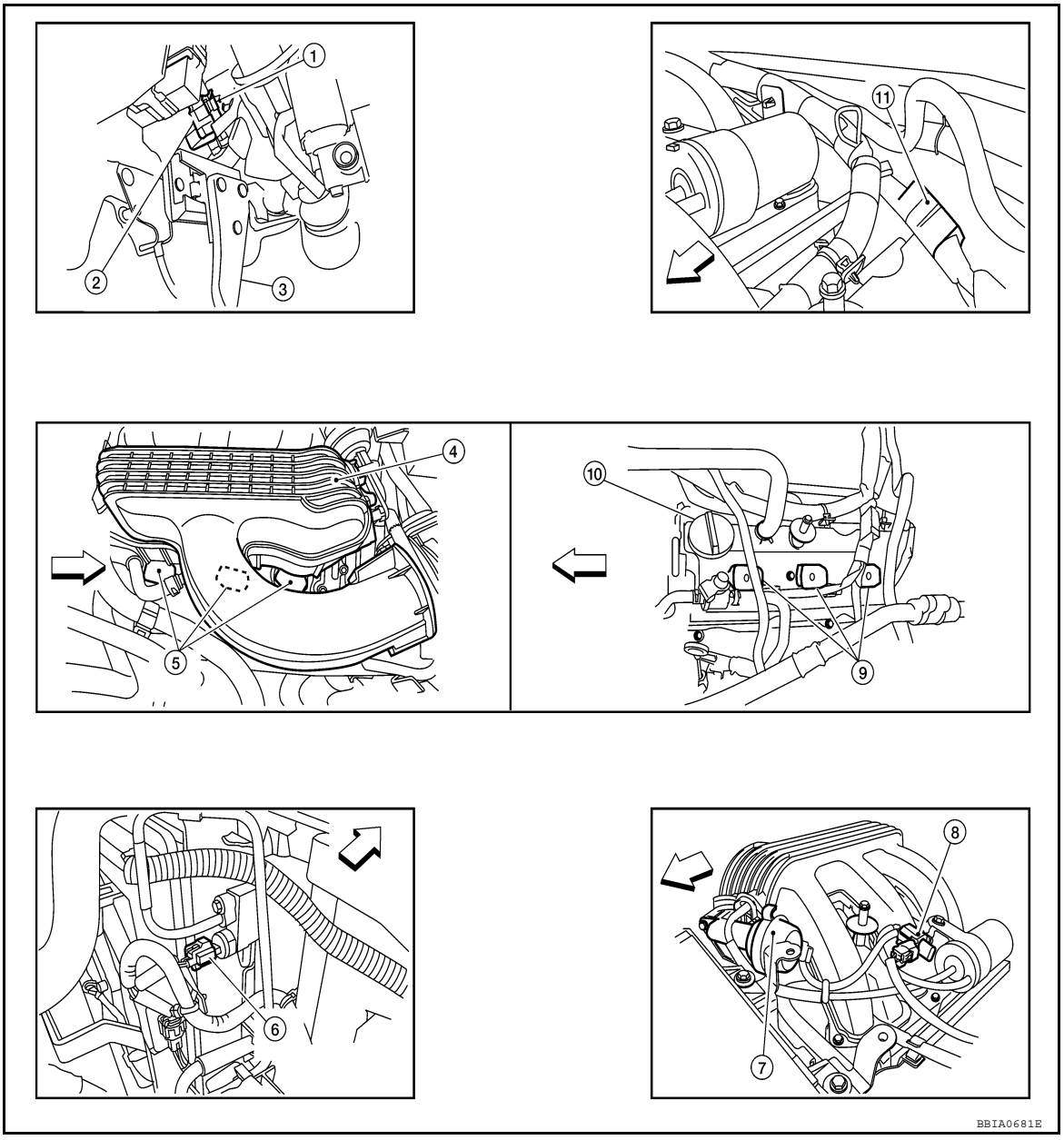

View with ECM cover removed
ECM harness connectors
Coolant reservoir


View with intake manifold collector removed
Injector harness connector
Injector harness connector


View with intake manifold colector removed
Knock sensor (Bank 2)
Knock sensor (Bank 1)


RESUME/ACCELERATE switch
SET/COAST switch
MAIN switch
CANCEL switch
ASCD steering switch
ACCEL/RES
COAST/SET
ON-OFF
CANCEL

PBIB2646E



1. ASCD brake switch (view with lower instrument panel LH removed)
2. Stop lamp switch
3. Brake pedal
4. Intake manifold collector
5. Ignition coil harness connector (Bank 1)
6. Refrigerant pressure sensor harness connector (view with battery removed)
7. Power valve actuator (view with engine cover removed)
8. VIAS control solenoid valve
9. Ignition coil harness connector (Bank 2)
10. Oil filler cap
11. Condenser-1 (view with engine cover removed)

⇦ Front

MULTIPORT FUEL INJECTION SYSTEM

System Description

INFOID:0000000005281958

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) signal	Gear position		
Knock sensor	Engine knocking condition		
Battery	Battery voltage*3		
Power steering pressure sensor	Power steering operation		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		
Air conditioner switch	Air conditioner operation*2		
Wheel sensor	Vehicle speed*2		

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

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

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

SYSTEM DESCRIPTION

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

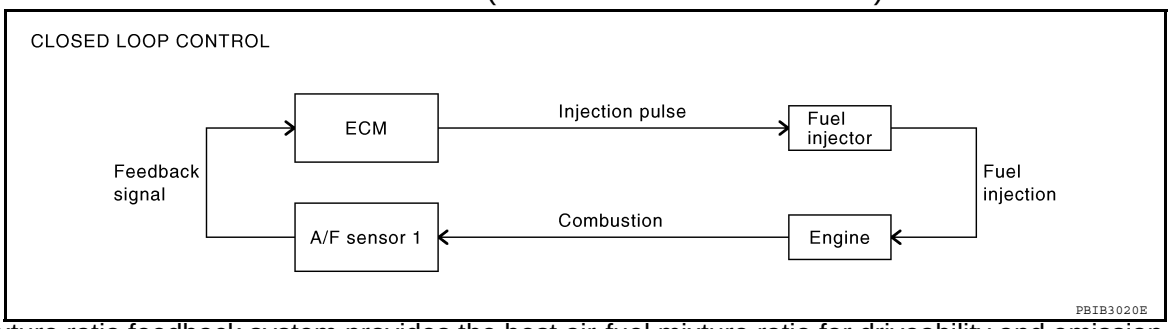
VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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 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-143. 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

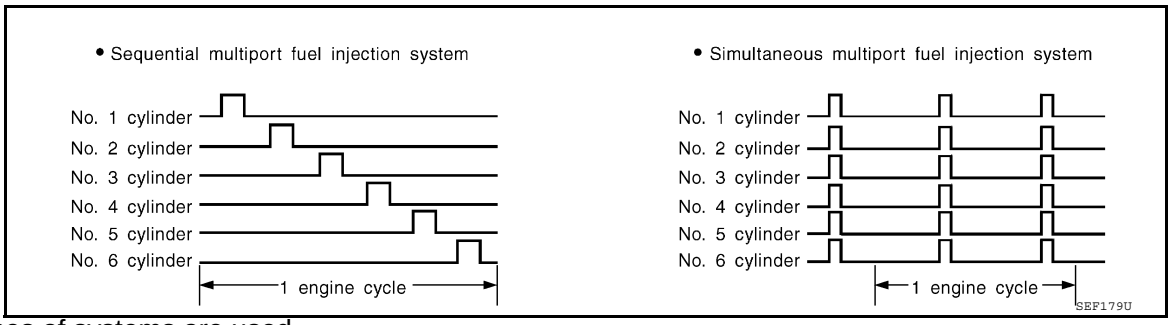
The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- 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 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 overtime 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 firing order. This system is used when the engine is running.

Simultaneous Multiport Fuel Injection System

Fuel is injected simultaneously into all six cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
The six 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.

ELECTRIC IGNITION SYSTEM

System Description

INFOID:0000000005281959

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		
Knock sensor	Engine knocking		
Park/neutral position (PNP) signal	Gear position		
Battery	Battery voltage*2		
Wheel sensor	Vehicle speed*1		

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

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

SYSTEM DESCRIPTION

Firing order: 1-2-3-4-5-6

The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.

The ECM receives information such as the injection pulse width and camshaft position sensor (PHASE) signal. Computing this information, ignition signals are transmitted to the power transistor.

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

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

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

AIR CONDITIONING CUT CONTROL

Input/Output Signal Chart

INFOID:0000000005281960

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		
Power steering pressure sensor	Power steering operation		
Wheel sensor	Vehicle speed*1		

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

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

System Description

INFOID:0000000005281961

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:0000000005281962

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	Clutch pedal operation		
ASCD steering switch	ASCD steering switch operation		
Park/neutral position (PNP) signal	Gear position		
Wheel sensor	Vehicle speed*		
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 174 km/h (108 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 174 km/h (108 MPH), press SET/COAST switch. (Then SET indicator in combination meter illuminates.)

ACCELERATE OPERATION

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

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.
- CANCEL switch is pressed
- More than 2 switches on 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 position is changed to N, P or R position (A/T models)
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- VDC system is operated

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

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

COAST OPERATION

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

RESUME OPERATION

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

- Brake pedal is released
- Clutch pedal is released (M/T models)
- Selector lever is in a position other than P and N positions (A/T models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 174 km/h (108 MPH)

Component Description

INFOID:0000000005281963

ASCD STEERING SWITCH

Refer to EC-147.

ASCD BRAKE SWITCH

Refer to EC-151 and EC-183.

ASCD CLUTCH SWITCH

Refer to EC-151 and EC-183

STOP LAMP SWITCH

Refer to EC-151, EC-165 and EC-183.

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EC-117, EC-113, EC-120 and EC-111.

ASCD INDICATOR

Refer to EC-192.

CAN COMMUNICATION

System Description

INFOID:0000000005281964

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-45, "CAN System Specification Chart", about CAN communication for detail.

COOLING FAN CONTROL

Description

INFOID:0000000005281965

SYSTEM DESCRIPTION

Cooling Fan Control

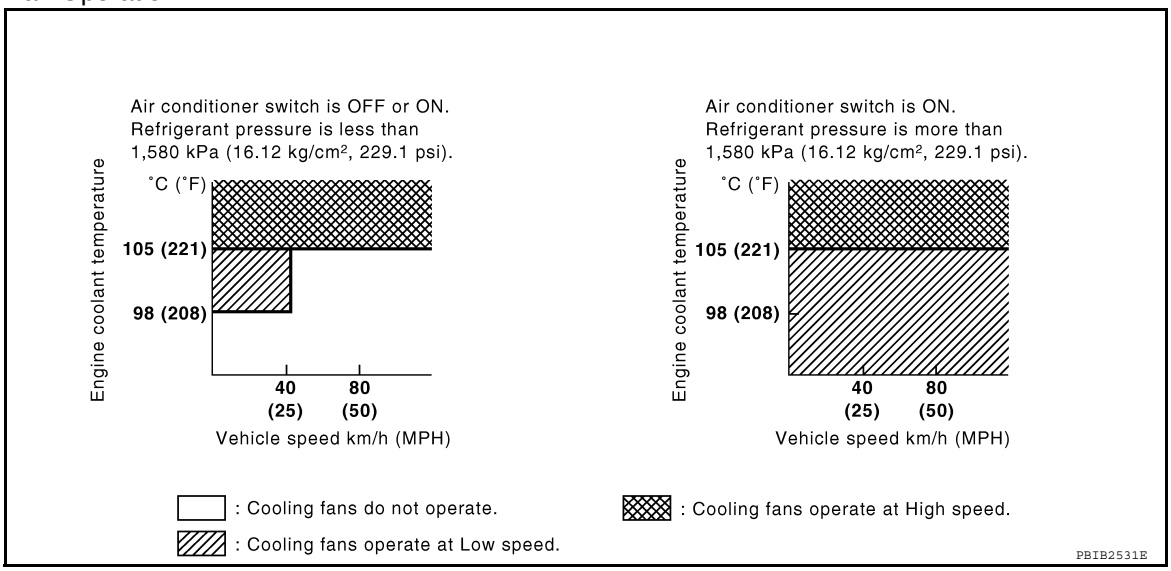
Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	Cooling fan control	IPDM E/R (Cooling fan relays)
Battery	Battery voltage*1		
Wheel sensor	Vehicle speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
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



Cooling Fan Relay Operation

The ECM controls cooling fan relays in the IPDM E/R through CAN communication line.

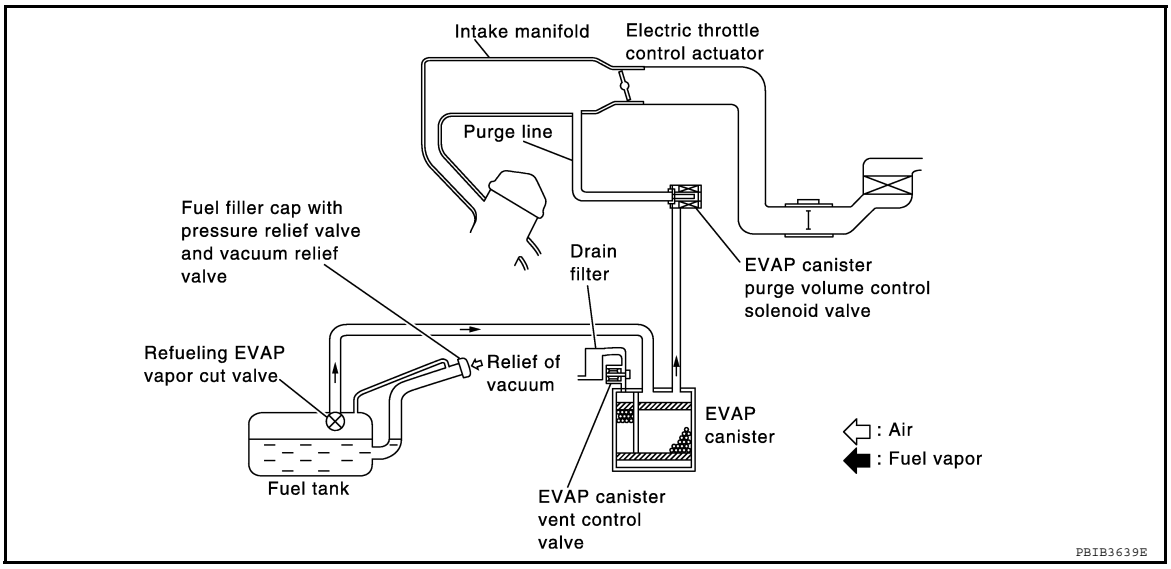
Cooling fan speed	Cooling fan relay	
	LO	HI
Stop (OFF)	OFF	OFF
Low (LOW)	ON	OFF
High (HI)	ON	ON

EVAPORATIVE EMISSION SYSTEM

Description

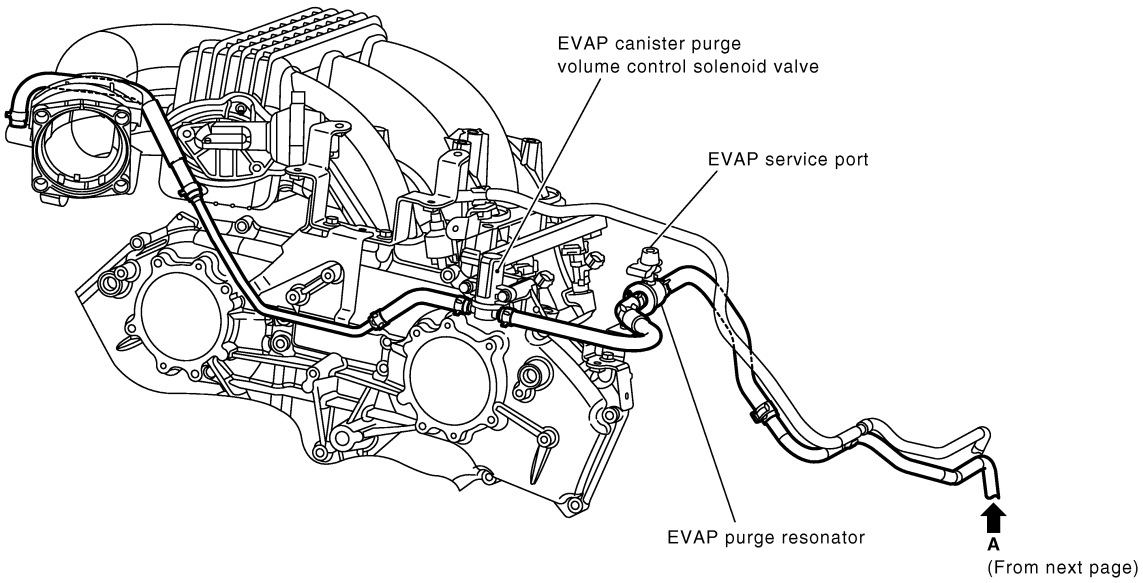
INFOID:0000000005281966

SYSTEM DESCRIPTION



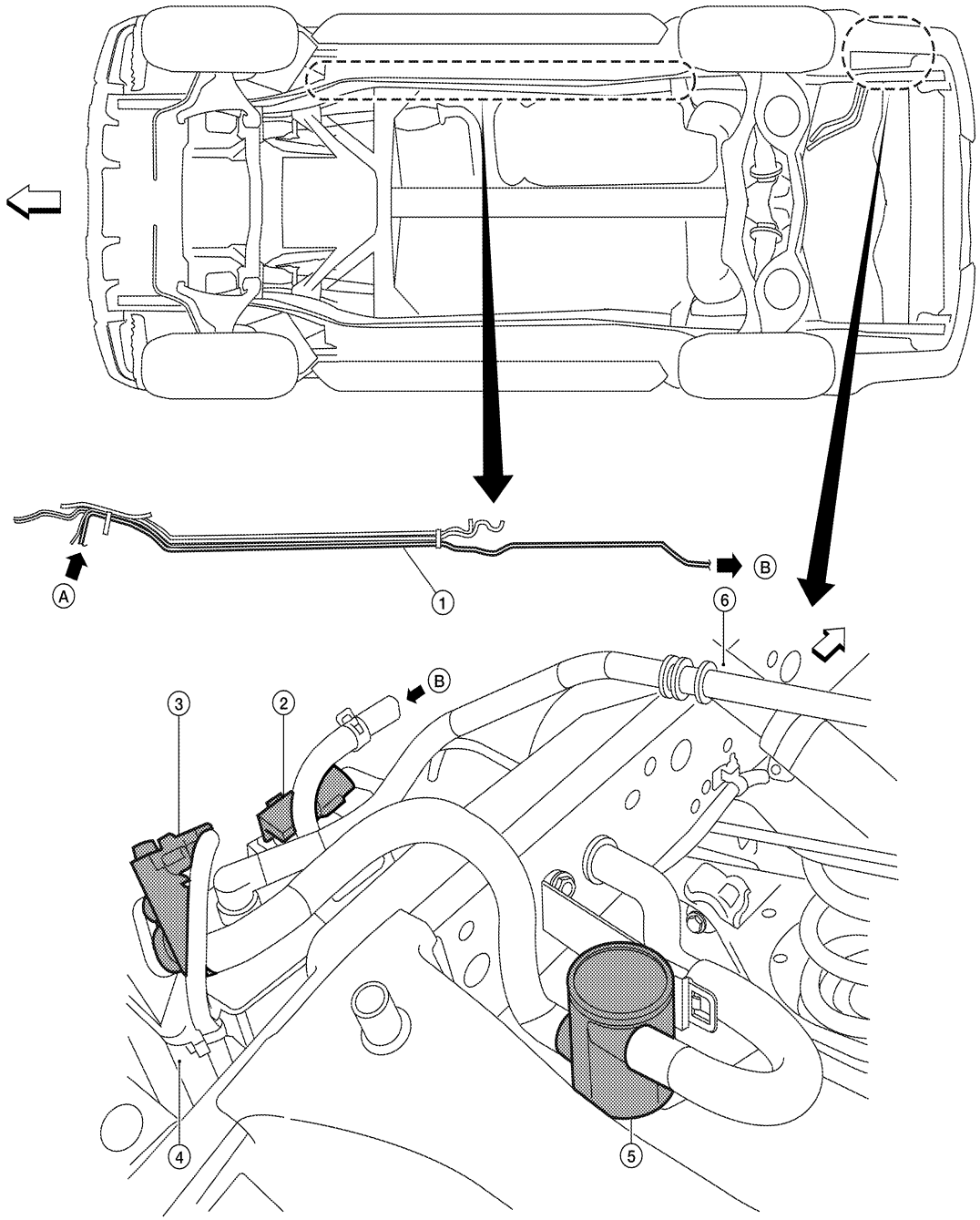
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon 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



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

PBIB2528E



ALBIA0366ZZ

1. EVAP vapor purge line
2. EVAP control system pressure sensor
3. EVAP canister vent control valve
4. EVAP canister
5. Drain filter
6. Fuel filler pipe

⇦ :Vehicle front

⬅ :Previous figure

INTAKE VALVE TIMING CONTROL

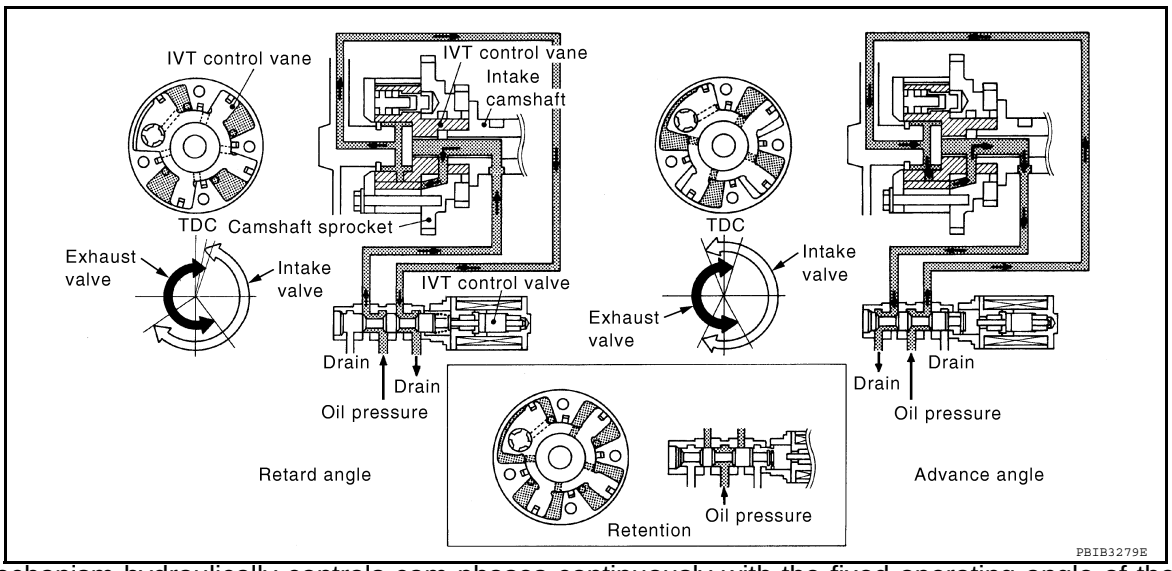
Description

INFOID:0000000005281967

SYSTEM DESCRIPTION

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		
Wheel sensor	Vehicle speed*		

*: 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.

VARIABLE INDUCTION AIR SYSTEM

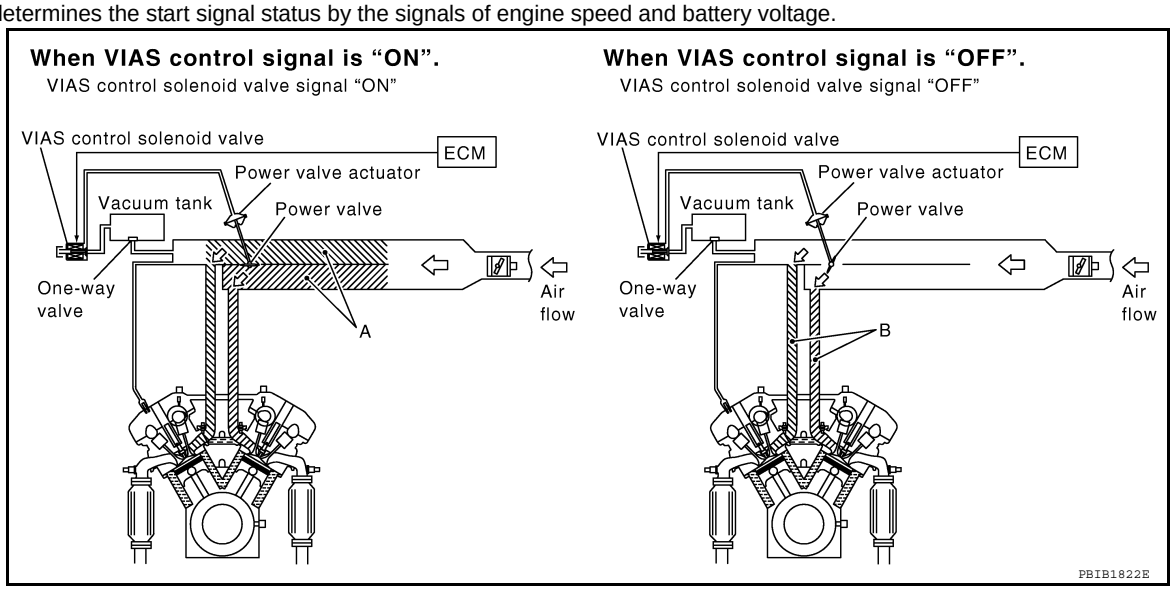
Description

INFOID:0000000005281968

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	VIAS control	VIAS control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*		

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

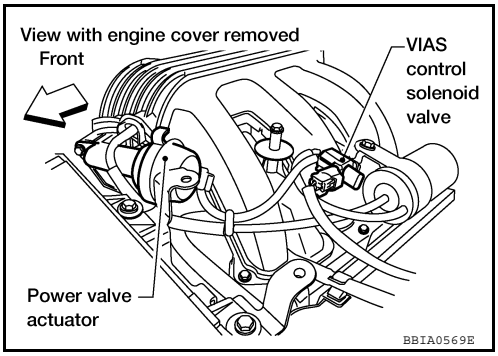


When the engine is running at medium speed, the ECM sends the ON signal to the VIAS control solenoid valve. This signal introduces the intake manifold vacuum into the power valve actuator and therefore closes the power valve.
Under this condition, the effective intake manifold length is equivalent to the total length of passage A and passage B. This long intake manifold provides increased amount of intake air, which results in improved suction efficiency and higher torque.
When engine is running at low or high speed, the ECM sends the OFF signal to the VIAS control solenoid valve and the power valve is opened.
Under this condition, the effective intake manifold length is equivalent to the length of passage B. This shortened intake manifold length results in enhanced engine output due to reduced suction resistance under high speeds.

COMPONENT DESCRIPTION

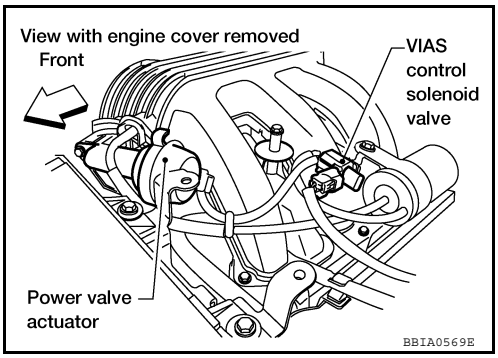
Power Valve

The power valve is installed in intake manifold collector and used to control the suction passage of the variable induction air control system. It is set in the fully closed or fully opened position by the power valve actuator operated by the vacuum stored in the surge tank. The vacuum in the surge tank is controlled by the VIAS control solenoid valve.



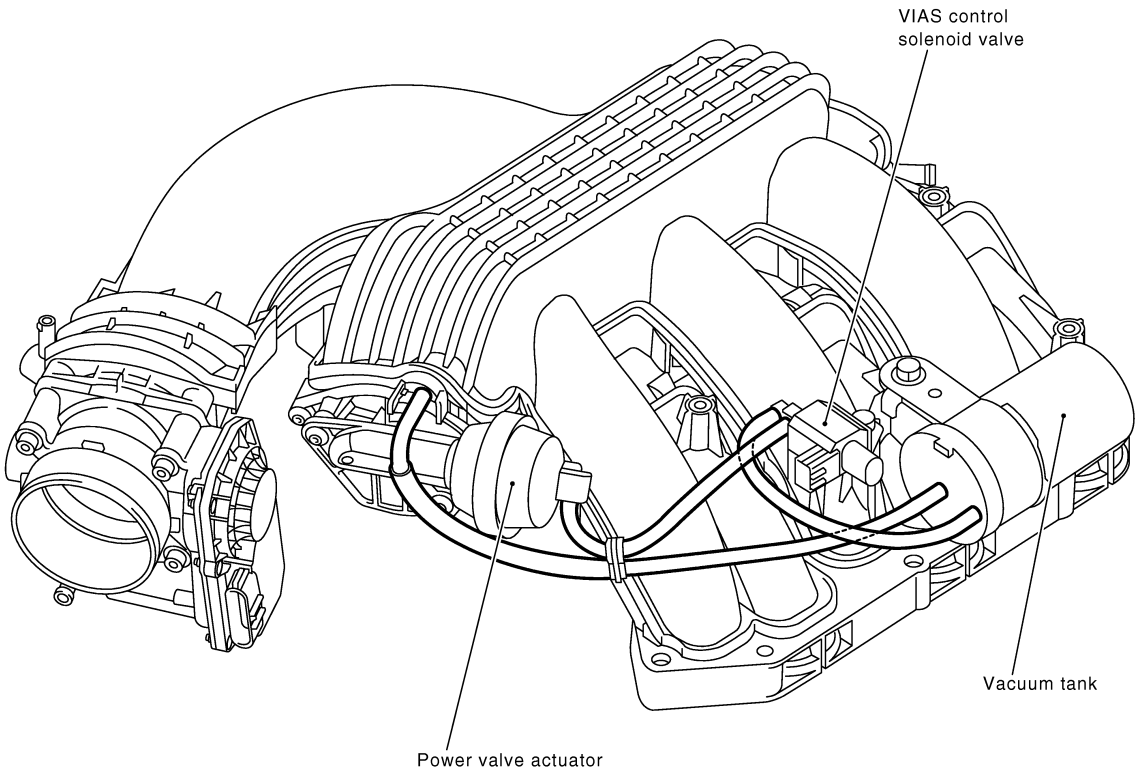
VIAS Control Solenoid Valve

The VIAS control solenoid valve cuts the intake manifold vacuum signal for power valve control. It responds to ON/OFF signals from the ECM. When the solenoid is off, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator.



Vacuum Hose Drawing

INFOID:0000000005281969



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

PBIB2529E

Refer to EC-20, "System Diagram" for Vacuum Control System.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Introduction

INFOID:0000000005281970

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

Emission-related diagnostic information
Diagnostic Trouble Code (DTC)
Freeze Frame data
1st Trip Diagnostic Trouble Code (1st Trip DTC)
1st Trip Freeze Frame data

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

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data
CONSULT-III	×	×	×	×
ECM	×	×*	—	—

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

The malfunction indicator lamp (MIL) on the instrument panel illuminates 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-267.)

Two Trip Detection Logic

INFOID:0000000005281971

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not illuminate at this stage. <1st trip>
If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL illuminates. The MIL illuminates at the same time when the DTC is stored. <2nd trip> The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. When the ECM enters fail-safe mode (Refer to EC-267, "Fail-Safe Chart"), the DTC is stored in the ECM memory even in the 1st trip.
When there is an open circuit on MIL circuit, the ECM cannot warn the driver by illuminating 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

Emission-related Diagnostic Information

INFOID:0000000005281972

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.
If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not illuminate (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 illuminates. In other words, the DTC is stored in the ECM memory and the MIL illuminates 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 fail-safe items, the DTC is stored in the ECM memory even in the 1st trip.
Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”.

When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to EC-6, "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

CONSULT-III display the DTC in “Self-Diagnosis Result” mode.Examples: P0340, P1706, etc.
(CONSULT-III also displays the malfunctioning component or system.)

Without CONSULT-III

The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0340, 1706, etc.
These DTCs are controlled by NISSAN.

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

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

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-III. The 1st trip freeze frame data can only be displayed on the CONSULT-III. For details, see EC-48, "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.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

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 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 (see EC-269, "DTC Index"), skip step 1.

1. Erase DTC in TCM. Refer to TM-95, "CONSULT-III Function (TRANSMISSION)".
2. Select “ENGINE” with CONSULT-III.
3. Select “SELF-DIAG RESULTS”.
4. Touch “ERASE”. (DTC in ECM will be erased.)

Without 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 (see EC-269, "DTC Index"), skip step 1.**

1. Erase DTC in ECM. Refer to HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
2. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal.

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

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

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

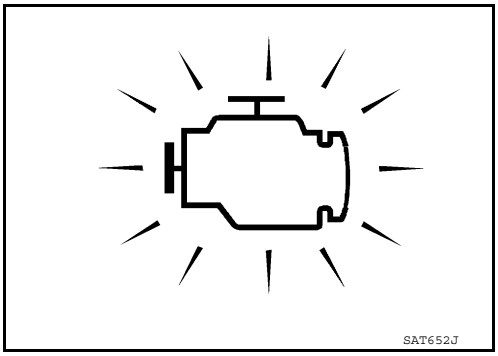
Malfunction Indicator Lamp (MIL)

INFOID:0000000005281973

DESCRIPTION

The MIL is located on the instrument panel.

1. The MIL will illuminate when the ignition switch is turned ON without the engine running. This is a bulb check.
   If the MIL does not illuminate, refer to MWI-3, "Work Flow".
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 illuminate to inform the driver that a malfunction has been detected. One trip detection diagnoses will illuminate or blink the MIL in the 1st trip.
Mode II	Ignition switch in ON position  Engine stopped 	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by illuminating 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

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.**

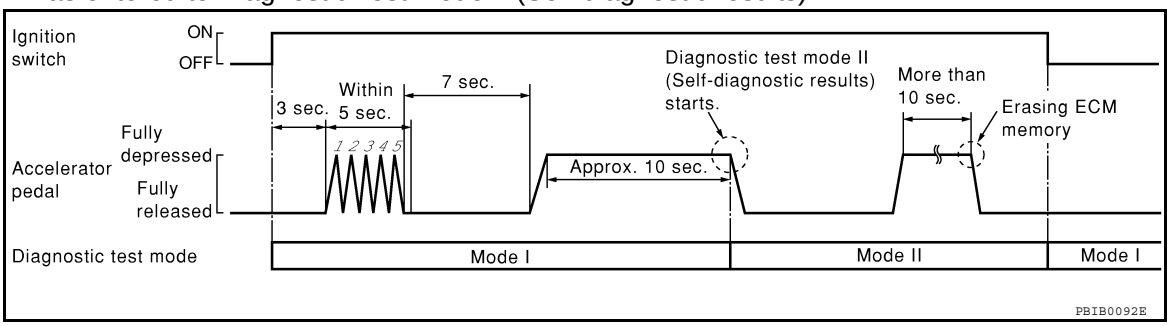
How to Set Diagnostic Test Mode II (Self-diagnostic Results)

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 MWI-3, "Work Flow".

DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

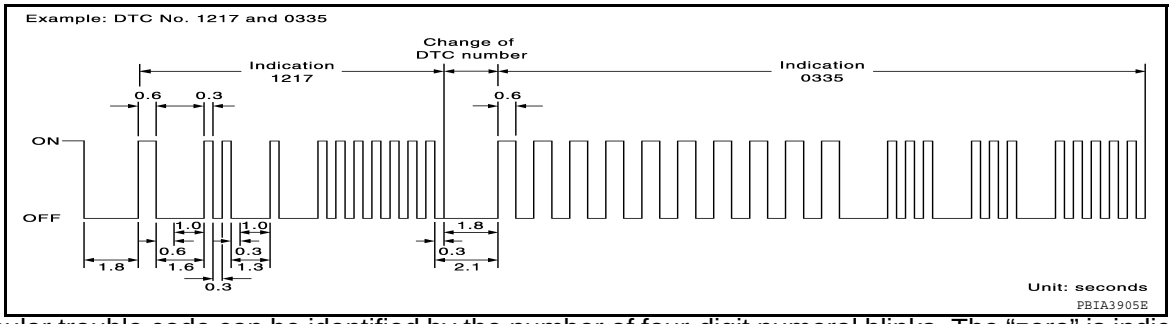
MIL	Condition
ON	When the malfunction is detected.
OFF	No malfunction.

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

DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS

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

tified codes can be identified by using the CONSULT-III. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral blinks. The “zero” is indicated by the number of ten blinks. The length of time the 1,000th-digit numeral blinks 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-269, "DTC Index")

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

CONSULT-III Function (ENGINE)

INFOID:0000000005281974

FUNCTION

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

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.
- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	• FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	• THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume

WORK ITEM	CONDITION	USAGE
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
TARGET IDLE RPM ADJ*	• IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	• IDLE CONDITION	When adjusting target ignition timing

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

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-269, "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-269, "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
FUEL SYS-B2	
COOLANT TEMP [°C] or [°F]	• The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	• “Long-term fuel trim” at the moment a malfunction is detected is displayed. • The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
L-FUEL TRM-B2 [%]	
S-FUEL TRM-B1 [%]	• “Short-term fuel trim” at the moment a malfunction is detected is displayed. • The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
S-FUEL TRM-B2 [%]	
ENGINE SPEED [rpm]	• The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	• The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH-P/S[%]	• The throttle valve opening angle at the amount a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	• The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	• The intake air temperature at the moment a malfunction is detected is displayed.

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

DATA MONITOR MODE

Monitored Item

×: Applicable

Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	• Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	• Accuracy becomes poor if engine speed drops below the idle rpm. • If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1	V	• The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated. • When engine is running specification range is indicated in “SPEC”.

Monitored item	Unit	Description	Remarks
B/FUEL SCHDL	msec	• “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	• When engine is running specification range is indicated in “SPEC”.
A/F ALPHA-B1	%	• The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • When engine is running specification range is indicated in “SPEC”. • This data also includes the data for the air-fuel ratio learning control.
A/F ALPHA-B2	%		
COOLAN TEMP/S	°C or °F	• The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	• When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
A/F SEN1 (B1)	V	• The A/F signal computed from the input signal of the Air fuel ratio (A/F) sensor 1 is displayed.	
A/F SEN1 (B2)	V		
HO2S2 (B1)	V	• The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S2 (B2)	V		
HO2S2 MNTR(B1)	RICH/ LEAN	• Display of heated oxygen sensor 2 signal: RICH: Means the amount of oxygen after three way catalyst is relatively small. LEAN: Means the amount of oxygen after three way catalyst is relatively large.	• When the engine is stopped, a certain value is indicated.
HO2S2 MNTR(B2)	RICH/ LEAN		
VHCL SPEED SE	km/h or mph	• The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT	V	• The power supply voltage of ECM is displayed.	
ACCEL SEN 1	V	• The accelerator pedal position sensor signal voltage is displayed.	• ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2	V		
TP SEN 1-B1	V	• The throttle position sensor signal voltage is displayed.	• THRTL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
TP SEN 2-B1	V		
INT/A TEMP SE	°C or °F	• The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
START SIGNAL	ON/OFF	• Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	• After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS	ON/OFF	• Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG	ON/OFF	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW	ON/OFF	• Indicates [ON/OFF] condition from the park/neutral position (PNP) signal.	
PW/ST SIGNAL	ON/OFF	• [ON/OFF] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor signal) 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.	

Monitored item	Unit	Description	Remarks
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.
INJ PULSE-B2	msec		
IGN TIMING	BTDC	• Indicates the ignition timing computed by ECM according to the input signals.	• When the engine is stopped, a certain value is indicated.
PURG VOL C/V	%	• Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
INT/V TIM(B1)	°CA	• Indicates [°CA] of intake camshaft advanced angle.	
INT/V TIM(B2)	°CA		
INT/V SOL(B1)	%	• The control condition 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.	
INT/V SOL(B2)	%		
VIAS S/V-1	ON/OFF	• The control condition of the VIAS control solenoid valve (determined by ECM according to the input signals) is indicated. ON: VIAS control solenoid valve is operating. OFF: VIAS control solenoid valve is not operating.	
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	• The control condition of the cooling fan (determined by ECM according to the input signals) is indicated. 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.	
HO2S2 HTR (B2)	ON/OFF		
I/P PULLY SPD	rpm	• Indicates the engine speed computed from the input speed signal.	
VEHICLE SPEED	km/h or mph	• Indicates the vehicle speed computed from the out put shaft revolution signal.	

Monitored item	Unit	Description	Remarks
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.	
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.	
A/F S1 HTR(B2)	%		
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.	
AT OD CANCEL	ON/OFF	• Indicates [ON/OFF] condition of A/T O/D cancel signal sent from the TCM.	
CRUISE LAMP	ON/OFF	• Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP	ON/OFF	• Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
ALT DUTY	%	• The signal voltage of battery current sensor is displayed.	This item is displayed but are not applicable to this model.
BAT CUR SEN	mV	• Indicates the duty ratio of the power generation command value. The ratio is calculated by ECM based on the battery current sensor signal.	This item is displayed but are not applicable to this model.

Monitored item	Unit	Description	Remarks
ALT DUTY SIG	ON/OFF	• The control condition of the power generation voltage variable control (determined by ECM according to the input signals) is indicated. ON: Power generation voltage variable control is active OFF: Power generation voltage variable control is inactive.	This item is displayed but are not applicable to this model.
HO2 S2 DIAG2 (B1)* [INCMP/CMPLT]		• Indicates DTC P0139 self-diagnosis (slow responce) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	
HO2 S2 DIAG2 (B2)* [INCMP/CMPLT]		• Indicates DTC P0159 self-diagnosis (slow responce) condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	

*: The item is indicated, but not used.

NOTE:

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

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	• Engine: Return to the original non-standard condition • Change the amount of fuel injection using CONSULT-III.	If malfunctioning symptom disappears, see CHECK ITEM.	• Harness and connectors • Fuel injector • Air fuel ratio (A/F) sensor 1
IGNITION TIMING	• Engine: Return to the original non-standard condition • Timing light: Set • Retard the ignition timing using CONSULT-III.	If malfunctioning symptom disappears, see CHECK ITEM.	• Perform Idle Air Volume Learning.
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch: OFF • Shift lever: P or N (A/T), Neutral (M/T) • Cut off each fuel injector signal one at a time using CONSULT-III.	Engine runs rough or dies.	• Harness and connectors • Compression • Fuel injector • Power transistor • Spark plug • Ignition coil
COOLING FAN*	• Ignition switch: ON • Turn the cooling fan HI, LOW and OFF using CONSULT-III.	Cooling fan moves and stops.	• Harness and connectors • Cooling fan motor • IPDM E/R
ENG COOLANT TEMP	• Engine: Return to the original non-standard condition • Change the engine coolant temperature using CONSULT-III.	If malfunctioning symptom disappears, see CHECK ITEM.	• Harness and connectors • Engine coolant temperature sensor • Fuel injector
FUEL PUMP RELAY	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay ON and OFF using CONSULT-III and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connectors • Fuel pump relay
VIAS SOL VALVE	• Ignition switch: ON • Turn solenoid valve ON and OFF with CONSULT-III and listen for operating sound.	Solenoid valve makes an operating sound.	• Harness and connectors • Solenoid valve

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
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
VENT CONTROL/V	• Ignition switch: ON (Engine stopped) • Turn solenoid valve ON and OFF with the CONSULT-III and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connectors • Solenoid valve
V/T ASSIGN ANGLE	• Engine: Return to the original non-standard condition • Change intake valve timing using CONSULT-III.	If malfunctioning symptom disappears, see CHECK ITEM.	• Harness and connectors • Intake valve timing control solenoid valve
ALTERNATOR DUTY	• This item is displayed but are not applicable to this model.		

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

COMPONENT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:0000000005281975

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/B2 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Testing Condition

INFOID:0000000005281976

- 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*1
- Electrical load: Not applied*2
- Engine speed: Idle

*1: After the engine is warmed up to normal operating temperature, drive vehicle until “ATF TEMP 1” (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
*2: Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

Inspection Procedure

INFOID:0000000005281977

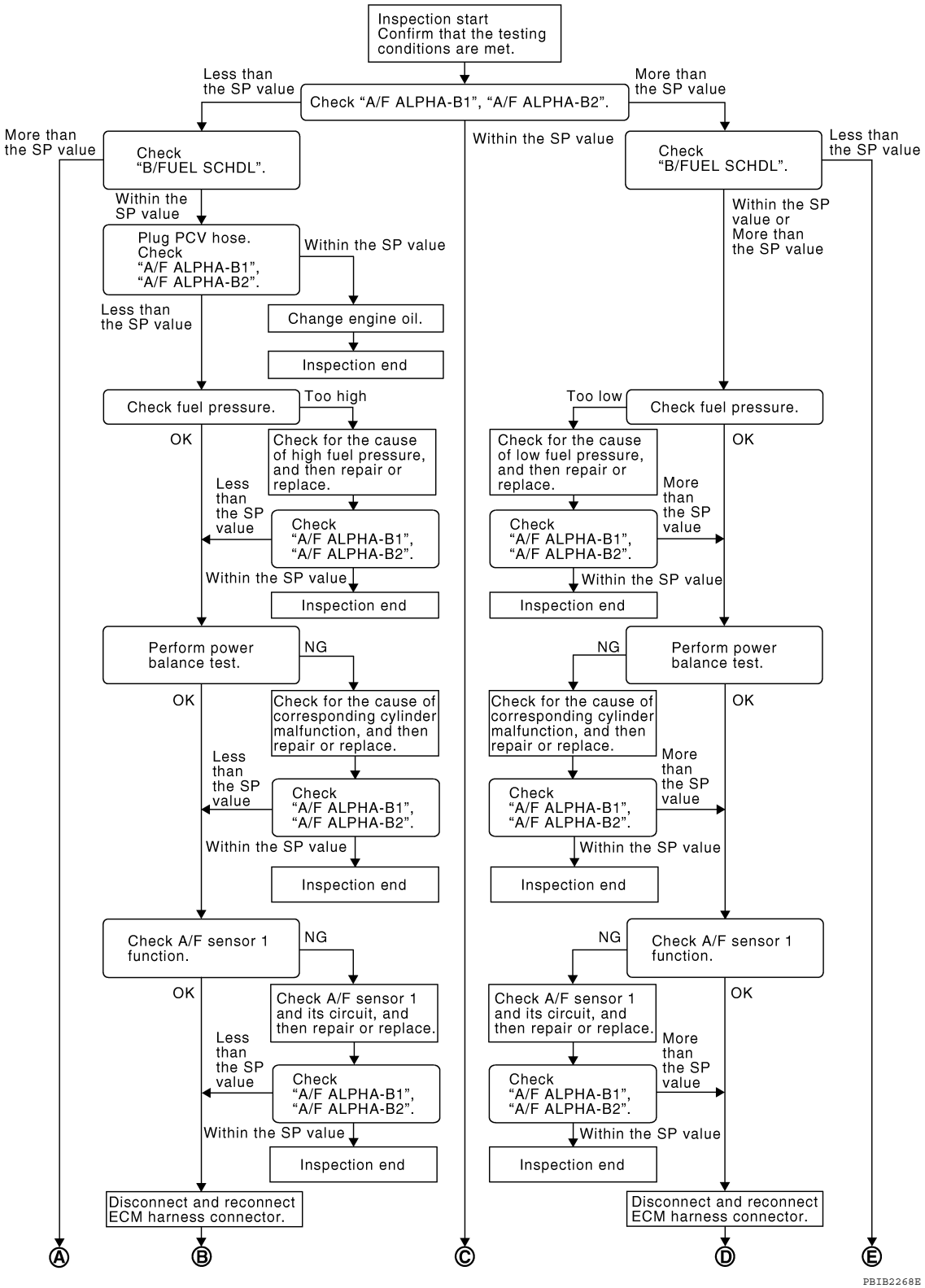
NOTE:
Perform “SPEC” of “DATA MONITOR” mode in maximum scale display.

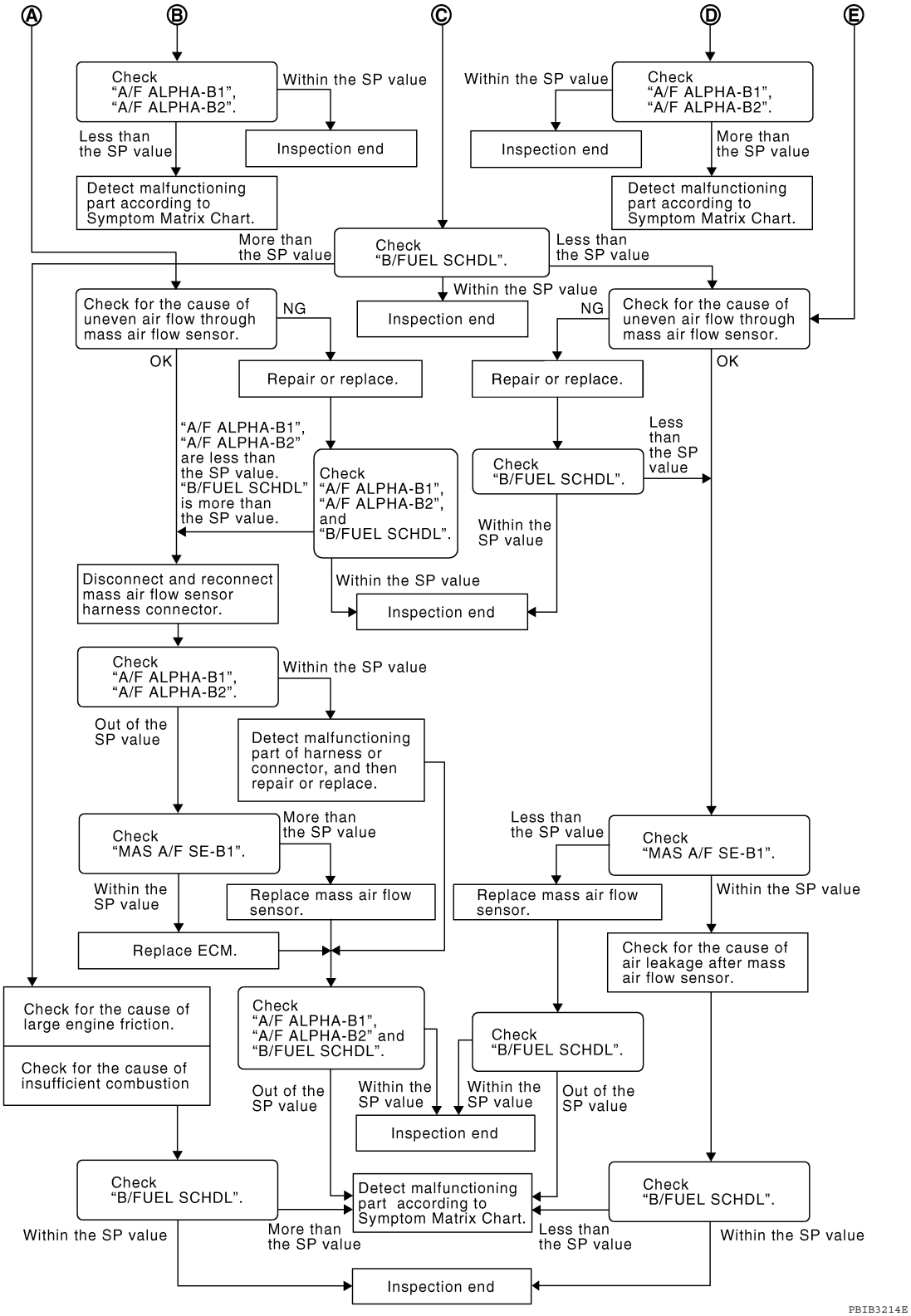
1. Perform EC-12, "Basic Inspection".
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1”, “A/F ALPHA-B2” and “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode with CONSULT-III.
4. Make sure that monitor items are within the SP value.
5. If NG, go to EC-55, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005281978

OVERALL SEQUENCE


Inspection start
Confirm that the testing conditions are met.
Check "A/F ALPHA-B1", "A/F ALPHA-B2".
Less than the SP value
More than the SP value
Within the SP value
Check "B/FUEL SCHDL".
More than the SP value
Within the SP value
Less than the SP value
Plug PCV hose. Check "A/F ALPHA-B1", "A/F ALPHA-B2".
Within the SP value
Change engine oil.
Inspection end
Less than the SP value
Check fuel pressure.
Too high
OK
Check for the cause of high fuel pressure, and then repair or replace.
Less than the SP value
Check "A/F ALPHA-B1", "A/F ALPHA-B2".
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.
Less than the SP value
Check "A/F ALPHA-B1", "A/F ALPHA-B2".
Within the SP value
Inspection end
Check A/F sensor 1 function.
NG
OK
Check A/F sensor 1 and its circuit, and then repair or replace.
Less than the SP value
Check "A/F ALPHA-B1", "A/F ALPHA-B2".
Within the SP value
Inspection end
Disconnect and reconnect ECM harness connector.
Within the SP value or More than the SP value
Too low
Check fuel pressure.
OK
Check for the cause of low fuel pressure, and then repair or replace.
More than the SP value
Check "A/F ALPHA-B1", "A/F ALPHA-B2".
Within the SP value
Inspection end
NG
Perform power balance test.
OK
Check for the cause of corresponding cylinder malfunction, and then repair or replace.
More than the SP value
Check "A/F ALPHA-B1", "A/F ALPHA-B2".
Within the SP value
Inspection end
NG
Check A/F sensor 1 function.
OK
Check A/F sensor 1 and its circuit, and then repair or replace.
More than the SP value
Check "A/F ALPHA-B1", "A/F ALPHA-B2".
Within the SP value
Inspection end
Disconnect and reconnect ECM harness connector.
Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
PBIB2268E



DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1", "A/F ALPHA-B2"

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-55, "Testing Condition".
3. Select "A/F ALPHA-B1", "A/F ALPHA-B2" in "SPEC" of "DATA MONITOR" mode, and make sure that the each indication is within the SP value.

NOTE:

Check “A/F ALPHA-B1”, “A/F ALPHA-B2” for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.

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”, “A/F ALPHA-B2”

1. Stop the engine.
2. Disconnect PCV hose, and then plug it.
3. Start engine.
4. Select “A/F ALPHA-B1”, “A/F ALPHA-B2” in “SPEC” of “DATA MONITOR” mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> GO TO 5.
NG >> 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-284, "Fuel Pressure Check".)

OK or NG

OK >> GO TO 9.
NG (Fuel pressure is too high)>>Replace fuel pressure regulator, refer to EC-284, "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-206, "Description".)
2. If NG, repair or replace the malfunctioning part. (Refer to EC-55, "Diagnosis Procedure".)
   If OK, replace fuel pressure regulator.

>> GO TO 8.

8. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

1. Start engine.
2. Select “A/F ALPHA-B1”, “A/F ALPHA-B2” in “SPEC” of “DATA MONITOR” mode, and make sure that the each indication is within the SP value.

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-220, "Component Description".)
- Fuel injector and its circuit (Refer to EC-202, "Component Description".)
- Intake air leakage
- Low compression pressure (Refer to EM-21, "Compression Pressure".)

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”, “A/F ALPHA-B2”

1. Start engine.
2. Select “A/F ALPHA-B1”, “A/F ALPHA-B2” in “SPEC” of “DATA MONITOR” mode, and make sure that the each indication is within the SP value.

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 P1271, P1281, refer to EC-135, "DTC Confirmation Procedure".
- For DTC P1272, P1282, refer to EC-139, "DTC Confirmation Procedure".
- For DTC P1276, P1286, refer to EC-143, "Overall Function Check".

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”, “A/F ALPHA-B2”

1. Start engine.
2. Select “A/F ALPHA-B1”, “A/F ALPHA-B2” in “SPEC” of “DATA MONITOR” mode, and make sure that the each indication is within the SP value.

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”, “A/F ALPHA-B2”

1. Start engine.
2. Select “A/F ALPHA-B1”, “A/F ALPHA-B2” in “SPEC” of “DATA MONITOR” mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-273, "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 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

OK or NG

OK >> GO TO 21.
NG >> Repair or replace malfunctioning part, and then GO TO 20.

20. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”, AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1”, “A/F ALPHA-B2”, and “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG (“B/FUEL SCHDL” is more, “A/F ALPHA-B1”, “A/F ALPHA-B2” are less than the SP value)>>GO TO 21.

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.

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

>> GO TO 22.

22. CHECK “A/F ALPHA-B1”, “A/F ALPHA-B2”

1. Start engine.
2. Select “A/F ALPHA-B1”, “A/F ALPHA-B2” in “SPEC” of “DATA MONITOR” mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> 1. Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-72.
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 NATS system and registration of all NATS ignition key IDs. Refer to SEC-7, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement".
3. Perform EC-16, "Accelerator Pedal Released Position Learning".
4. Perform EC-17, "Throttle Valve Closed Position Learning".
5. Perform EC-17, "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”, “A/F ALPHA-B2”, AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1”, “A/F ALPHA-B2”, and “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-273, "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-273, "Symptom Matrix Chart".

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000005281979

1.INSPECTION START

Start engine.
Is engine running?

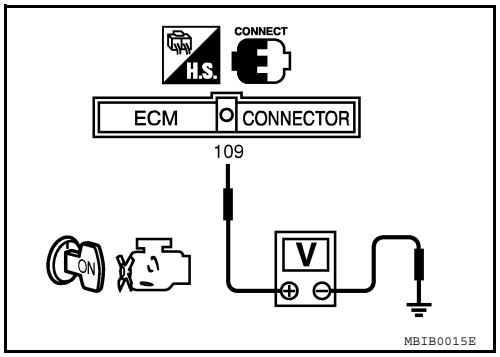
Yes or No

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 109 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

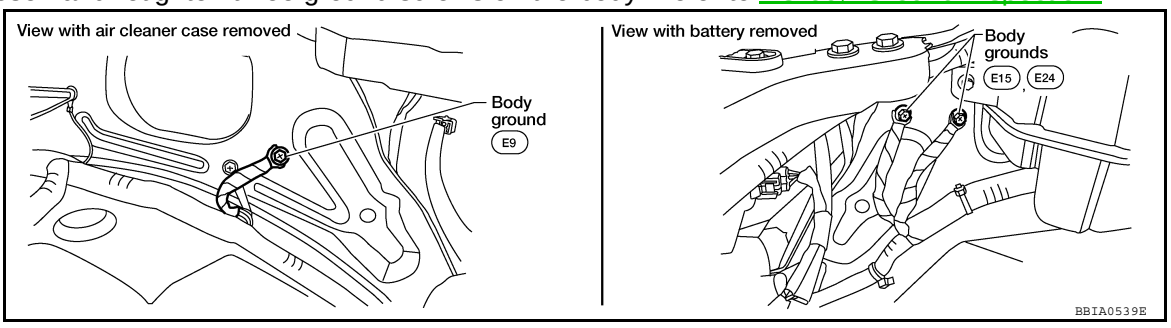
3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors M31, E152
- Fuse block (J/B) connector M4
- 10A fuse (No.1)
- Harness for open or short between ECM and fuse

>> Repair harness or connectors.

4.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".



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 1, 115, 116 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

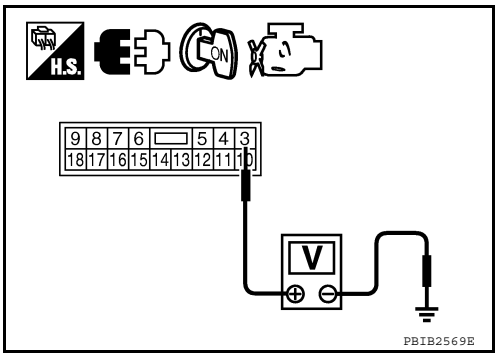
Check the following.
- Harness connectors F32, E2
- Harness for open or short between ECM and ground

>> 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 connector E119 terminal 3 and ground with CONSULT-III or tester.

Voltage: Battery voltage



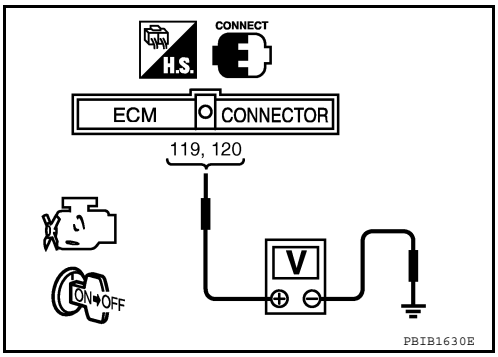
OK or NG

OK >> Go to EC-220, "Diagnosis Procedure".
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 terminals 119, 120 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.



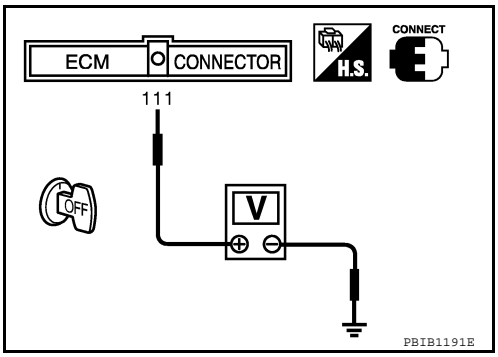
OK or NG

OK >> GO TO 13.
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

Check voltage between ECM terminal 111 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 E119.

3. Check harness continuity between ECM terminals 119, 120 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 16.
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 E119.
3. Check harness continuity between ECM terminal 111 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 12.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK 20A FUSE

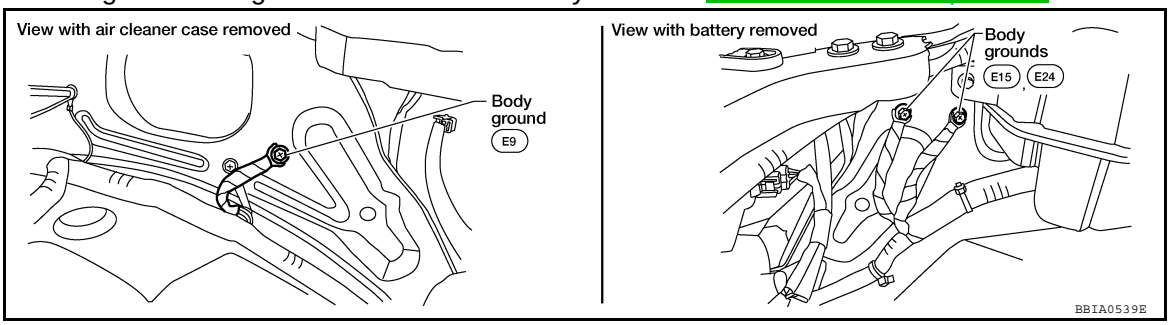
1. Disconnect 20 A fuse (No.53) from IPDM E/R.
2. Check 20A fuse.

OK or NG

OK >> GO TO 16.
NG >> Replace 20A fuse.

13. CHECK GROUND CONNECTIONS

Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".



OK or NG

OK >> GO TO 14.
NG >> Repair or replace ground connections.

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

1. Check harness continuity between ECM terminals 1, 115, 116 and ground.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F32, E2

- Harness for open or short between ECM and ground

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

16. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

OK or NG

OK >> Replace IPDM E/R.
NG >> Repair open circuit or short to power in harness or connectors.

Ground Inspection

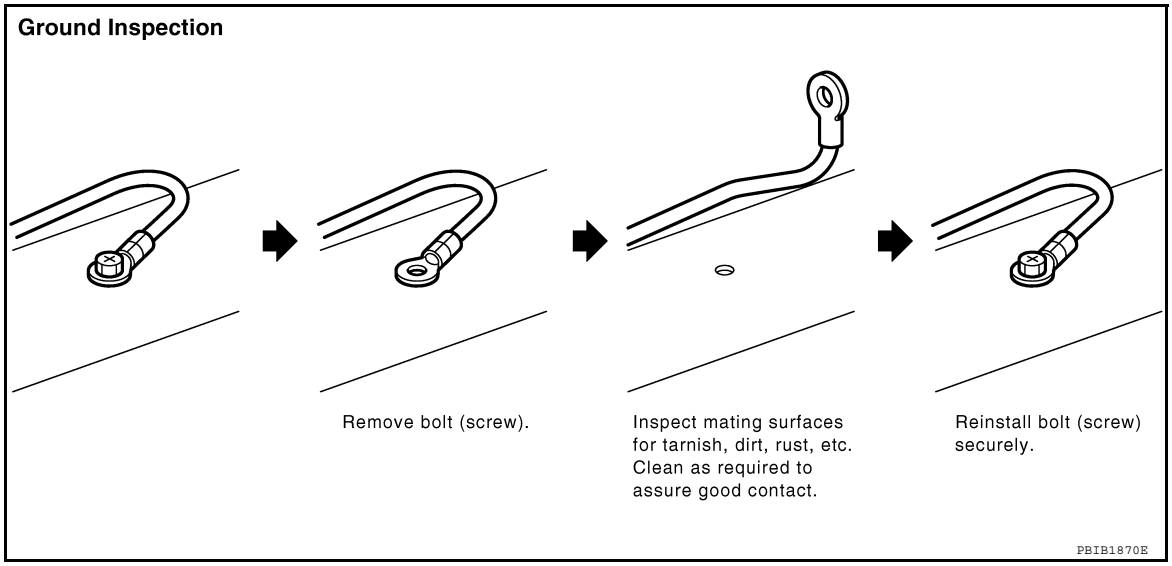
INFOID:0000000005281980

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. Check all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet check no ground wires have excess wire insulation.

For detailed ground distribution information, refer to GI-34, "Work Flow".

Ground Inspection



U1000, U1001 CAN COMM CIRCUIT

Description

INFOID:0000000005281981

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:0000000005281982

The MIL will not illuminate for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000 1000	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 1001		• When ECM is not transmitting or receiving CAN communication signal other than OBD (emission-related diagnosis) for 2 seconds or more.	

DTC Confirmation Procedure

INFOID:0000000005281983

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-67, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005281984

Go to LAN-45, "CAN System Specification Chart".

P0011, P0021 IVT CONTROL

On Board Diagnosis Logic

INFOID:0000000005281985

The MIL will not illuminates for these diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0011 0011 (Bank 1)	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
P0021 0021 (Bank 2)			

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode.

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:0000000005281986

CAUTION:
Always drive at a safe speed.
NOTE:
- **If DTC P0011 or P0021 is displayed with DTC P1111 or P1136, first perform trouble diagnosis for DTC P1111 or P1136. Refer to EC-108.**
- If DTC Confirmation Procedure has been previously conducted, 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
COOLAN TEMP/S	More than 60°C (140°F)
B/FUEL SCHDL	More than 3.5 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.
6. If the 1st trip DTC is detected, go toEC-69, "Diagnosis Procedure".
   If the 1st trip DTC is not detected, go to next step.
7. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,700 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 70°C (158°F)

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

8. Check 1st trip DTC.
9. If the 1st trip DTC is detected, go to EC-69, "Diagnosis Procedure".

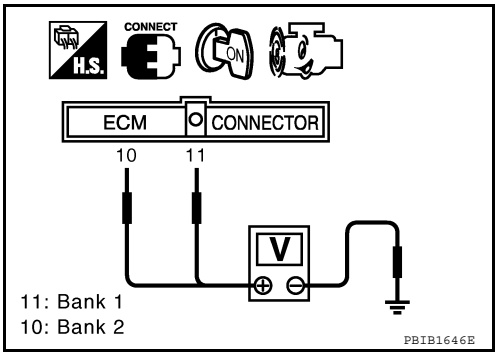
Overall Function Check

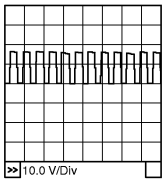
INFOID:0000000005281987

Use procedure to check the overall function of the intake valve timing control solenoid valve circuit.During this check, a 1st trip DTC might not be confirmed.

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. Turn ignition switch ON.
4. Set the tester probe between ECM terminal 11 [IVT control solenoid valve (bank 1) signal] or 10 [IVT control solenoid valve (bank 2) signal] and ground.
5. Start engine and let it idle.
6. Check the voltage under the following conditions.
   Verify that the oscilloscope screen shows the signal wave as shown below.



Conditions	Voltage
At idle	BATTERY VOLTAGE (11 - 14V)
2,500 rpm	7V - 12V ★  PBIB1790E

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

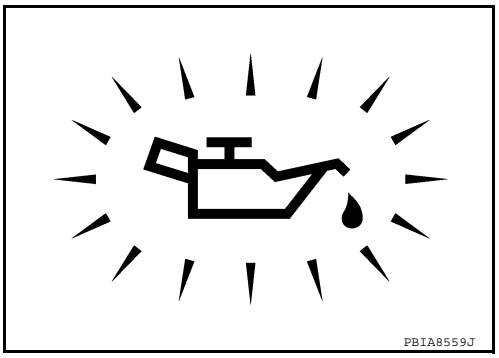
7. If NG, go to EC-69, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005281988

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-7, "Inspection".

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-70, "Component Inspection".

OK or NG

OK >> GO TO 3.
NG >> Replace malfunctioning intake valve timing control solenoid valve.

3. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-92, "Component Inspection".

OK or NG

OK >> GO TO 4.
NG >> Replace crankshaft position sensor (POS).

4. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-97, "Component Inspection".

OK or NG

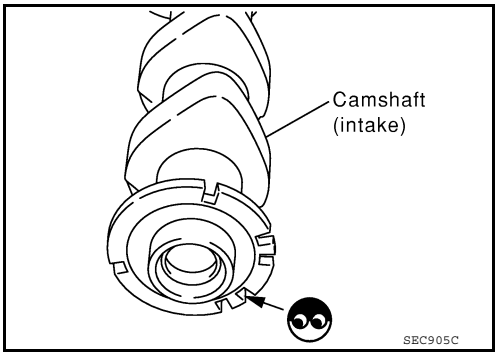
OK >> GO TO 5.
NG >> Replace malfunctioning camshaft position sensor (PHASE).

5. CHECK CAMSHAFT (INTAKE)

Check the following.
- Accumulation of debris on the signal plate of camshaft 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 misalignment.
Are there any service records that may cause timing chain misalignment?

Yes or No

Yes >> Check timing chain installation. Refer to EM-58, "Removal and Installation".
No >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to EM-72, "Removal and Installation".

OK or NG

OK >> GO TO 8.
NG >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

>> **INSPECTION END**

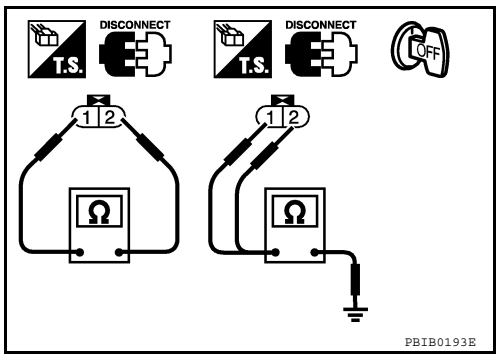
Component Inspection

INFOID:0000000005281989

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.



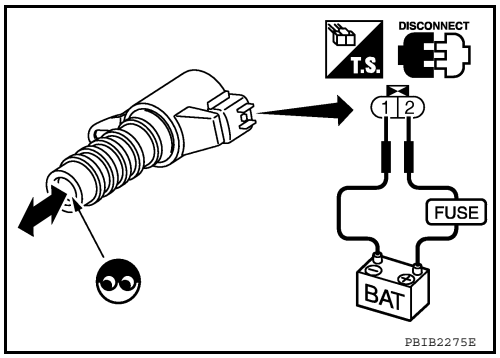
Terminal	Resistance
1 and 2	7.0 - 7.7Ω at 20°C (68°F)
1 or 2 and ground	∞Ω (Continuity should not exist.)

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. Check that the plunger moves as shown in the figure.

CAUTION:
Never 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.

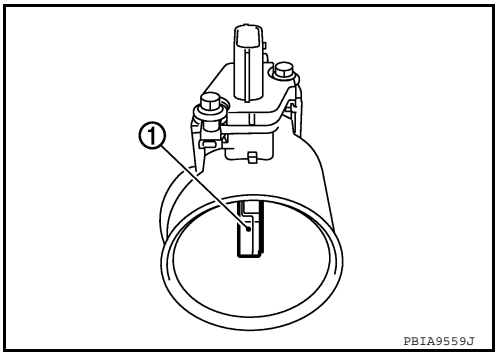


P0102, P0103 MAF SENSOR

Component Description

INFOID:0000000005281990

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



On Board Diagnosis Logic

INFOID:0000000005281991

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 (The 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 (The 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 illuminates.

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:0000000005281992

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-72, "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-72, "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-72, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005281993

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

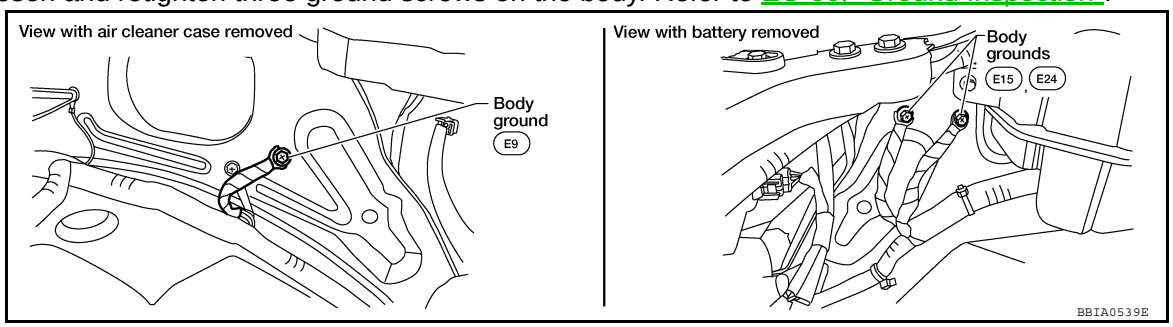
Check the following for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".

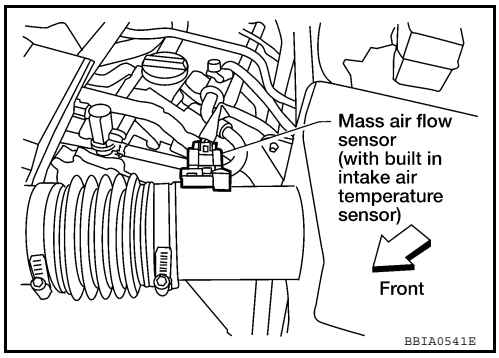


OK or NG

OK >> GO TO 4.
NG >> Repair or replace ground connections.

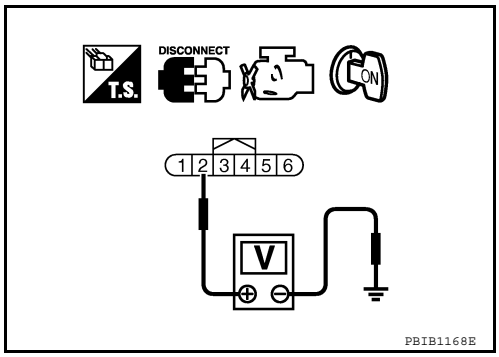
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor 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 E2, F32
- Harness for open or short between IPDM E/R and mass air flow sensor

• 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 67. 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 51. 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-74, "Component Inspection".

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

>> **INSPECTION END**

Component Inspection

INFOID:0000000005281994

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.)	0.9 - 1.2
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 1.8
Idle to about 4,000 rpm	0.9 - 1.2 to Approx. 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.

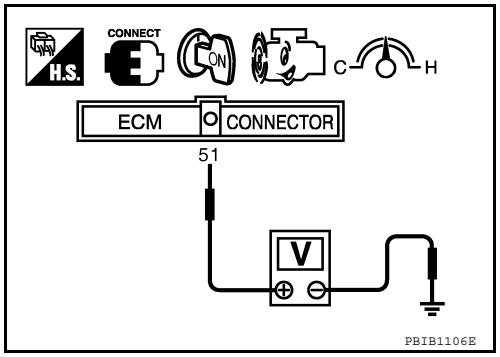
a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

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 51 (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.)	0.9 - 1.2
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 1.8
Idle to about 4,000 rpm	0.9 - 1.2 to Approx. 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.

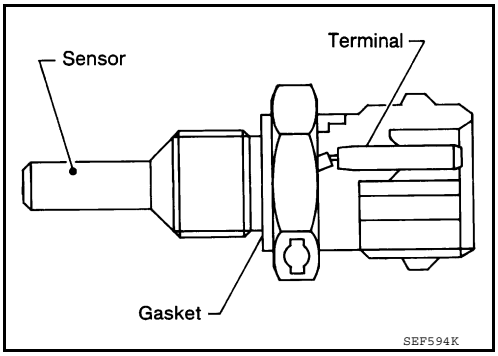
5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

P0117, P0118 ECT SENSOR

Component Description

INFOID:0000000005281995

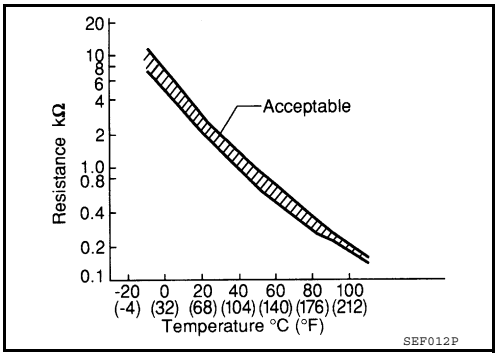
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The 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 73 (Engine coolant temperature sensor) and ground.



CAUTION:

Never 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:0000000005281996

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 (The 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 MIL illuminate.

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:0000000005281997

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.

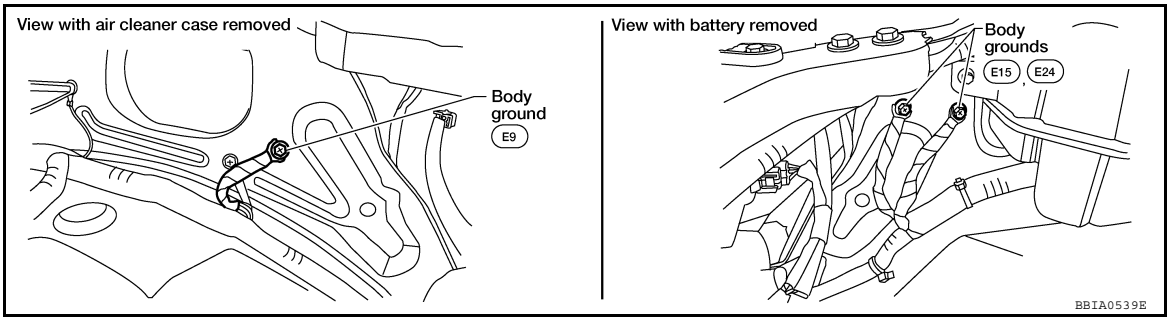
1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.
3. If 1st trip DTC is detected, go to EC-77, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005281998

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".

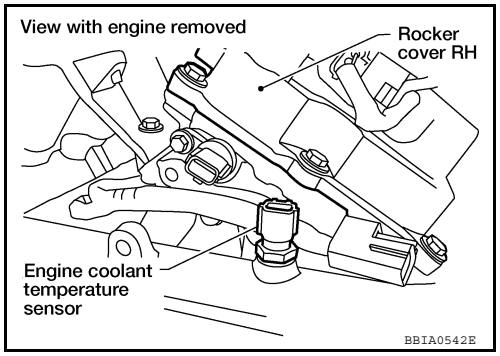


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

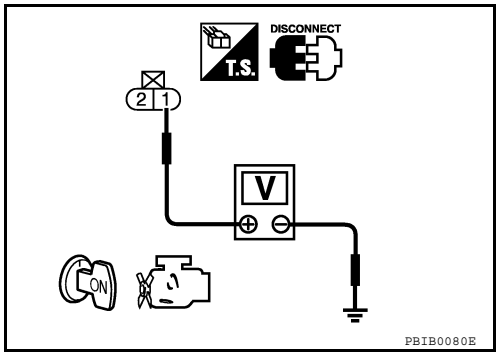
2.CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor harness connector.
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 ECT sensor terminal 2 and ECM terminal 67. 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-78, "Component Inspection".

OK or NG

OK >> GO TO 5.
NG >> Replace engine coolant temperature sensor.

5.CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

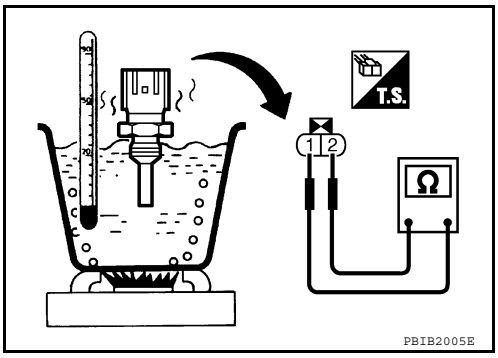
>> **INSPECTION END**

Component Inspection

INFOID:0000000005281999

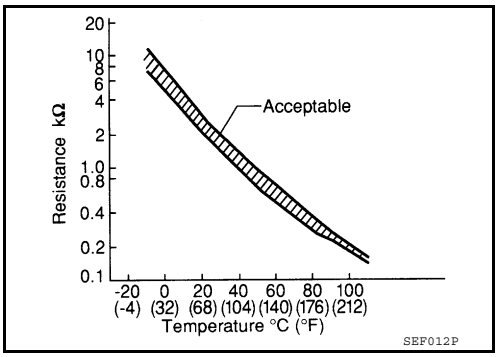
ENGINE COOLANT TEMPERATURE SENSOR

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



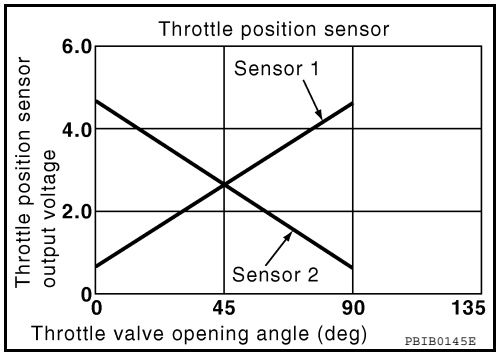
2. If NG, replace engine coolant temperature sensor.

P0122, P0123 TP SENSOR

Component Description

INFOID:0000000005282000

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



On Board Diagnosis Logic

INFOID:0000000005282001

These self-diagnoses have the one trip detection logic.

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 (The TP sensor 2 circuit is open or shorted.) (The APP sensor 2 circuit is shorted.) • Electric throttle control actuator (TP sensor 2) • Accelerator pedal position sensor (APP 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 illuminates.

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:0000000005282002

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 let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-79, "Diagnosis Procedure".

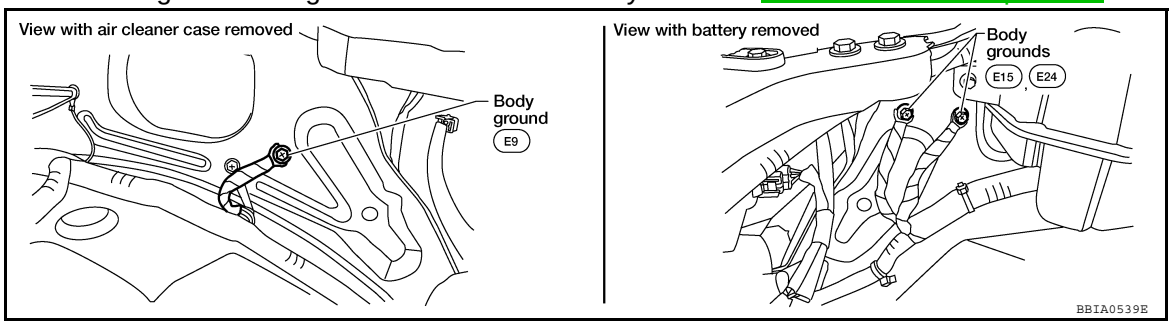
Diagnosis Procedure

INFOID:0000000005282003

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.

2. Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".

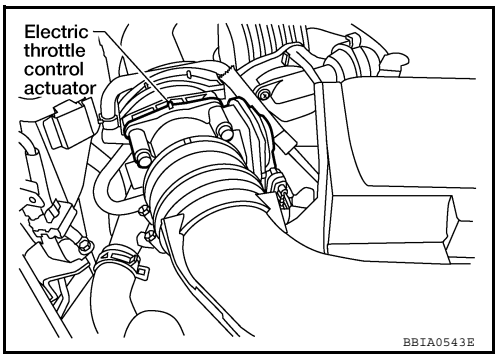


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

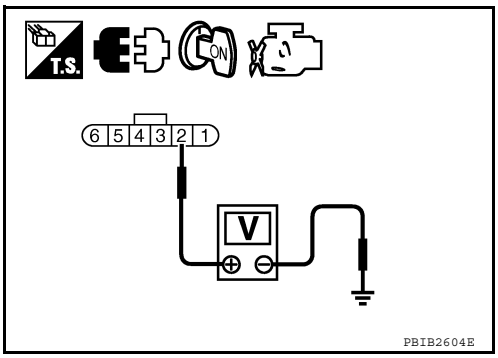
2. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.



3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 2 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit.

4. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-III

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

ECM terminal	Sensor terminal
47	Electric throttle control actuator terminal 2
91	APP sensor terminal 1

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-174, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-16, "Accelerator Pedal Released Position Learning".
3. Perform EC-17, "Throttle Valve Closed Position Learning".
4. Perform EC-17, "Idle Air Volume Learning".

>> **INSPECTION END**

7. 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 66. 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 THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 69 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 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-82, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-17, "Throttle Valve Closed Position Learning".
3. Perform EC-17, "Idle Air Volume Learning".

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

>> **INSPECTION END**

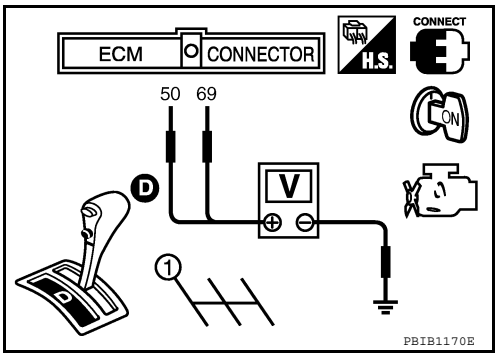
Component Inspection

INFOID:0000000005282004

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-17, "Throttle Valve Closed Position Learning".
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T), 1st position (M/T)
5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



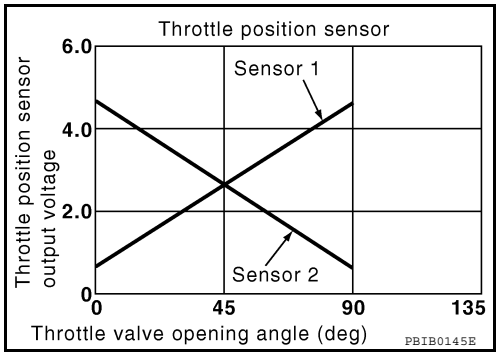
6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-17, "Throttle Valve Closed Position Learning".
8. Perform EC-17, "Idle Air Volume Learning".

P0222, P0223 TP SENSOR

Component Description

INFOID:0000000005282005

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



On Board Diagnosis Logic

INFOID:0000000005282006

These self-diagnoses have the one trip detection logic.

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 (The TP sensor 1 circuit is open or shorted.) (The 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, ECM enters fail-safe mode and the MIL illuminates.

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:0000000005282007

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 let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-83, "Diagnosis Procedure".

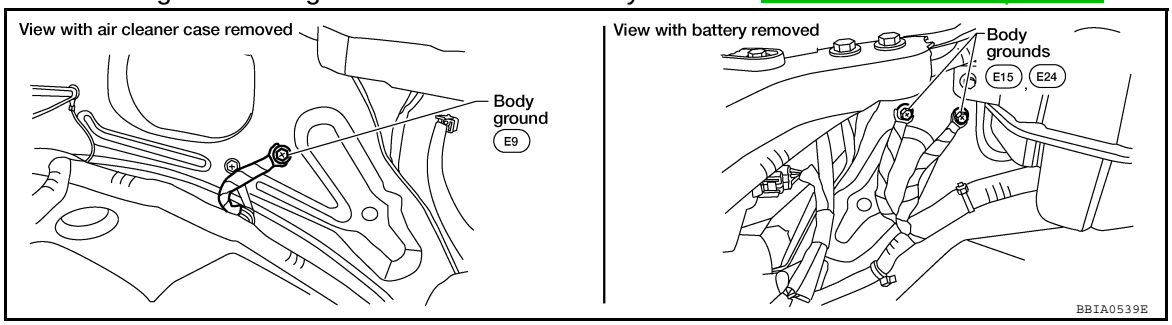
Diagnosis Procedure

INFOID:0000000005282008

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.

2. Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".

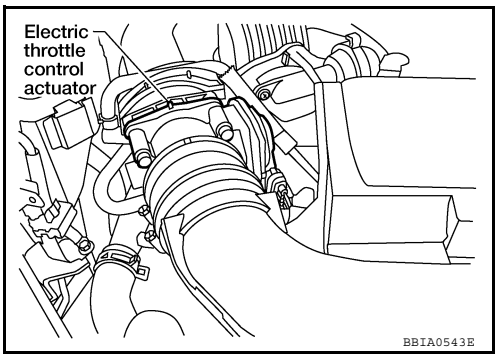


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

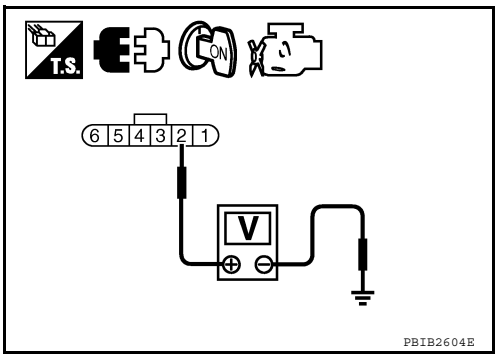
2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.
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 7.
NG >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 2 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit.

4. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-III

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

ECM terminal	Sensor terminal
47	Electric throttle control actuator terminal 2
91	APP sensor terminal 1

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-174, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-16, "Accelerator Pedal Released Position Learning".
3. Perform EC-17, "Throttle Valve Closed Position Learning".
4. Perform EC-17, "Idle Air Volume Learning".

>> **INSPECTION END**

7. 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 electric throttle control actuator terminal 4 and ECM terminal 66. 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 THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 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 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-86, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-17, "Throttle Valve Closed Position Learning".
3. Perform EC-17, "Idle Air Volume Learning".

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

>> **INSPECTION END**

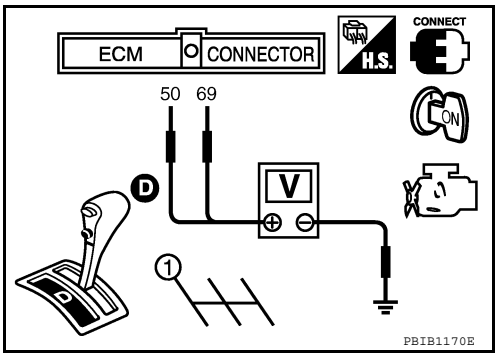
Component Inspection

INFOID:0000000005282009

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-17, "Throttle Valve Closed Position Learning".
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T), 1st position (M/T)
5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



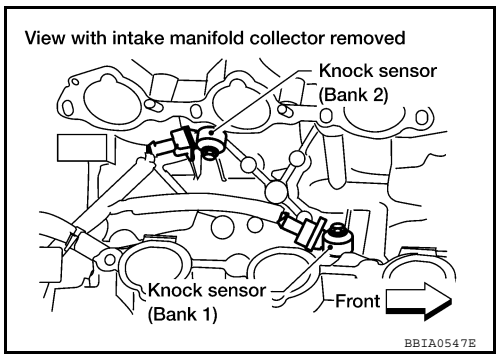
6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-17, "Throttle Valve Closed Position Learning".
8. Perform EC-17, "Idle Air Volume Learning".

P0327, P0328, P0332, P0333 KS

Component Description

INFOID:0000000005282010

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.



On Board Diagnosis Logic

INFOID:0000000005282011

The MIL will not illuminate for these diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0327 0327 (Bank 1)	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
P0332 0332 (Bank 2)			
P0328 0328 (Bank 1)	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	
P0333 0333 (Bank 2)			

DTC Confirmation Procedure

INFOID:0000000005282012

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-87, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005282013

1. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminals 15, 36 and ground. Refer to Wiring Diagram.
   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

   Resistance: Approximately 532 - 588 kΩ [at 20°C (68°F)]

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

OK or NG

OK >> GO TO 5.

NG >> GO TO 2.

2.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

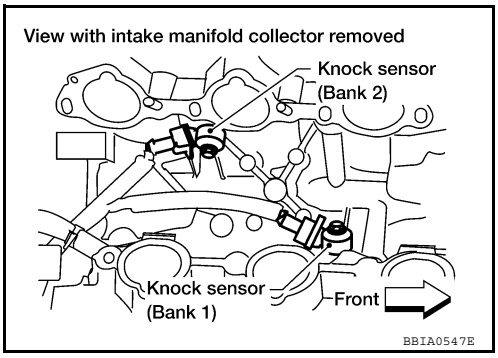
1. Disconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 15 and knock sensor (bank1) terminal 1, ECM terminal 36 and knock sensor (bank 2) terminal 1.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F67, F250
- Harness for open or short between ECM and knock sensor

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

4.CHECK KNOCK SENSOR

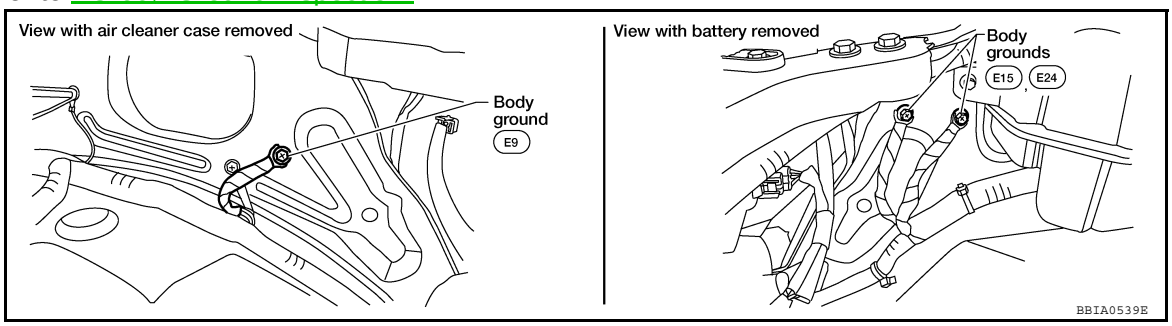
Refer to EC-89, "Component Inspection".

OK or NG

OK >> GO TO 5.
NG >> Replace malfunctioning knock sensor.

5.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-66, "Ground Inspection".



OK or NG

OK >> GO TO 6.
NG >> Repair or replace ground connections.

6.CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect knock sensor harness connector.
2. Check harness continuity between knock sensor terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F67, F250
- Harness connectors F14, E5
- Harness for open or short between knock sensor and ground

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

8. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

>> **INSPECTION END**

Component Inspection

INFOID:0000000005282014

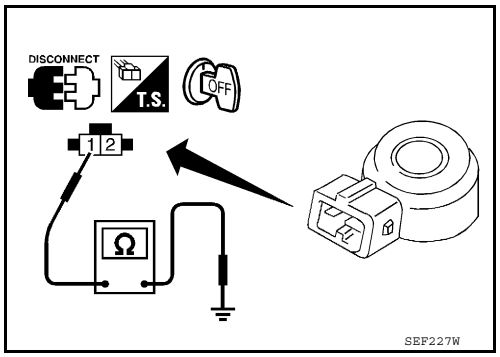
KNOCK SENSOR

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 - 588 kΩ [at 20°C (68°F)]



CAUTION:

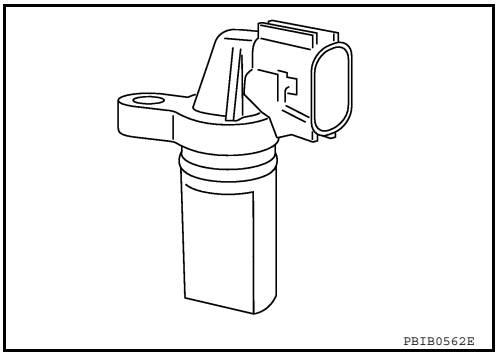
Never use any knock sensors that have been dropped or physically damaged. Use only new ones.

P0335 CKP SENSOR (POS)

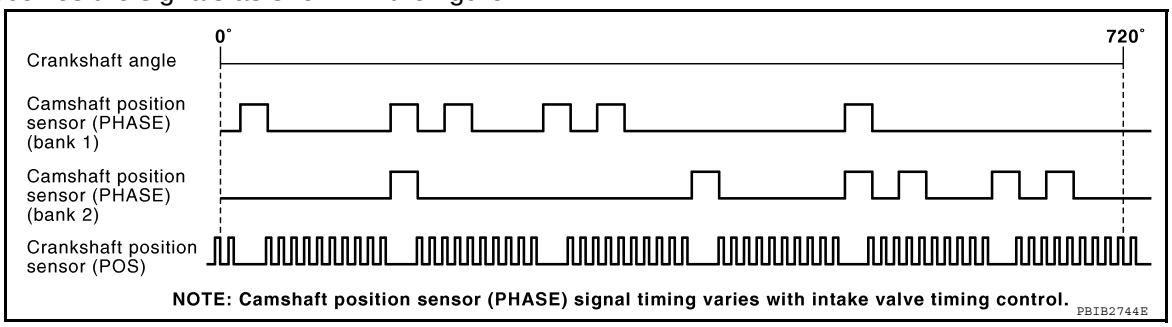
Component Description

INFOID:0000000005282015

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.


PBIB0562E

ECM receives the signals as shown in the figure.



On Board Diagnosis Logic

INFOID:0000000005282016

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 (The sensor circuit is open or shorted) • Crankshaft position sensor (POS) • Signal plate

DTC Confirmation Procedure

INFOID:0000000005282017

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-90, "Diagnosis Procedure".

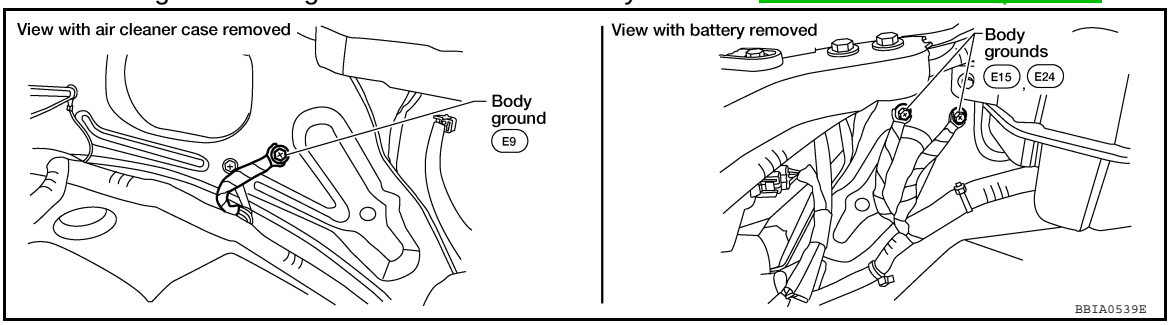
Diagnosis Procedure

INFOID:0000000005282018

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.

2. Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".

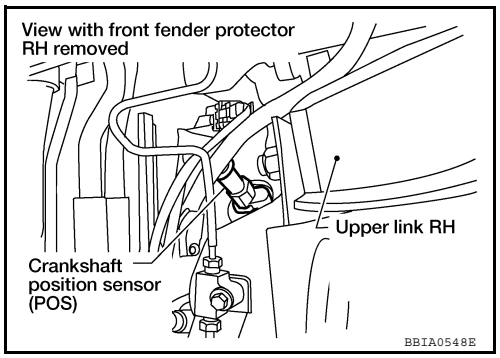


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

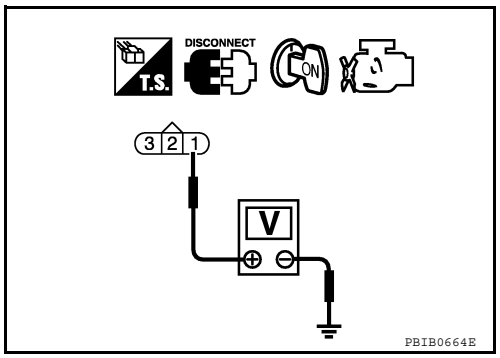
2. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch ON.



3. Check voltage between CKP sensor (POS) 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 F32, E2
- Harness for open or short between crankshaft position sensor (POS) and ECM
- Harness for open or short between crankshaft position sensor (POS) and IPDM E/R

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

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

1. Turn ignition switch OFF.
2. Check harness continuity between CKP sensor (POS) terminal 3 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F32, E2
- Harness for open or short between crankshaft position sensor (POS) and ground

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

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

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 13 and CKP sensor (POS) 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 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-92, "Component Inspection".

OK or NG

OK >> GO TO 8.
NG >> Replace crankshaft position sensor (POS).

8. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 9.
NG >> Replace the signal plate.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

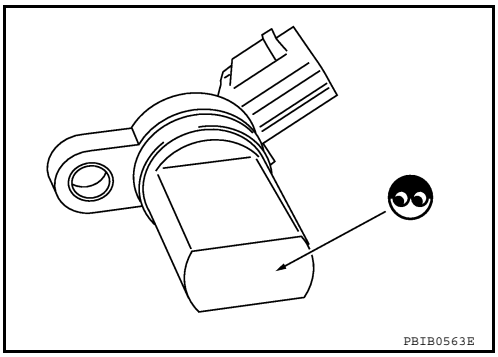
>> **INSPECTION END**

Component Inspection

INFOID:0000000005282019

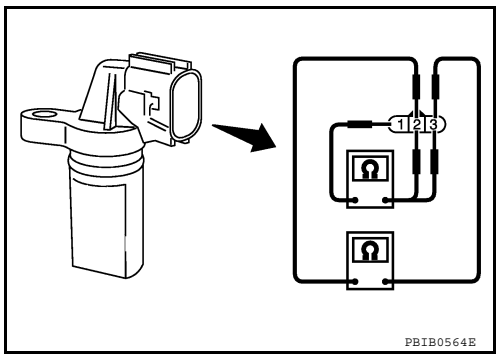
CRANKSHAFT POSITION SENSOR (POS)

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 (-)	

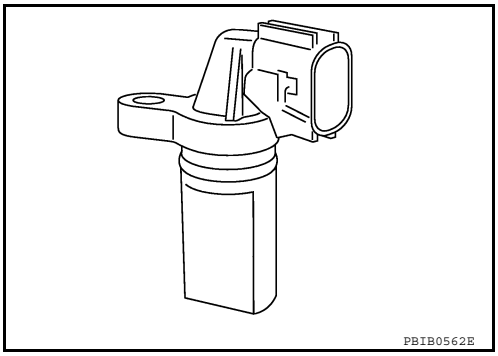


P0340, P0345 CMP SENSOR (PHASE)

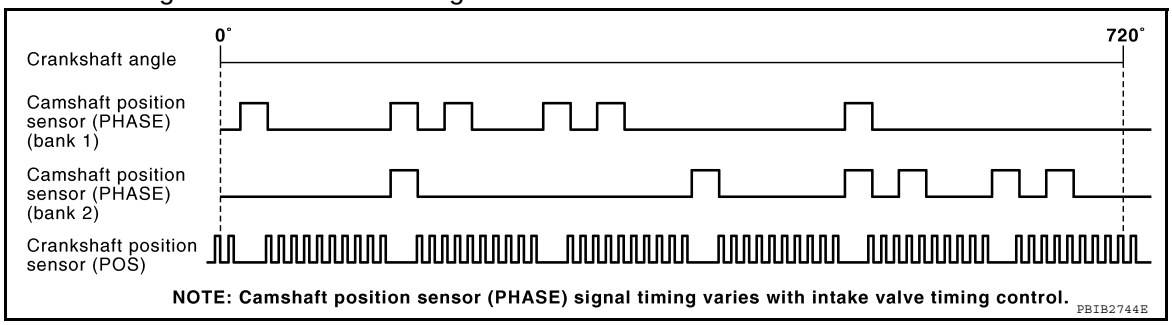
Component Description

INFOID:0000000005282020

The camshaft position sensor (PHASE) senses the retraction of intake valve camshaft 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.


PBIB0562E

Due to the changing magnetic field, the voltage from the sensor changes.
ECM receives the signals as shown in the figure.



NOTE: Camshaft position sensor (PHASE) signal timing varies with intake valve timing control.
PBIB2744E

On Board Diagnosis Logic

INFOID:0000000005282021

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340 (Bank 1)	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 (Intake) • Starter motor • Starting system circuit • Dead (Weak) battery
P0345 0345 (Bank 2)			

DTC Confirmation Procedure

INFOID:0000000005282022

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-95, "Diagnosis Procedure".
   If 1st trip DTC is not detected, go to next step.
4. Maintaining 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-95, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005282023

1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over?

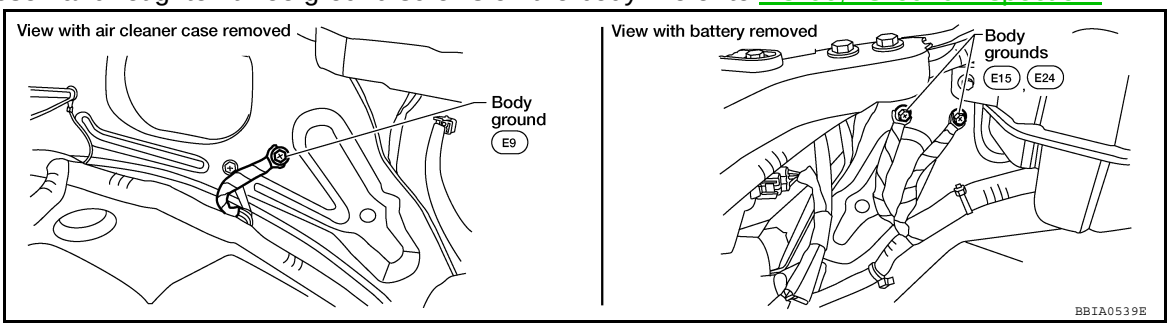
Does the starter motor operate?

Yes or No

Yes >> GO TO 2.
No >> Check starting system. (Refer to STR-4, "Work Flow".)

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".

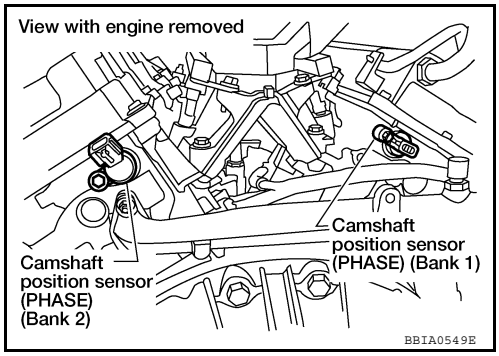


OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

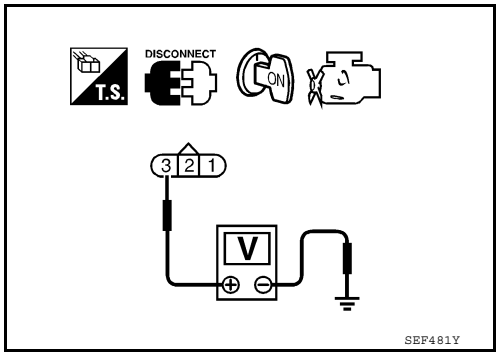
3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch ON.



3. Check voltage between CMP sensor (PHASE) terminal 3 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 E2, F32
- Harness for open or short between camshaft position sensor (PHASE) and ECM

• Harness for open or short between camshaft position sensor (PHASE) and IPDM E/R

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

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

1. Turn ignition switch OFF.
2. Check harness continuity between CMP sensor (PHASE) terminal 1 and ground.

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 F32, E2
• Harness for open or short between CMP sensor (PHASE) and ground

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

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

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 33 (bank 1) or 14 (bank 2) and CMP sensor (PHASE) 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 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-97, "Component Inspection".

OK or NG

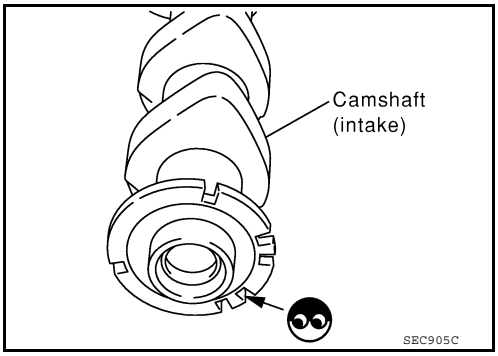
OK >> GO TO 9.
NG >> Replace malfunctioning camshaft position sensor (PHASE).

9. CHECK CAMSHAFT (INTAKE)

Check the following.
• Accumulation of debris to the signal plate of camshaft rear end
• Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 10.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



10. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

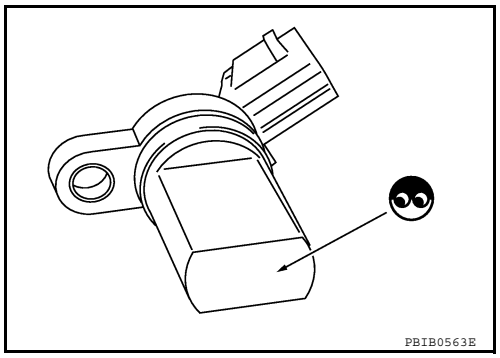
>> **INSPECTION END**

Component Inspection

INFOID:0000000005282024

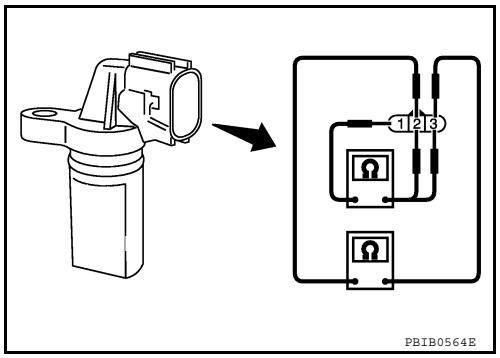
CAMSHAFT POSITION SENSOR (PHASE)

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 (-)	

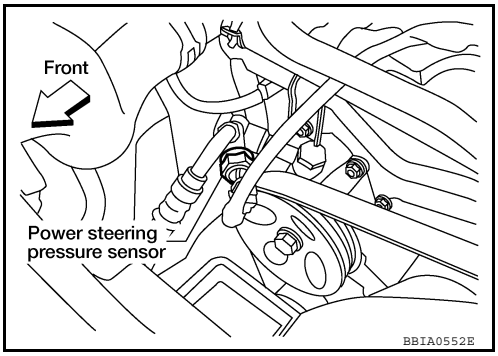


P0550 PSP SENSOR

Component Description

INFOID:0000000005282025

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



On Board Diagnosis Logic

INFOID:0000000005282026

The MIL will not illuminate for this diagnosis.
NOTE:
If DTC P0550 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-132.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0550 0550	Power steering pressure sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted) • Power steering pressure sensor

DTC Confirmation Procedure

INFOID:0000000005282027

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.

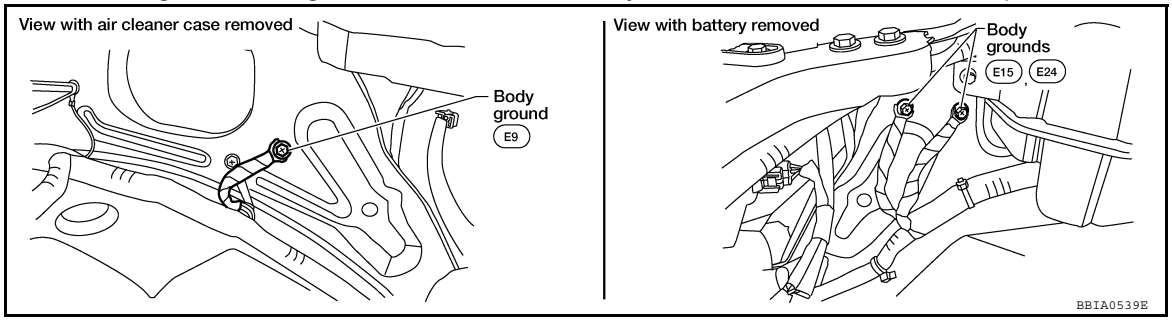
1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-98, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005282028

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".

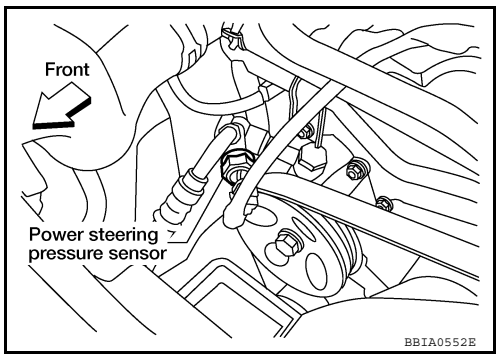


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

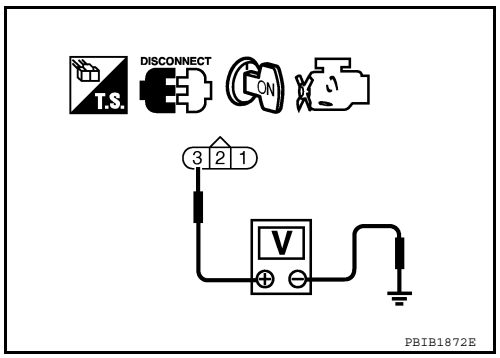
2.CHECK PSP SENSOR POWER SUPPLY CIRCUIT

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



3. Check voltage between PSP sensor terminal 3 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 PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between PSP sensor terminal 1 and ECM terminal 67. 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 PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 12 and PSP sensor terminal 2.

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 PSP SENSOR

Refer to EC-100, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace PSP sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

>> **INSPECTION END**

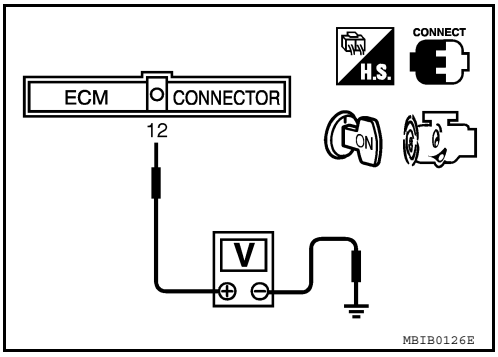
Component Inspection

INFOID:0000000005282029

POWER STEERING PRESSURE SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and let it idle.
3. Check voltage between ECM terminal 12 and ground under the following conditions.

Condition	Voltage
Steering wheel: Being turned	0.5 - 4.5V
Steering wheel: Not being turned	0.4 - 0.8V

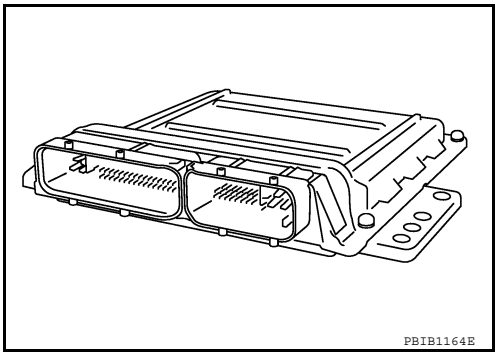


P0605 ECM

Component Description

INFOID:0000000005282030

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



On Board Diagnosis Logic

INFOID:0000000005282031

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 the 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:0000000005282032

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-102, "Diagnosis Procedure".

PROCEDURE FOR MALFUNCTION B

1. Turn ignition switch ON and wait at least 1 second.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-102, "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-102, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005282033

1. INSPECTION START

With CONSULT-III

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-III.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-101, "DTC Confirmation Procedure".
5. Is the 1st trip DTC P0605 displayed again?

Without CONSULT-III

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory.
3. **Perform DTC Confirmation Procedure.**
   See EC-101, "DTC Confirmation Procedure".
4. 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 NATS system and registration of all NATS ignition key IDs. Refer to SEC-7, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement".
3. Perform EC-16, "Accelerator Pedal Released Position Learning".
4. Perform EC-17, "Throttle Valve Closed Position Learning".
5. Perform EC-17, "Idle Air Volume Learning".

>> **INSPECTION END**

P1031 P1032 P1051 P1052 A/F SENSOR 1 HEATER

Description

INFOID:0000000005282034

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.

On Board Diagnosis Logic

INFOID:0000000005282035

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1031 1031 (Bank 1) P1051 1051 (Bank 2)	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
P1032 1032 (Bank 1) P1052 1052 (Bank 2)	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

INFOID:0000000005282036

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.

With CONSULT-III
1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-103, "Diagnosis Procedure".

Without CONSULT-III
1. Start engine and let it idle for at least 10 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to EC-103, "Diagnosis Procedure".

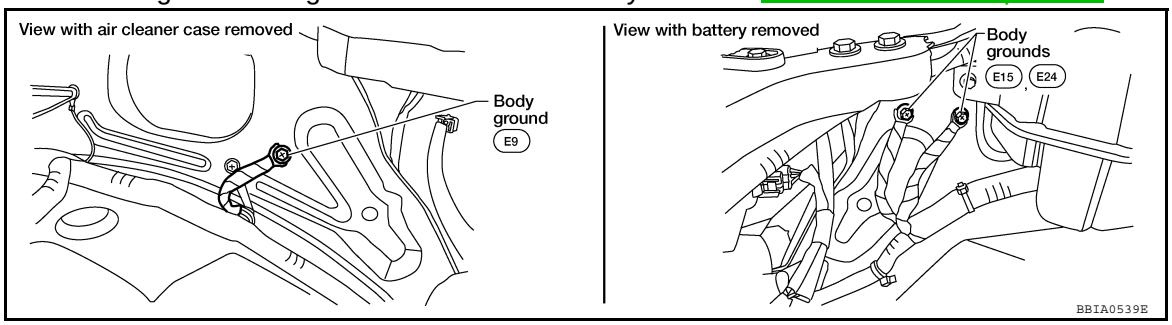
Diagnosis Procedure

INFOID:0000000005282037

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.

2. Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".

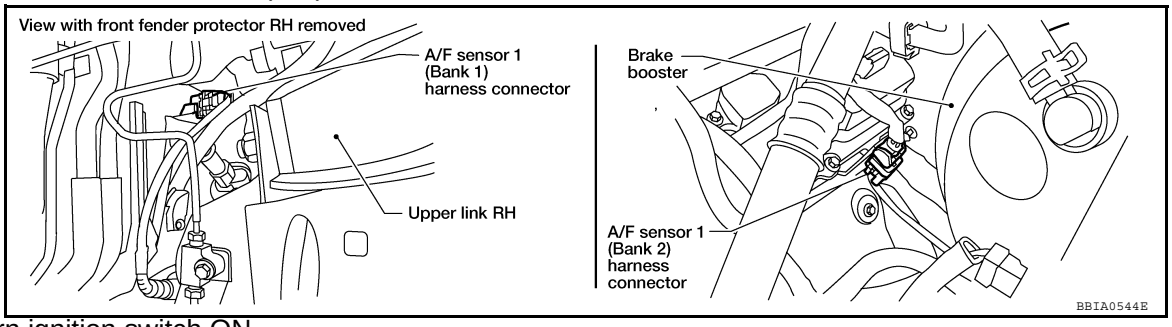


OK or NG

OK >> GO TO 2.
NG >> Repair or Replace ground connections.

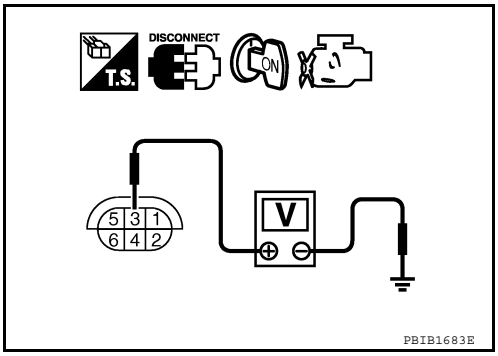
2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.



2. Turn ignition switch ON.
3. Check voltage between air fuel ratio sensor 1 terminal 3 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 E2, F32
- IPDM E/R harness connector E119
- 15A fuse (No.54)
- Harness for open or short between air fuel ratio sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK AIR FUEL RATIO (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 2 (bank 1) or 24 (bank 2) and air fuel ratio (A/F) sensor 1 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 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

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

Refer to EC-105, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> GO TO 7.

6. CHECK INTERMITTENT INCIDENT

Perform GI-34, "Work Flow".

OK or NG

OK >> GO TO 7.
NG >> Repair or replace.

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

Replace malfunctioning 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 and approved anti-seize lubricant.**

>> **INSPECTION END**

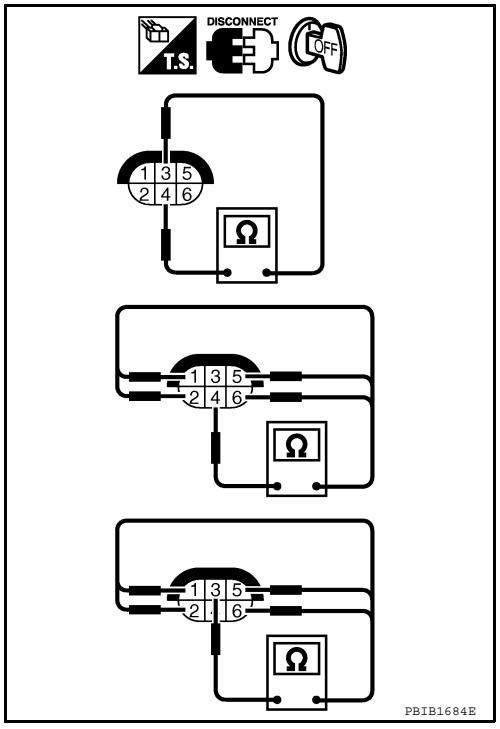
Component Inspection

INFOID:0000000005282038

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	1.80 - 2.44 Ω [at 25°C (77°F)]
3 and 1, 2, 5, 6	∞ Ω (Continuity should not exist)
4 and 1, 2, 5, 6	



2. If NG, replace air fuel ratio (A/F) sensor 1.

CAUTION:

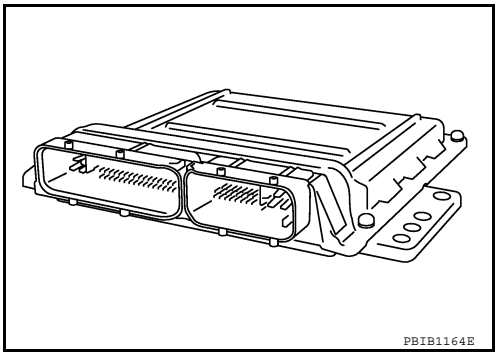
- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new A/F sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**

P1065 ECM POWER SUPPLY

Component Description

INFOID:0000000005282039

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



On Board Diagnosis Logic

INFOID:0000000005282040

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0603 0603	ECM power supply circuit	ECM back-up RAM system does not function properly.	• Harness or connectors [ECM power supply (back-up) circuit is open or shorted.] • ECM

DTC Confirmation Procedure

INFOID:0000000005282041

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. If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next step.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Turn ignition switch ON.
c. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON, wait at least 10 seconds.
3. Turn ignition switch OFF, wait at least 5 minutes.
4. Turn ignition switch ON, wait at least 10 seconds.
5. Repeat steps 2 to 3 for 5 times.
6. Check 1st trip DTC.
7. If 1st trip DTC is detected, go to EC-106, "Diagnosis Procedure".

Diagnosis Procedure

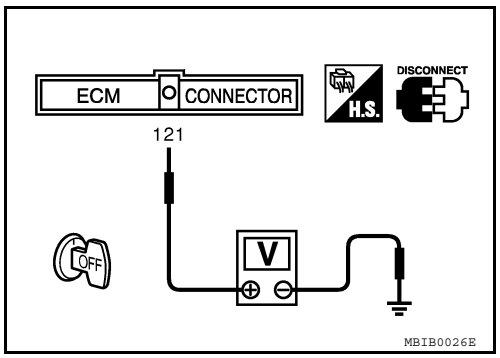
INFOID:0000000005282042

1.CHECK ECM POWER SUPPLY

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

3. Check voltage between ECM terminal 121 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.
- 20A fuse (No.53)
- IPDM E/R harness connector E121
- Harness for open or short between ECM and battery

>> Repair open circuit in harness or connectors.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

OK or NG

OK >> GO TO 4.
NG >> Repair or replace harness or connectors.

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC
3. **Perform DTC Confirmation Procedure.**
   See EC-106, "DTC Confirmation Procedure".
4. Is the 1st trip DTC P1065 displayed again?

Yes or No

Yes >> GO TO 5.
No >> **INSPECTION END**

5.REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-7, "ECM RE-COMMUNICATING FUNCTION : Special Repair Requirement".
3. Perform EC-16, "Accelerator Pedal Released Position Learning".
4. Perform EC-17, "Throttle Valve Closed Position Learning".
5. Perform EC-17, "Idle Air Volume Learning".

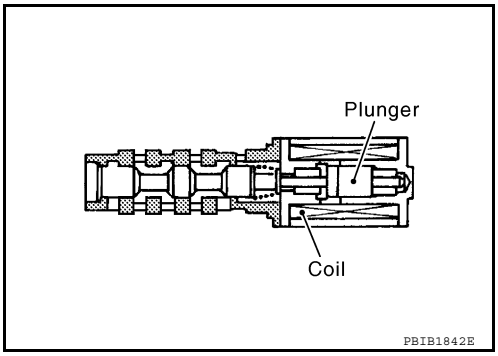
>> **INSPECTION END**

P1111 P1136 IVT CONTROL SOLENOID VALVE

Component Description

INFOID:0000000005282043

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.



On Board Diagnosis Logic

INFOID:0000000005282044

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1111 1111 (Bank 1) P1136 1136 (Bank 2)	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:0000000005282045

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.

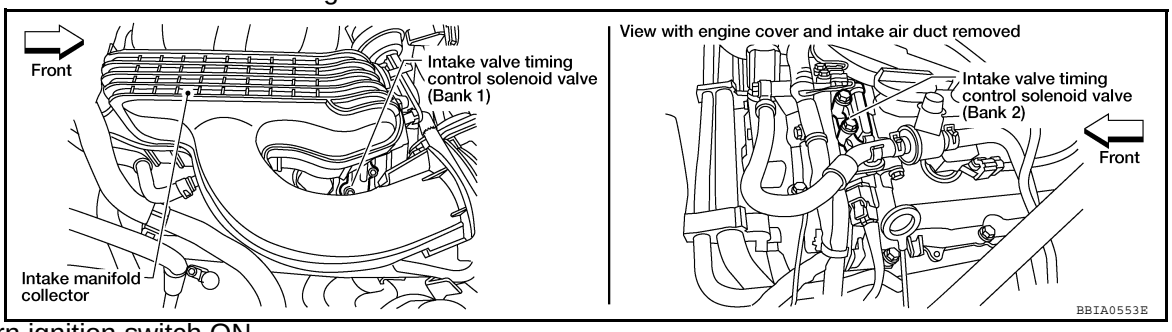
1. Start engine and let it idle for 5 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-108, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005282046

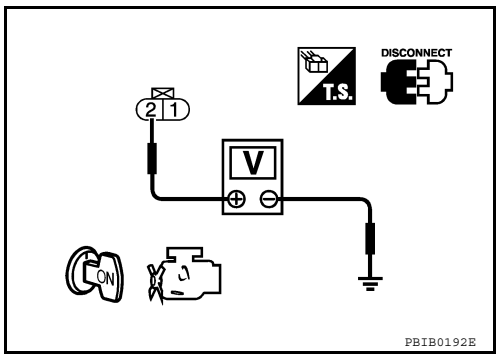
1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

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



3. Turn ignition switch ON.

4. Check voltage between intake valve timing control solenoid valve 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 E2, F32
- Harness connectors F26, F225 (bank 1)
- Harness for open or short between intake valve timing control solenoid valve and IPDM E/R
- Harness for open or short between intake valve timing control solenoid valve and ECM

>> Repair 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 11 (bank 1) or 10 (bank 2) and intake valve timing control solenoid valve 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 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F26, F225 (bank 1)
- Harness for open and short between ECM and intake valve timing control solenoid valve

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

5. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-109, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace malfunctioning intake valve timing control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

>> **INSPECTION END**

Component Inspection

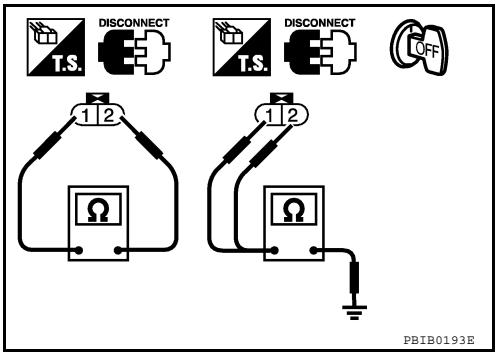
INFOID:0000000005282047

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	7.0 - 7.7Ω [at 20°C (68°F)]
1 or 2 and ground	∞Ω (Continuity should not exist.)

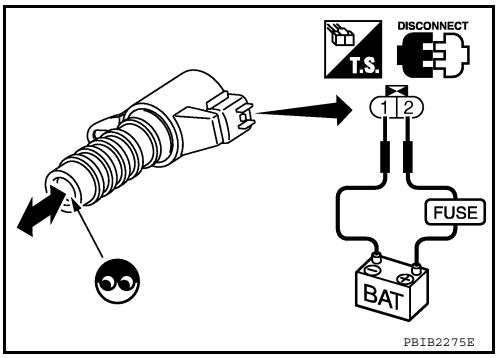


If NG, replace intake valve timing control solenoid valve.
If OK, go to next step.

3. Remove intake valve timing control solenoid valve.

4. Provide 12V DC between intake valve timing control solenoid valve terminals and then interrupt it. Check that the plunger moves as shown in the figure.

CAUTION:
Never 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.



P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

Component Description

INFOID:0000000005282048

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:0000000005282049

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121 1121	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.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL illuminates.

Detected items	Engine operating condition in fail-safe mode
Malfunction A	The 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, and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

INFOID:0000000005282050

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.
- **Perform PROCEDURE FOR MALFUNCTION A AND B first. If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION C.**

PROCEDURE FOR MALFUNCTION A AND B

1. Turn ignition switch ON and wait at least 1 second.
2. Shift selector lever to D position (A/T) or 1st position (M/T), and wait at least 3 seconds.
3. Shift selector lever to P or N position (A/T) 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. Shift selector lever to D position (A/T) or 1st position (M/T), and wait at least 3 seconds.
7. Shift selector lever to P or N position (A/T) 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-112, "Diagnosis Procedure".

PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Shift selector lever to D position (A/T) or 1st position (M/T), and wait at least 3 seconds.

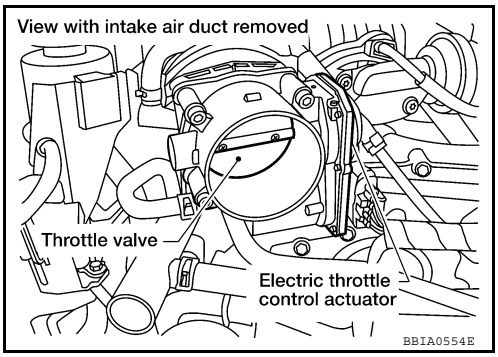
3. Shift selector lever to P or N position (A/T) or neutral position (M/T).
4. Start engine and let it idle for 3 seconds.
5. Check DTC.
6. If DTC is detected, go to EC-112, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005282051

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

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



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-17, "Throttle Valve Closed Position Learning".
3. Perform EC-17, "Idle Air Volume Learning".

>> **INSPECTION END**

P1122 ELECTRIC THROTTLE CONTROL FUNCTION

Description

INFOID:0000000005282052

NOTE:
If DTC P1122 is displayed with DTC P1121 or P1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-117or EC-111.
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:0000000005282053

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122 1122	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, ECM enters fail-safe mode and the MIL illuminates.

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:0000000005282054

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 the engine is running.

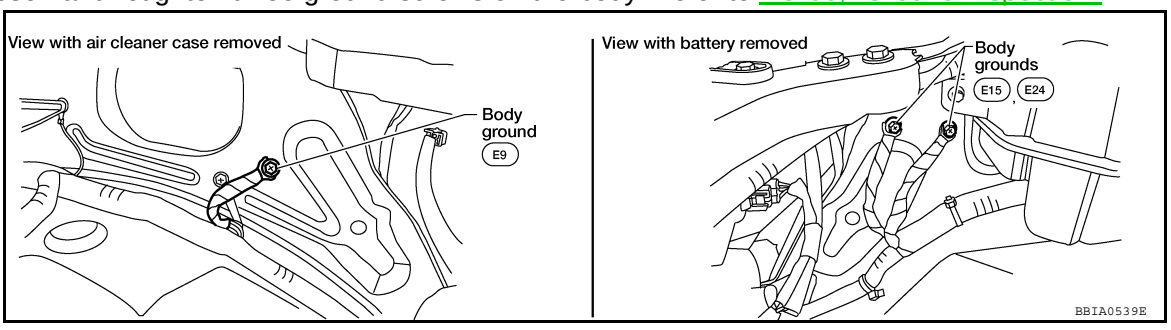
1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.
4. If DTC is detected, go to EC-113, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005282055

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF
2. Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".



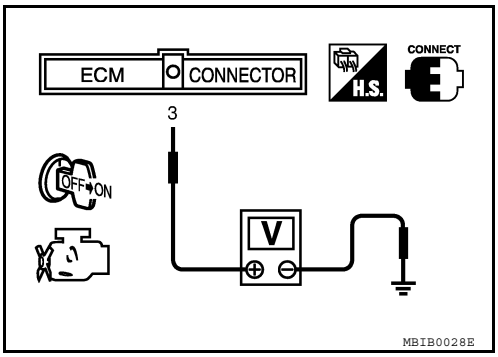
OK or NG

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 3 and ground under the following conditions with CONSULT-III or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)



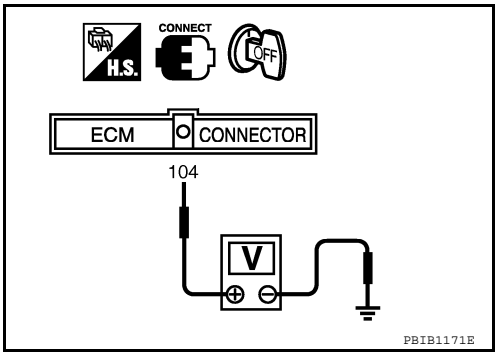
OK or NG

OK >> GO TO 9.
NG >> GO TO 3.

3.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Check voltage between ECM terminal 104 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 4.

4.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-II

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector E122.
3. Check continuity between ECM terminal 104 and IPDM E/R terminal 47. 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 FUSE

1. Disconnect 20A fuse (No.52).
2. Check 20A fuse for blown.

OK or NG

OK >> GO TO 8.
NG >> Replace 20A fuse.

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 E119.
4. Check continuity between ECM terminal 3 and IPDM E/R terminal 6. 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 E2, F32
- Harness for open or short between ECM and IPDM E/R

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

8. CHECK INTERMITTENT INCIDENT

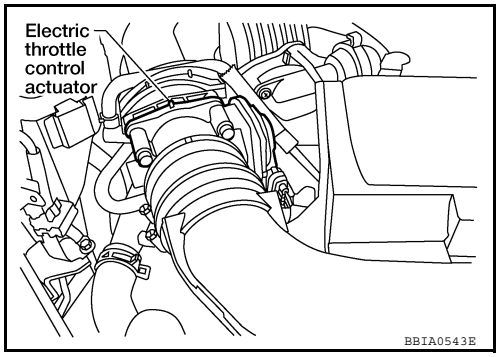
Refer to GI-34, "Work Flow".

OK or NG

OK >> Replace IPDM E/R. Refer to PCS-32, "Removal and Installation of IPDM E/R".
NG >> 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 harness continuity between the following terminals. Refer to Wiring Diagram.



Electric throttle control actuator terminal	ECM terminal	Continuity
5	5	Should not exist
	4	Should exist
6	5	Should exist
	4	Should not exist

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

OK or NG

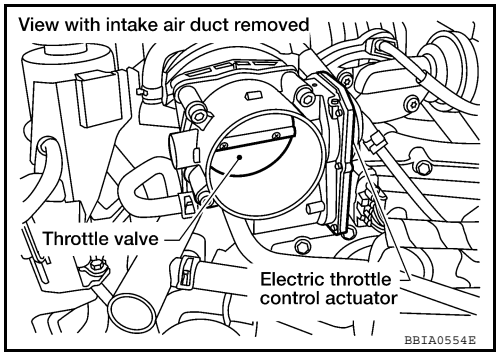
OK >> GO TO 10.
NG >> Repair or replace.

10. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

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

OK or NG

OK >> GO TO 11.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



11. CHECK THROTTLE CONTROL MOTOR

Refer to EC-116, "Component Inspection".

OK or NG

OK >> GO TO 12.
NG >> GO TO 13.

12. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

OK or NG

OK >> GO TO 13.
NG >> Repair or replace harness or connectors.

13. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-17, "Throttle Valve Closed Position Learning".
3. Perform EC-17, "Idle Air Volume Learning".

>> **INSPECTION END**

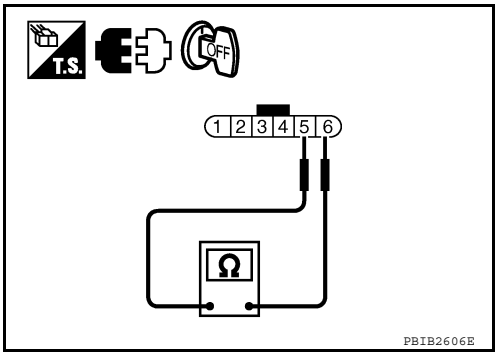
Component Inspection

INFOID:0000000005282056

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-17, "Throttle Valve Closed Position Learning".
5. Perform EC-17, "Idle Air Volume Learning".

P1124, P1126 THROTTLE CONTROL MOTOR RELAY

Component Description

INFOID:0000000005282057

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.

On Board Diagnosis Logic

INFOID:0000000005282058

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124 1124	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
P1126 1126	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

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL illuminates.

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:0000000005282059

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 P1124

TESTING CONDITION:

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

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-117, "Diagnosis Procedure".

PROCEDURE FOR DTC P1126

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check 1st trip DTC.
4. If DTC is detected, go to EC-117, "Diagnosis Procedure".

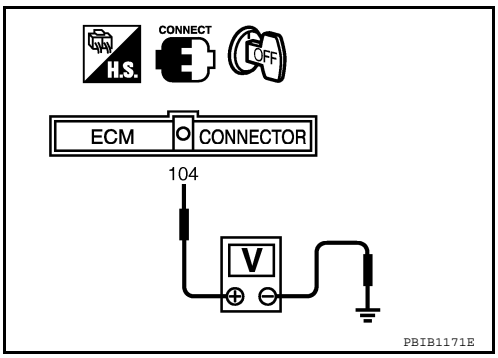
Diagnosis Procedure

INFOID:0000000005282060

1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.

2. Check voltage between ECM terminal 104 and ground with CONSULT-III or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
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 E122.
3. Check continuity between ECM terminal 104 and IPDM E/R terminal 47. 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 FUSE

1. Disconnect 20A fuse (No.52).
2. Check 20A fuse for blown.

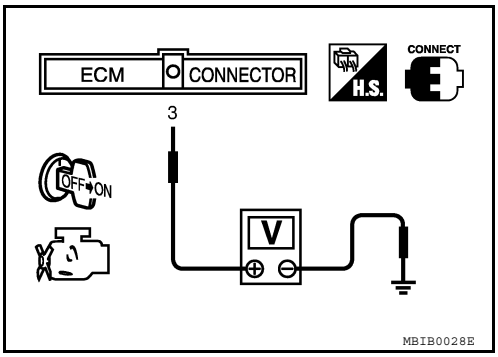
OK or NG

OK >> GO TO 7.
NG >> Replace 20A fuse.

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

1. Check voltage between ECM terminal 3 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 7.
NG >> GO TO 5.

5. 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 E119.
4. Check continuity between ECM terminal 3 and IPDM E/R terminal 6. 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 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E2, F32
- 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 INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

OK or NG

OK >> Replace IPDM E/R. Refer to PCS-32, "Removal and Installation of IPDM E/R".
NG >> Repair or replace harness or connectors.

P1128 THROTTLE CONTROL MOTOR

Component Description

INFOID:0000000005282061

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:0000000005282062

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1128 1128	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, the ECM enters fail-safe mode and the MIL illuminates.

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:0000000005282063

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

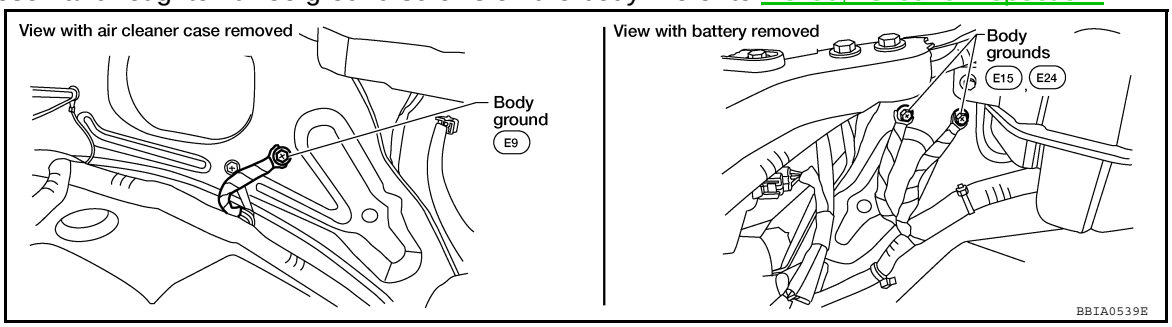
1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.
4. If DTC is detected, go to EC-120, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005282064

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".

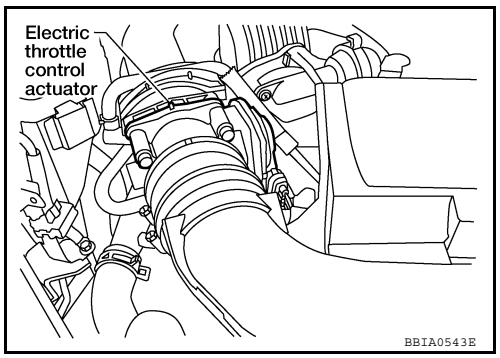


OK or NG

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 harness connector.
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	5	Should not exist
	4	Should exist
6	5	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 or replace.

3.CHECK THROTTLE CONTROL MOTOR

Refer to EC-121, "Component Inspection".

OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4.CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

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-17, "Throttle Valve Closed Position Learning".
3. Perform EC-17, "Idle Air Volume Learning".

>> **INSPECTION END**

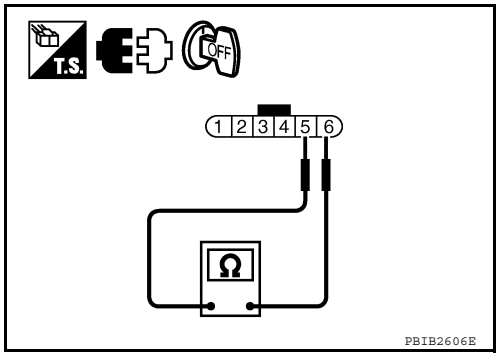
Component Inspection

INFOID:0000000005282065

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-17, "Throttle Valve Closed Position Learning".
5. Perform EC-17, "Idle Air Volume Learning".

P1211 TCS CONTROL UNIT

Description

INFOID:0000000005282066

The malfunction information related to TCS is transferred through the CAN communication line from “ABS actuator and electric unit (control unit)” to ECM.
Be sure to erase the malfunction information such as DTC not only for “ABS actuator and electric unit (control unit)” but also for ECM after TCS related repair.

On Board Diagnosis Logic

INFOID:0000000005282067

Freeze frame data is not stored in the ECM for this self-diagnosis.
The MIL will not illuminate for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1211 1211	TCS control unit	ECM receives a malfunction information from “ABS actuator electric unit (control unit)”	• ABS actuator and electric unit (control unit) • TCS related parts

DTC Confirmation Procedure

INFOID:0000000005282068

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

1. Start engine and let it idle for at least 60 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-122, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005282069

Go to BRC-6, "Work Flow" or BRC-65, "Work Flow".

P1212 TCS COMMUNICATION LINE

Description

INFOID:0000000005282070

NOTE:
- **If DTC P1212 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-67, "DTC Confirmation Procedure".**

This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and “ABS actuator and electric unit (control unit)”.
Be sure to erase the malfunction information such as DTC not only for “ABS actuator and electric unit (control unit)” but also for ECM after TCS related repair.

On Board Diagnosis Logic

INFOID:0000000005282071

Freeze frame data is not stored in the ECM for this self-diagnosis.
The MIL will not illuminate for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1212 1212	TCS communication line	ECM can not receive the information from “ABS actuator and electric unit (control unit)” continuously.	• Harness or connectors (The CAN communication line is open or short-ed.) • ABS actuator and electric unit (control unit) • Dead (Weak) battery

DTC Confirmation Procedure

INFOID:0000000005282072

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

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.
3. If 1st trip DTC is detected, go to EC-123, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005282073

Go to BRC-6, "Work Flow" or BRC-65, "Work Flow".

P1217 ENGINE OVER TEMPERATURE

On Board Diagnosis Logic

INFOID:0000000005282074

NOTE:

- **If DTC P1217 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-67, "On Board Diagnosis 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.
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 level 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 • Cooling fan (Crankshaft driven) • Radiator hose • Radiator • Radiator cap • Reservoir tank • Reservoir tank cap • Water pump • Thermostat For more information, refer to EC-126, "Main 12 Causes of Overheating".

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, "Changing Engine Oil".

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-12, "Engine Coolant Mixture Ratio".**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

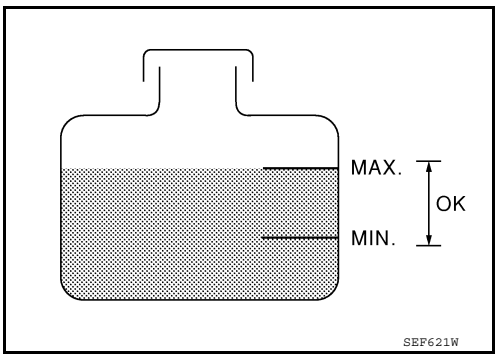
INFOID:0000000005282075

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 and/or reservoir tank cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator and/or reservoir tank.
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.

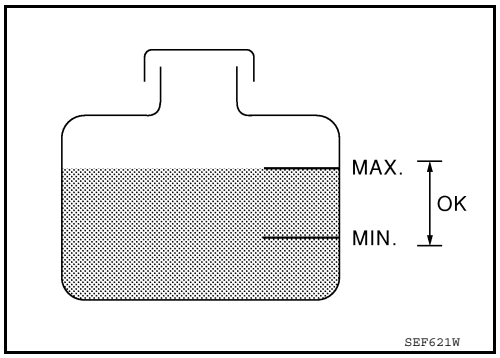
WITH CONSULT-III

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-125, "Diagnosis Procedure".
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-125, "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-125, "Diagnosis Procedure".



WITHOUT 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-125, "Diagnosis Procedure".
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-125, "Diagnosis Procedure".
3. Perform IPDM E/R auto active test and check cooling fan motor operation, refer to PCS-13, "Diagnosis Description".
4. If NG, go to EC-125, "Diagnosis Procedure".



Diagnosis Procedure

INFOID:0000000005282076

1. CHECK COOLING FAN (CRANKSHAFT DRIVEN) OPERATION

1. Start engine and let it idle.
2. Check that cooling fan (crankshaft driven) operates normally.

OK or NG

OK (With CONSULT-III)>>GO TO 2.
OK (Without CONSULT-III)>>GO TO 3.
NG >> Check cooling fan (crankshaft driven). Refer to CO-18, "Removal and Installation (Crankshaft driven type)"

2. CHECK COOLING FAN OPERATION

With CONSULT-III

1. Start engine and let it idle.
2. Select “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-III.
3. Check that cooling fan operates at each speed (LOW/HI).

OK or NG

OK >> GO TO 4.
NG >> Check cooling fan control circuit. (Go to “PROCEDURE A”.)

3. CHECK COOLING FAN OPERATION

Without CONSULT-III

1. Perform IPDM E/R auto active test and check cooling fan motor operation, refer to PCS-13, "Diagnosis Description".
2. Check that cooling fan operates at each speed (Low/High).

OK or NG

OK >> GO TO 4.
NG >> Check cooling fan control circuit. (Go to “PROCEDURE A”.)

4. CHECK COOLING SYSTEM FOR LEAK

Refer to CO-10, "System Inspection".

OK or NG

OK >> GO TO 5.
NG >> Check the following for leak. Refer to CO-10, "System Inspection".
- Hose
- Radiator
- Radiator cap
- Reservoir tank
- Water pump

5. CHECK RESERVOIR TANK CAP

Refer to CO-10, "System Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace reservoir tank cap.

6.CHECK COMPONENT PARTS

Check the following
- Thermostat. Refer to CO-26, "Removal and Installation".
- Engine coolant temperature sensor. Refer to EC-78, "Component Inspection".

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning component.

7.CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to EC-126, "Main 12 Causes of Overheating".

>> **INSPECTION END**

Main 12 Causes of Overheating

INFOID:0000000005282077

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	• Blocked radiator • Blocked condenser • Blocked radiator grille • Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	50 - 50% coolant mixture	MA-12, "Engine Coolant Mixture Ratio"
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	CO-11, "Changing Engine Coolant"
	4	• Reservoir tank cap	• Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2, 9 - 14 psi) (Limit)	CO-10, "System Inspection"
ON*2	5	• Coolant leaks	• Visual	No leaks	CO-10, "System Inspection"
ON*2	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	CO-26, "Removal and Installation"
ON*1	7	• Cooling fan	• CONSULT-III	Operating	See trouble diagnosis for DTC P1217 (EC-125, "Diagnosis Procedure").
ON*2	7	• Cooling fan (Crankshaft driven)	• Visual	Operating	See CO-18, "Removal and Installation (Crankshaft driven type)".
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, "Changing Engine Coolant"
OFF*4	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	CO-11, "Changing Engine Coolant"
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	EM-90, "Inspection After Disassembly"
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	EM-90, "Inspection After Disassembly"

*1: Turn the ignition switch ON.

*2: Engine running at 3,000 rpm for 10 minutes.

*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.

*4: After 60 minutes of cool down time.

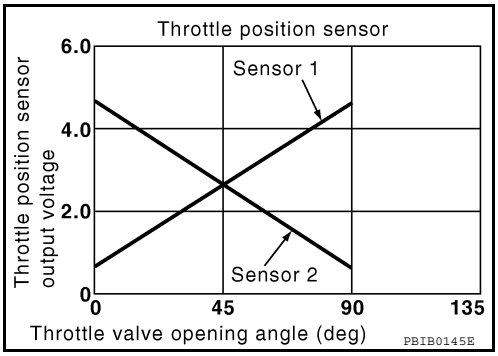
For more information, refer to CO-8, "Troubleshooting Chart".

P1225 TP SENSOR

Component Description

INFOID:0000000005282078

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 the 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:0000000005282079

The MIL will not illuminate 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:0000000005282080

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.

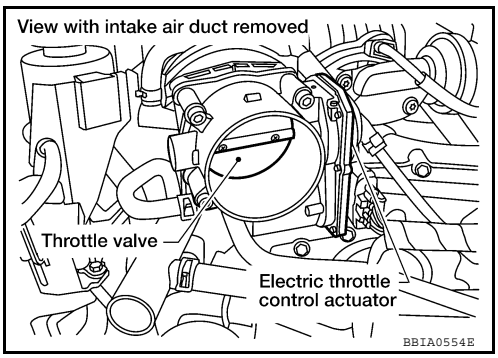
1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.
5. If 1st trip DTC is detected, go to EC-128, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005282081

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 and the housing.



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-17, "Throttle Valve Closed Position Learning".
3. Perform EC-17, "Idle Air Volume Learning".

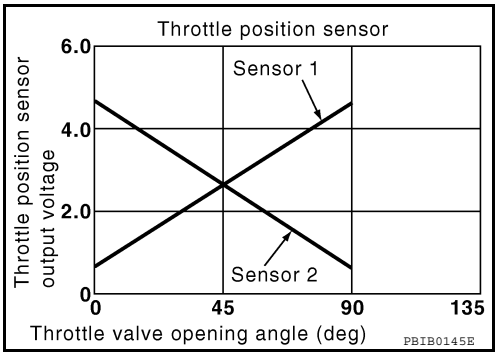
>> **INSPECTION END**

P1226 TP SENSOR

Component Description

INFOID:0000000005282082

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 the 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:0000000005282083

The MIL will not illuminate 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:0000000005282084

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 2 and 3 for 32 times.
5. Check 1st trip DTC.
6. If 1st trip DTC is detected, go to EC-130, "Diagnosis Procedure".

Diagnosis Procedure

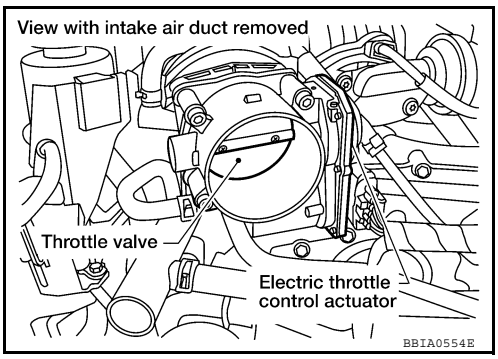
INFOID:0000000005282085

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 and the housing.

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-17, "Throttle Valve Closed Position Learning".
3. Perform EC-17, "Idle Air Volume Learning".

>> **INSPECTION END**

P1229 SENSOR POWER SUPPLY

On Board Diagnosis Logic

INFOID:0000000005282086

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1229 1229	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.) (PSP sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1) • EVAP control system pressure sensor • Power steering pressure sensor • Refrigerant pressure sensor

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode.

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:0000000005282087

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.

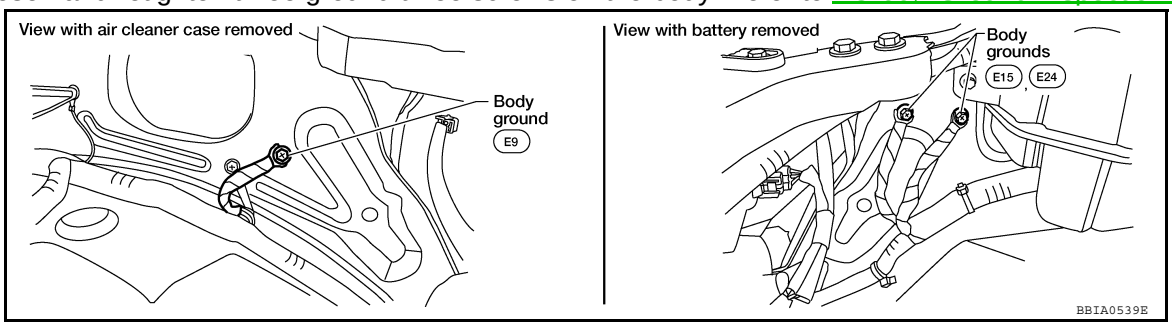
1. Start engine and let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-132, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005282088

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground three screws on the body. Refer to EC-66, "Ground Inspection".

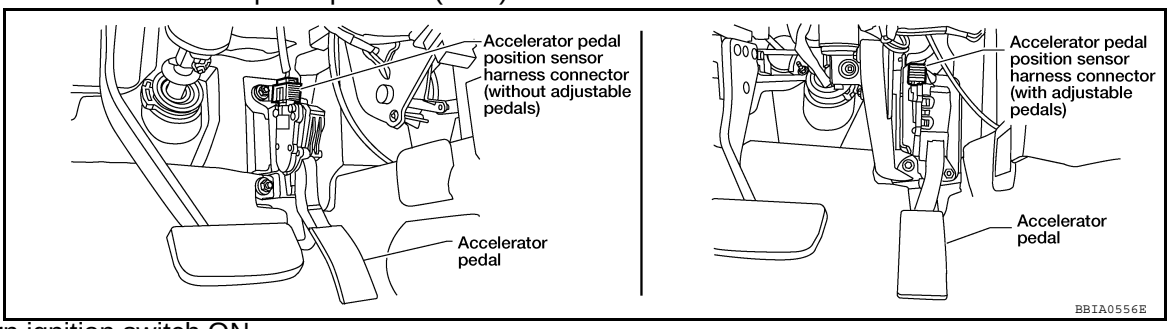


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

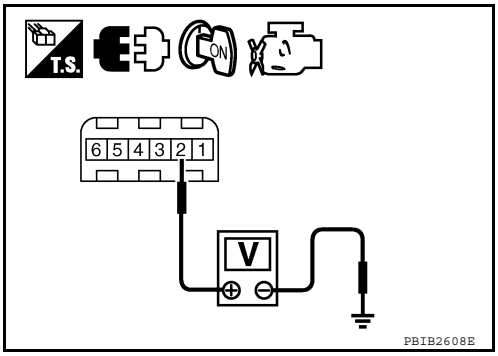
2.CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.



2. Turn ignition switch ON.
3. Check voltage between APP sensor terminal 2 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 5.
NG >> GO TO 3.

3. CHECK SENSOR POWER SUPPLY CIRCUITS

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

ECM terminal	Sensor terminal
48	EVAP control system pressure sensor terminal 3
49	Refrigerant pressure sensor terminal 3
68	PSP sensor terminal 3
90	APP sensor terminal 2

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 EC-227, "Component Description".)
- Power steering pressure sensor (Refer to EC-100, "Component Inspection".)

OK or NG

OK >> GO TO 5.
NG >> Replace malfunctioning component.

5. CHECK APP SENSOR

Refer to EC-170, "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-16, "Accelerator Pedal Released Position Learning".
3. Perform EC-17, "Throttle Valve Closed Position Learning".
4. Perform EC-17, "Idle Air Volume Learning".

>> **INSPECTION END**

7.CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

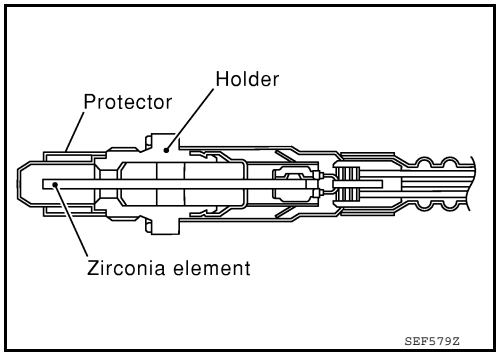
>> **INSPECTION END**

P1271 P1281 A/F SENSOR 1

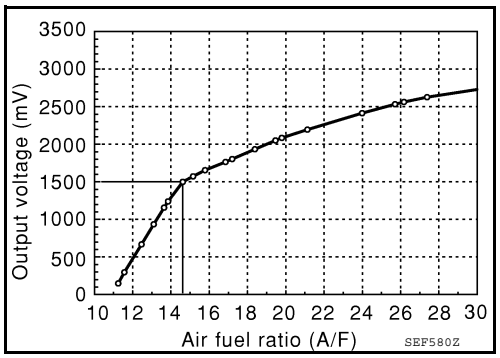
Component Description

INFOID:0000000005282089

The air fuel ratio (A/F) sensor is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.
The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).
The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



On Board Diagnosis Logic

INFOID:0000000005282090

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
P1271 1271 (Bank 1) P1281 1281 (Bank 2)	Air fuel ratio (A/F) sensor 1 circuit low voltage	• The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0V.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • A/F sensor 1

DTC Confirmation Procedure

INFOID:0000000005282091

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next text.
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)” or “A/F SEN1 (B2)” in “DATA MONITOR” mode with CONSULT-III.
3. Check “A/F SEN1 (B1)” or “A/F SEN1 (B2)” indication.
   If the indication is constantly approx. 0V, go to EC-136, "Diagnosis Procedure".
   If the indication is not constantly approx. 0V, go to next step.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON.
6. Turn ignition switch OFF and wait at least 10 seconds.
7. Restart engine.
8. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.

9. 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
Gear position	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.**

10. Check 1st trip DTC.
11. If 1st trip DTC is displayed, go to EC-136, "Diagnosis Procedure".

Overall Function Check

INFOID:0000000005282092

Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check 1st trip DTC might no be confirmed.

WITHOUT CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
3. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
4. Maintain the following conditions for about 20 consecutive seconds.

Engine Speed	1,000 - 3,200 rpm
Vehicle Speed	More than 40 km/h (25 MPH)
Selector lever	Suitable position
Driving location	Driving at level road (To avoid overloading will help maintain the driving conditions required for this test.)

NOTE:
- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 2, return to step 2.**

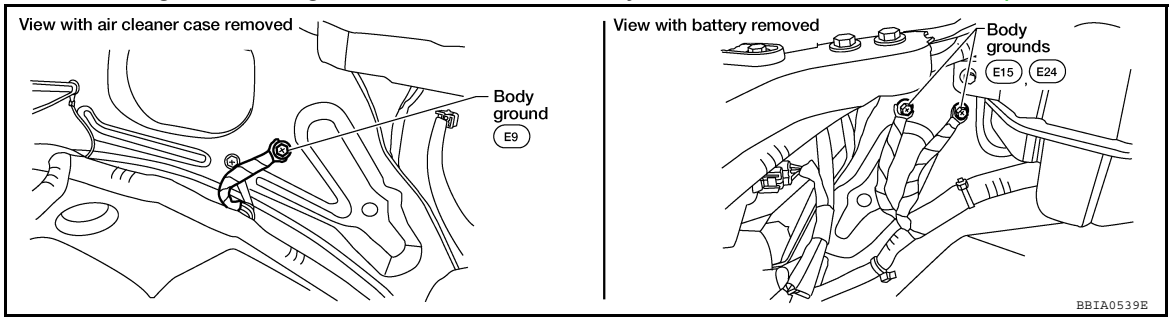
5. Repeat steps 2 to 4.
6. Stop the vehicle.
7. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
8. Check 1st trip DTC.
9. If 1st trip DTC is displayed, go to EC-136, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005282093

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".

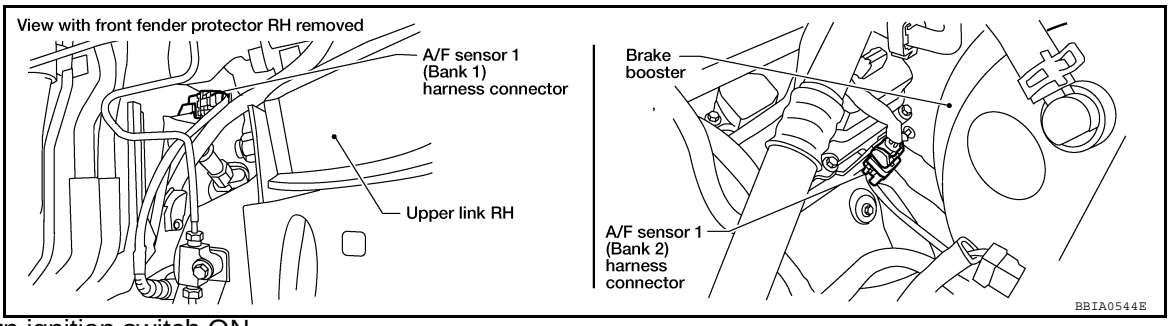


OK or NG

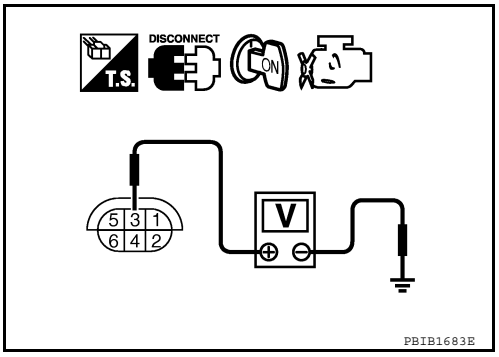
OK >> GO TO 2.
NG >> Repair or replace ground connections.

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

1. Disconnect A/F sensor 1 harness connector.



2. Turn ignition switch ON.
3. Check voltage between A/F sensor 1 terminal 3 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 E2, F32
- IPDM E/R connector E119
- 15A 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 harness continuity between A/F sensor 1 terminal and ECM terminal as follows. Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

4. Check harness continuity between the following terminals and ground.

Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

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 GI-34, "Work Flow".

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

6.REPLACE A/F SENSOR 1

Replace malfunctioning 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 and approved anti-seize lubricant.**

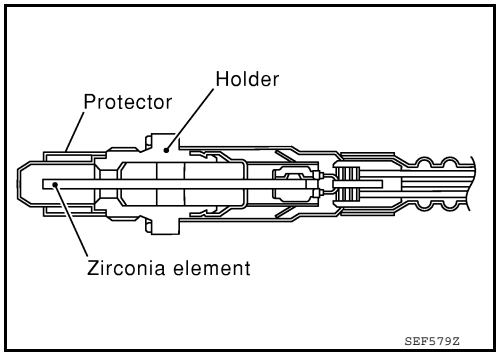
>> **INSPECTION END**

P1272 P1282 A/F SENSOR 1

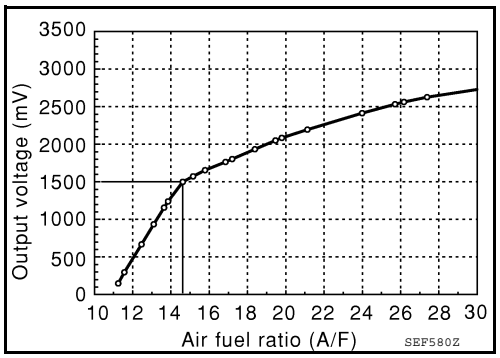
Component Description

INFOID:0000000005282094

The air fuel ratio (A/F) sensor is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.
The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).
The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



On Board Diagnosis Logic

INFOID:0000000005282095

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
P1272 1272 (Bank 1) P1282 1282 (Bank 2)	Air fuel ratio (A/F) sensor 1 circuit high voltage	• The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5V.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • A/F sensor 1

DTC Confirmation Procedure

INFOID:0000000005282096

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)” or “A/F SEN1 (B2)” in “DATA MONITOR” mode with CONSULT-III.
3. Check “A/F SEN1 (B1)” or “A/F SEN1 (B2)” indication.
   If the indication is constantly approx. 5V, go to EC-140, "Diagnosis Procedure".
   If the indication is not constantly approx. 5V, go to next step.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON.
6. Turn ignition switch OFF and wait at least 10 seconds.
7. Restart engine.
8. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.

9. 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
Gear position	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.**

10. Check 1st trip DTC.
11. If 1st trip DTC is displayed, go to EC-140, "Diagnosis Procedure".

Overall Function Check

INFOID:0000000005282097

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.

WITHOUT CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
3. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
4. Maintain the following conditions for about 20 consecutive seconds.

Engine Speed	1,000 - 3,200 rpm
Vehicle Speed	More than 40 km/h (25 MPH)
Selector lever	Suitable position
Driving location	Driving at level road (To avoid overloading will help maintain the driving conditions required for this test.)

NOTE:
- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 2, return to step 2.**

5. Repeat steps 2 to 4.
6. Stop the vehicle.
7. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
8. Check 1st trip DTC.
9. Make sure that no DTC is detected.
   If 1st trip DTC is displayed, go to EC-140, "Diagnosis Procedure".

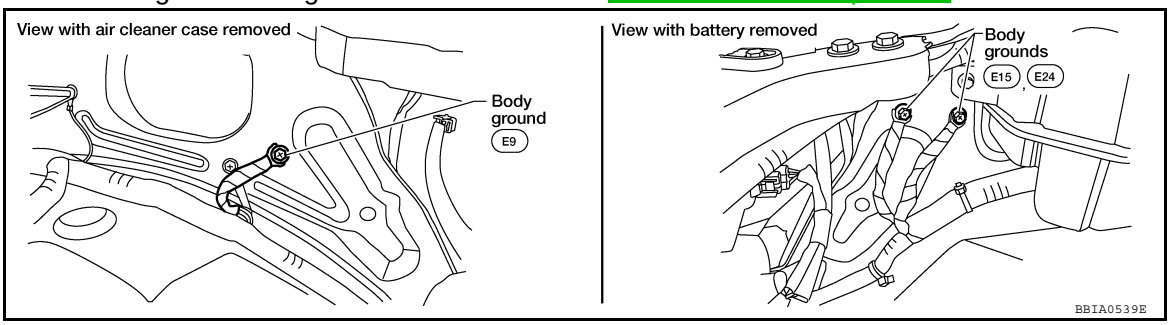
Diagnosis Procedure

INFOID:0000000005282098

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.

2. Loosen and retighten three ground screws. Refer to EC-66, "Ground Inspection".

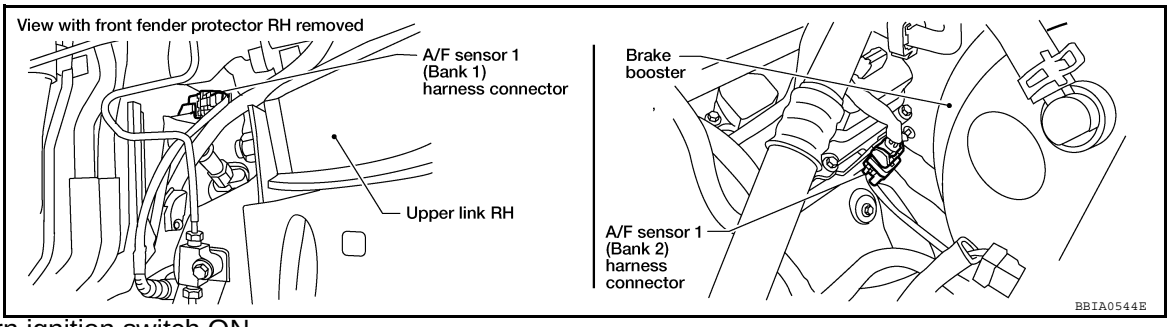


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

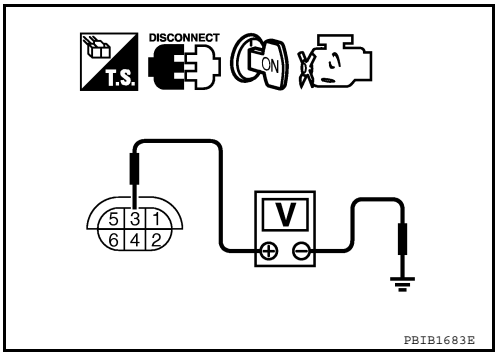
2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect A/F sensor 1 harness connector.



2. Turn ignition switch ON.
3. Check voltage between A/F sensor 1 terminal 3 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 E2, F32
- IPDM E/R connector E119
- 15A 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 harness continuity between A/F sensor 1 terminal and ECM terminal as follows. Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal

Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

4. Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal
1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

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 GI-34, "Work Flow".

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

6.REPLACE A/F SENSOR 1

Replace malfunctioning 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 and approved anti-seize lubricant.**

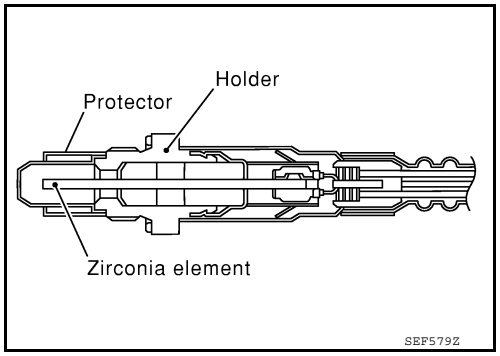
>> **INSPECTION END**

P1276 P1286 A/F SENSOR 1

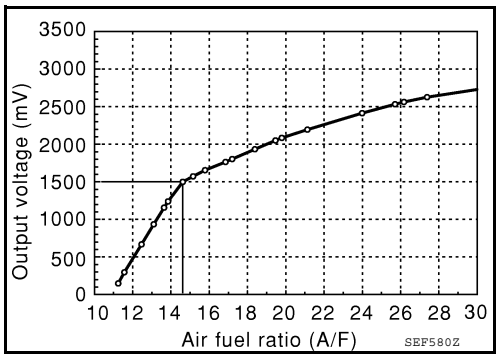
Component Description

INFOID:0000000005282099

The air fuel ratio (A/F) sensor is a planar dual-cell limit current sensor. The sensor element of the air fuel ratio (A/F) sensor is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.
The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).
The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the air fuel ratio (A/F) sensor is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



On Board Diagnosis Logic

INFOID:0000000005282100

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1276 1276 (Bank 1)	Air fuel ratio (A/F) sensor 1 circuit	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 1.5V.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • Air fuel ratio (A/F) sensor 1
P1286 1286 (Bank 2)			

Overall Function Check

INFOID:0000000005282101

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.

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)” or “A/F SEN1 (B2)” in “DATA MONITOR” mode with CONSULT-III.
3. Check “A/F SEN1 (B1)” or “A/F SEN1 (B2)” indication.
   If the indication is constantly approx. 1.5V and does not fluctuates, go to EC-144, "Diagnosis Procedure".
   If the indication fluctuates around 1.5V, go to next step.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and warm it up to normal operating temperature.
6. Select “DATA MONITOR” mode with CONSULT-III.
7. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.

8. Set selector lever to D position with “OD” OFF (A/T) 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.
9. Repeat steps 7 to 8 for five times.
10. Stop the vehicle and turn ignition switch OFF.
11. Wait at least 10 seconds and restart engine.
12. Repeat steps 7 to 8 for five times.
13. Check that no DTC is detected.
    If 1st trip DTC is detected, go to EC-144, "Diagnosis Procedure".

⊗ WITHOUT CONSULT-III

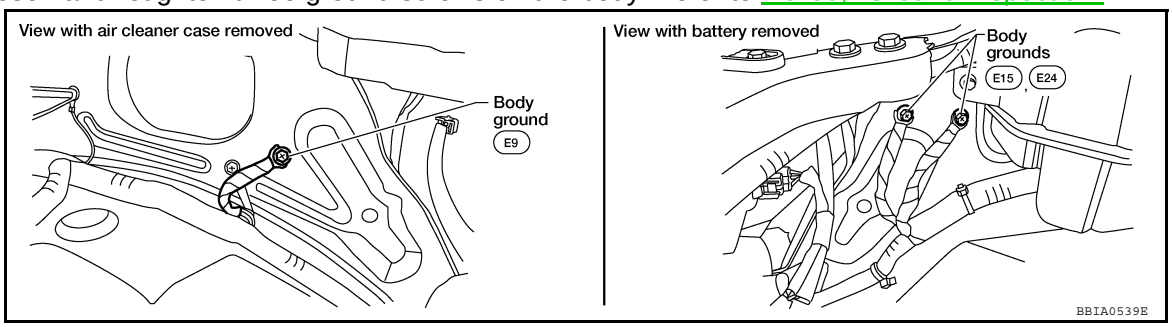
1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
3. Set selector lever to D position with “OD” OFF (A/T) or 5th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).
   NOTE:
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 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. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
10. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
11. Check that no DTC is detected.
    If 1st trip DTC is detected, go to EC-144, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005282102

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".

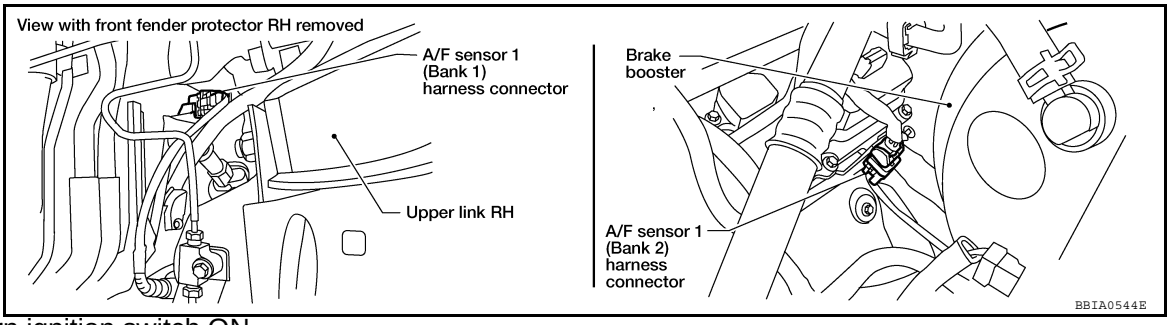


OK or NG

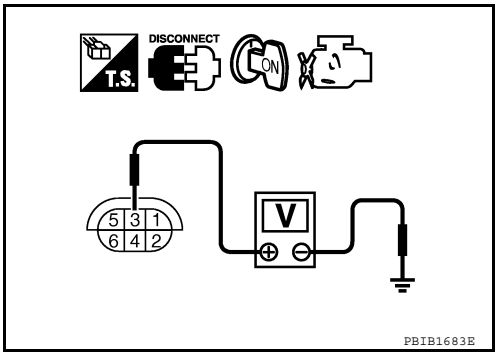
OK >> GO TO 2.
NG >> Repair or replace ground connections.

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

1. Disconnect A/F sensor 1 harness connector.



2. Turn ignition switch ON.
3. Check voltage between A/F sensor 1 terminal 3 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 E2, F32
- IPDM E/R connector E119
- 15A 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 harness continuity between A/F sensor 1 terminal and ECM terminal as follows. Refer to Wiring Diagram.

	A/F sensor 1 terminal	ECM terminal
Bank1	1	16
	2	75
	5	35
	6	56
Bank 2	1	76
	2	77
	5	57
	6	58

Continuity should exist.

4. Check harness continuity between the following terminals and ground. Refer to Wiring Diagram.

Bank 1		Bank 2	
A/F sensor 1 terminal	ECM terminal	A/F sensor 1 terminal	ECM terminal

1	16	1	76
2	75	2	77
5	35	5	57
6	56	6	58

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 GI-34, "Work Flow".

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

6.REPLACE A/F SENSOR 1

Replace malfunctioning 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 and approved anti-seize lubricant.**

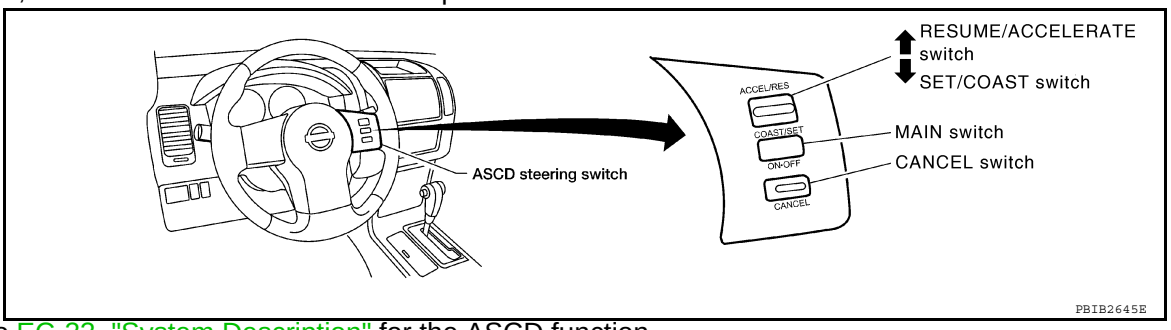
>> **INSPECTION END**

P1564 ASCD STEERING SWITCH

Component Description

INFOID:0000000005282103

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.



Refer to EC-33, "System Description" for the ASCD function.

On Board Diagnosis Logic

INFOID:0000000005282104

This self-diagnosis has the one trip detection logic.
The MIL will not illuminate for this diagnosis.
NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-101.

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 (The switch circuit is open or shorted.) • ASCD steering switch • ECM

DTC Confirmation Procedure

INFOID:0000000005282105

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-147, "Diagnosis Procedure".

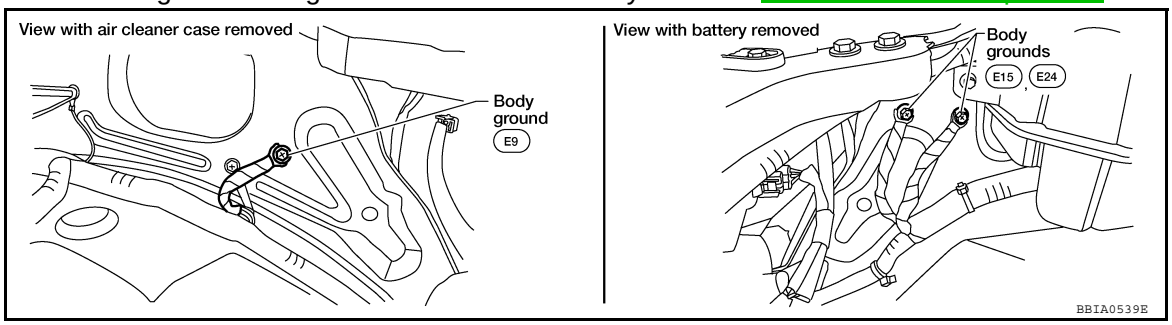
Diagnosis Procedure

INFOID:0000000005282106

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.

2. Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK ASCD STEERING SWITCH CIRCUIT

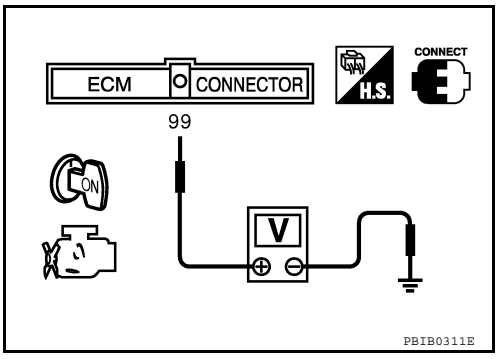
With CONSULT-III

1. Turn ignition switch ON.
2. Select “MAIN SW”, “CANCEL SW”, “RESUME/ACC SW” and “SET 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
RESUME/ACCELER-ATE 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 99 and ground with pressing each button.



Switch	Condition	Voltage [V]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4
CANCEL switch	Pressed	Approx. 1
	Released	Approx. 4
RESUME/ACCELERATE switch	Pressed	Approx. 3
	Released	Approx. 4
SET/COAST switch	Pressed	Approx. 2
	Released	Approx. 4

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.

3. Disconnect ECM harness connector.
4. Check harness continuity between combination switch terminal 17 and ECM terminal 67. 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 M31, E152
- Harness connectors E5, F14
- 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 99 and combination switch terminal 16. 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 M31, E152
- 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-149, "Component Inspection".

OK or NG

OK >> GO TO 8.
NG >> Replace steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

>> **INSPECTION END**

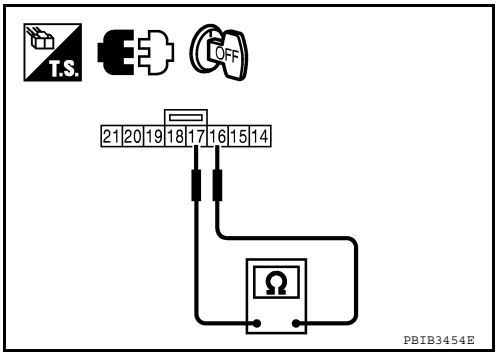
Component Inspection

INFOID:0000000005282107

ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable).

2. Check continuity between combination switch (spiral cable) terminals 16 and 17 with pushing each switch.



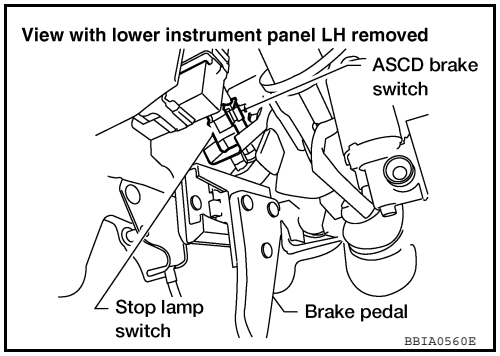
Switch	Condition	Resistance [Ω]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4,000
CANCEL switch	Pressed	Approx. 250
	Released	Approx. 4,000
RESUME/ACCELERATE switch	Pressed	Approx. 1,480
	Released	Approx. 4,000
SET/COAST switch	Pressed	Approx. 660
	Released	Approx. 4,000

P1572 ASCD BRAKE SWITCH

Component Description

INFOID:0000000005282108

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by those two types input (ON/OFF signal).
Refer to EC-33, "System Description" for the ASCD function.



On Board Diagnosis Logic

INFOID:0000000005282109

This self-diagnosis has the one trip detection logic.
The MIL will not illuminate for this diagnosis.
NOTE:
- **If DTC P 1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-101.**
- **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 (The stop lamp switch circuit is shorted.) • Harness or connectors (The ASCD brake switch circuit is shorted.) • Harness or connectors (The ASCD clutch switch circuit shorted) (M/T models) • Stop lamp switch • ASCD brake switch • ASCD clutch switch • Incorrect stop lamp switch installation • Incorrect ASCD brake switch installation • Incorrect ASCD clutch switch installation • ECM
		B)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving	

DTC Confirmation Procedure

INFOID:0000000005282110

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.
- The procedure for malfunction B is not described. It takes an extremely long time to complete the procedure for malfunction B. By performing the procedure for malfunction A, the condition 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 (VDC switch OFF).
2. Select “DATA MONITOR” mode with CONSULT-III.

3. Press MAIN switch and check that CRUISE indicator illuminates.
4. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position

5. Check 1st trip DTC.
   If DTC is detected, go to EC-152, "Diagnosis Procedure".
   If 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)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

7. Check DTC.
8. If DTC is detected, go to EC-152, "Diagnosis Procedure".

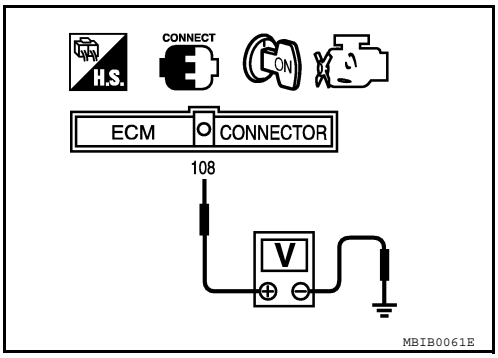
Overall Function Check

INFOID:0000000005282111

Use this procedure to check the overall function of the ASCD brake switch circuit. During this check, a 1st trip DTC might not be confirmed

WITHOUT CONSULT-III

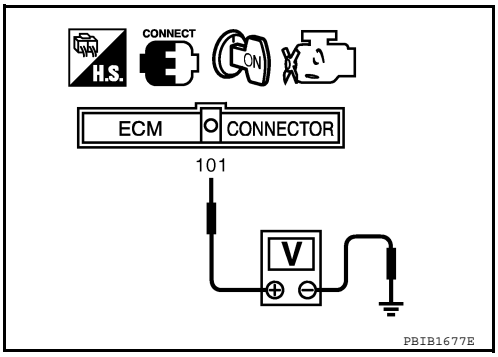
1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 (ASCD brake switch signal) and ground under the following conditions.



CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage

3. If NG, go to EC-152, "Diagnosis Procedure".
   If OK, go to next step.

4. Check voltage between ECM terminal 101 (stop lamp switch signal) and ground under the following conditions.



CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

5. If NG, go to EC-152, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005282112

A/T MODELS

1.CHECK OVERALL FUNCTION-I

With CONSULT-III

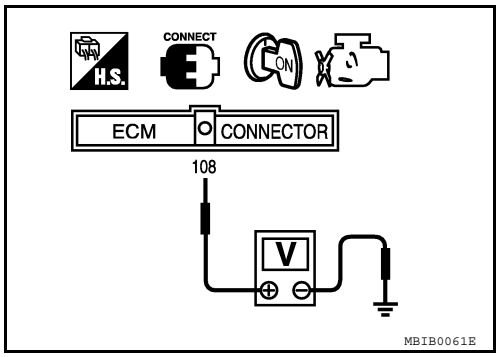
1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-III.

3. Check “BRAKE SW1” indication under the following conditions.

CONDITION	INDICATION
When brake pedal: Slightly depressed	OFF
When brake pedal: Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.



CONDITION	VOLTAGE
When brake pedal: Slightly depressed	Approximately 0V
When brake pedal: Fully released	Battery voltage

OK or NG

OK >> GO TO 2.
NG >> GO TO 3.

2.CHECK OVERALL FUNCTION-II

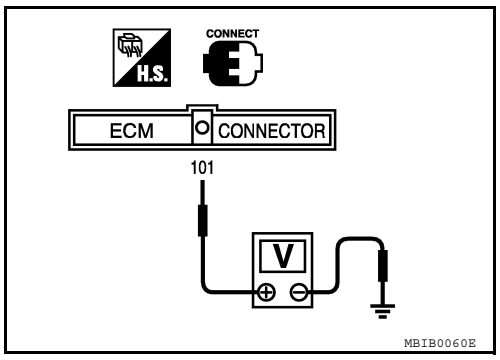
With CONSULT-III

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

CONDITION	INDICATION
When brake pedal: Fully released	OFF
When brake pedal: Slightly depressed	ON

Without CONSULT-III

Check voltage between ECM terminal 101 and ground under the following conditions.



CONDITION	VOLTAGE
When brake pedal: Fully released	Approximately 0V
When brake pedal: Slightly depressed	Battery voltage

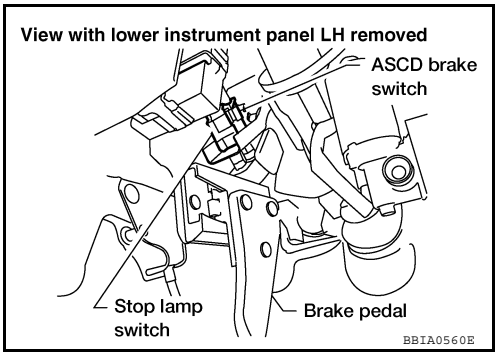
OK or NG

OK >> GO TO 11.
NG >> GO TO 7.

3.CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.

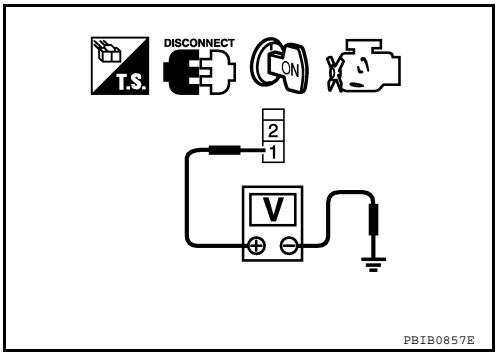


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector E160
- 10A fuse (No.12)
- Harness for open or short between ASCD brake switch and fuse

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

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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 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 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ASCD BRAKE SWITCH

Refer to EC-159, "Component Inspection".

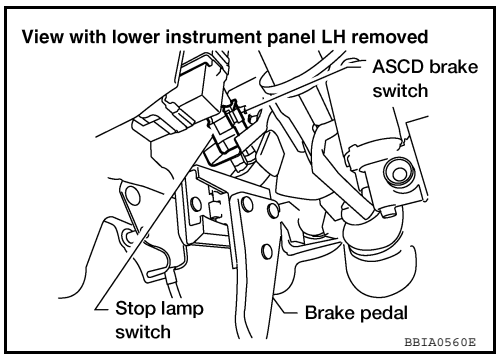
OK or NG

OK >> GO TO 11.
NG >> Replace ASCD brake switch.

7. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect stop lamp switch harness connector.

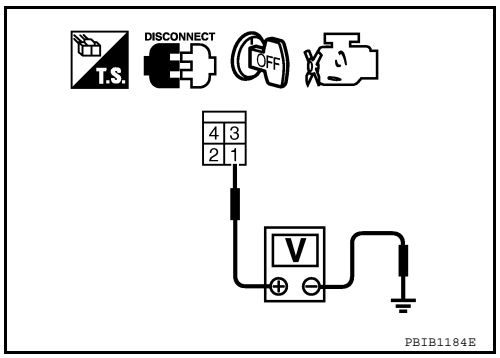


3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.



8. DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector E160
- 10A fuse (No.20)
- 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.

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

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 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 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK STOP LAMP SWITCH

Refer to EC-159, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> Replace stop lamp switch.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

>> **INSPECTION END**

M/T MODELS

1. CHECK OVERALL FUNCTION-I

With CONSULT-III

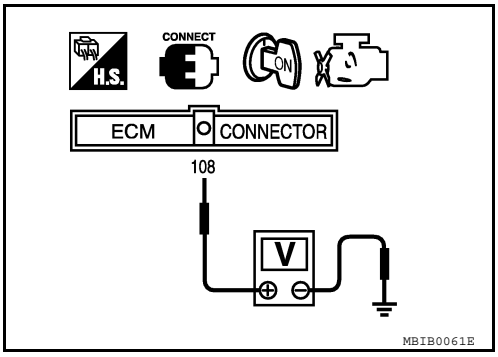
1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-III.
3. Check “BRAKE SW1” indication under the following conditions.

CONDITION	INDICATION
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage



OK or NG

OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-III

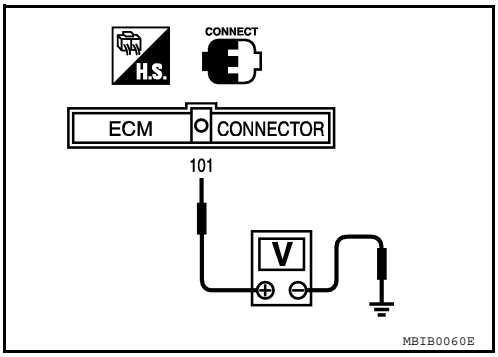
Check “BRAKE SW2” indication in “DATA MONITOR” mode.

CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON

Without CONSULT-III

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage



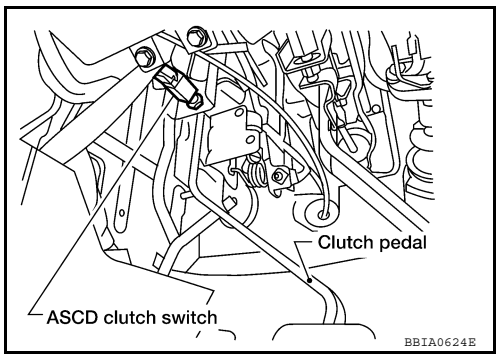
OK or NG

OK >> GO TO 14.
NG >> GO TO 10.

3. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

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

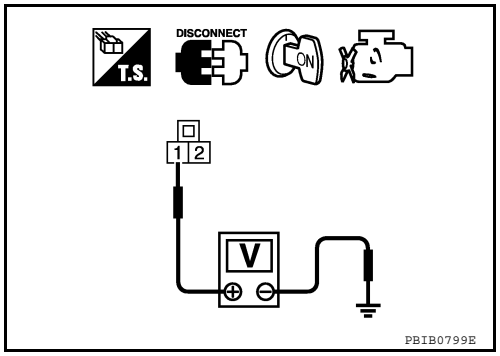


4. Check voltage between ASCD clutch switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

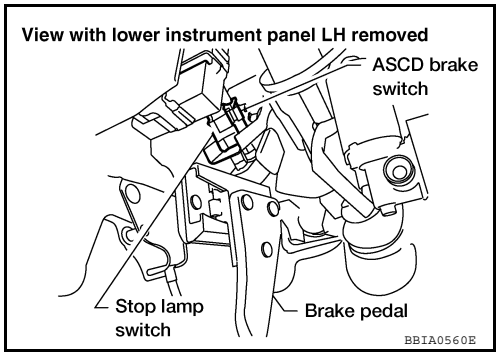
OK or NG

OK >> GO TO 8.
NG >> GO TO 4.



4. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

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

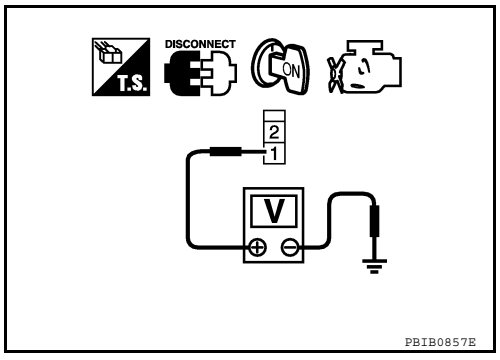


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector E160
- 10A fuse (No.12)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground 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 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH

Refer to EC-159, "Component Inspection".

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD brake switch.

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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 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 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ASCD CLUTCH SWITCH

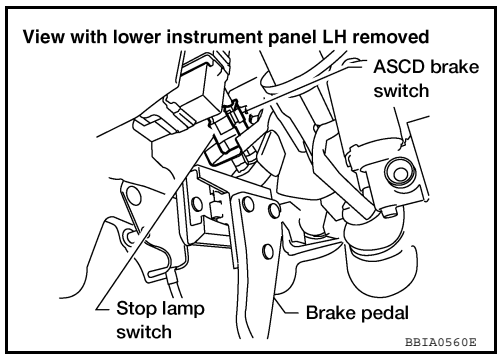
Refer to EC-159, "Component Inspection".

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD clutch switch.

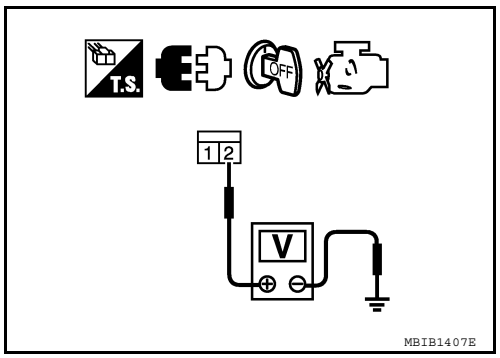
10. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



3. Check voltage between stop lamp switch terminal 2 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.
- Fuse block (J/B) connector E160
- 10A fuse (No.20)
- 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.

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

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 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 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH

Refer to EC-159, "Component Inspection".

OK or NG

OK >> GO TO 14.
NG >> Replace stop lamp switch.

14. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

>> **INSPECTION END**

Component Inspection

INFOID:0000000005282113

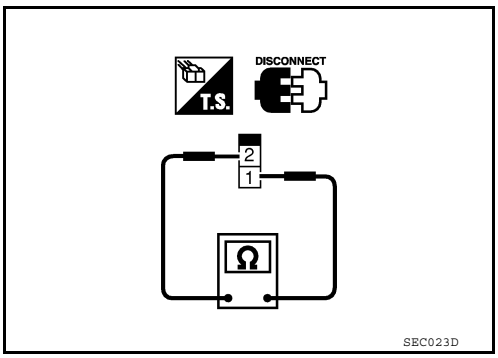
ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.

3. Check harness continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
When brake pedal: Fully released.	Should exist.
When brake pedal: Slightly depressed.	Should not exist.

If NG, adjust ASCD brake switch installation, refer to BR-17, "Inspection and Adjustment", and perform step 3 again.

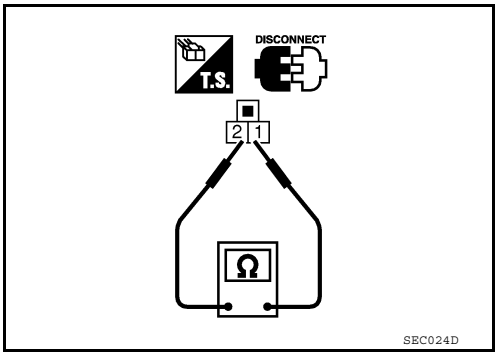


ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check harness 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-7, "On-Vehicle Inspection and Adjustment", and perform step 3 again.



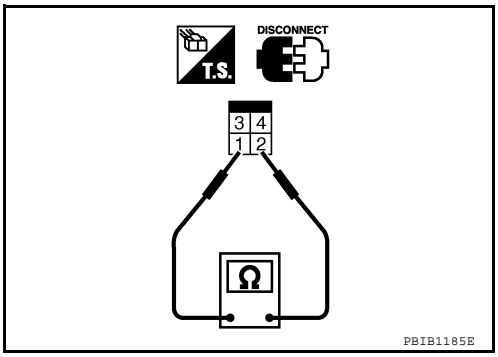
STOP LAMP SWITCH

A/T models

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check harness continuity between stop lamp switch terminals 1 and 2 under the following conditions.

Condition	Continuity
When brake pedal: Fully released.	Should not exist.
When brake pedal: Slightly depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to BR-17, "Inspection and Adjustment", and perform step 3 again.

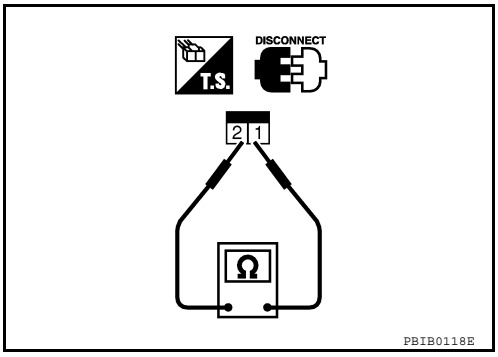


M/T models

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check harness continuity between stop lamp switch terminals 1 and 2 under the following conditions.

Condition	Continuity
When brake pedal: Fully released.	Should not exist.
When brake pedal: Slightly depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to BR-17, "Inspection and Adjustment", and perform step 3 again.



P1706 PNP SWITCH

Component Description

INFOID:0000000005282114

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

On Board Diagnosis Logic

INFOID:0000000005282115

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706 1706	Park/neutral position switch	The park/neutral position (PNP) signal is not changed in the process of engine starting and driving.	• Harness or connectors [The park/neutral position (PNP) signal circuit is open or shorted.] • Transmission range switch • Combination meter • TCM (A/T models)

Overall Function Check

INFOID:0000000005282117

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

WITH CONSULT-III

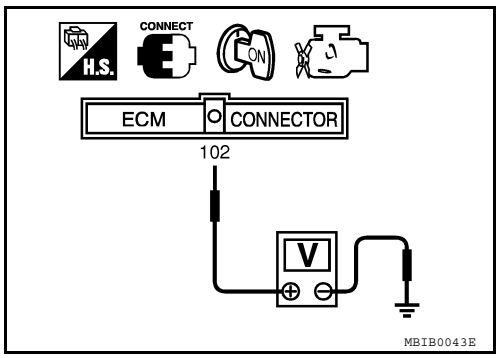
1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-III. Then check the “P/N POSI SW” signal under the following conditions.

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

3. If NG, go to EC-161, "Diagnosis Procedure".

WITHOUT CONSULT-III

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 102 (PNP switch signal) and ground under the following conditions.



Condition (Gear position)	Voltage V (Known-good data)
P or N position (A/T) Neutral position (M/T)	Approx. 0
Except above position	BATTERY VOLTAGE (11 - 14V)

3. If NG, go to EC-161, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005282118

A/T MODELS

1.CHECK DTC WITH TCM

Refer to TM-177, "DTC Inspection Priority Chart".

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 STR-7, "A/T : System Diagram".

3.CHECK PNP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 102 and combination meter terminal 7. 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 5.
NG >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E152, M31
- Harness for open or short between ECM and combination meter

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

5.CHECK INTERMITTENT INCIDENT

Refer to GI-38, "Intermittent Incident".

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

6.REPLACE COMBINATION METER

Refer to MWI-86, "Removal and Installation".

>> **INSPECTION END**

M/T MODELS

1.CHECK PNP SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 3
NG >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E5, F14
- Harness for open or short between PNP switch and ground

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

3.CHECK PNP SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 102 and PNP 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 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E5, F14
- Harness for open or short between PNP switch and ECM

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

5. CHECK PNP SWITCH

Refer to TM-16, "Checking".

OK or NG

OK >> GO TO 6.
NG >> Replace PNP switch.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

>> **INSPECTION END**

P1715 INPUT SPEED SENSOR

Description

INFOID:0000000005282119

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

On Board Diagnosis Logic

INFOID:0000000005282120

NOTE:
- **If DTC P1715 is displayed with DTC U1000, U1001 first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-67, "On Board Diagnosis Logic".**
- **If DTC P1715 is displayed with DTC P0335, first perform the trouble diagnosis for DTC P0335. Refer to EC-90.**
- **If DTC P1715 is displayed with DTC P0340, P0345 first perform the trouble diagnosis for DTC P0340, P0345. Refer to EC-94.**
- **If DTC P1715 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-101.**

The MIL will not illuminate for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1715 1715	Input speed sensor (TCM output)	Input speed signal is different from the theoretical value calculated by ECM from out put shaft revolution signal and engine rpm signal.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (Input speed sensor circuit is open or shorted) • TCM

Diagnosis Procedure

INFOID:0000000005282121

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-95, "CONSULT-III Function (TRANSMISSION)".

OK or NG

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

2.REPLACE TCM

Replace TCM.

>> **INSPECTION END**

P1805 BRAKE SWITCH

Description

INFOID:0000000005282122

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 driven.

On Board Diagnosis Logic

INFOID:0000000005282123

This self-diagnoses have the one trip detection logic.

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 driven.	• 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 fail-safe mode and MIL illuminate.

Engine operating condition in 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
When engine is idling	Normal
When accelerating	Poor acceleration

DTC Confirmation Procedure

INFOID:0000000005282124

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-165, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000005282125

1.CHECK STOP LAMP SWITCH CIRCUIT

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

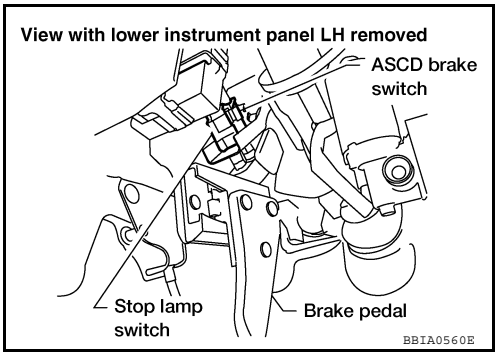
Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

OK or NG

OK >> GO TO 4.
NG >> GO TO 2.

2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch harness connector.

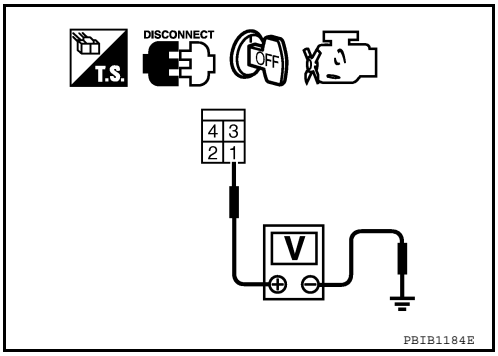


2. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.
- 10A fuse (No.20)
- Fuse block (J/B) connector E160
- 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

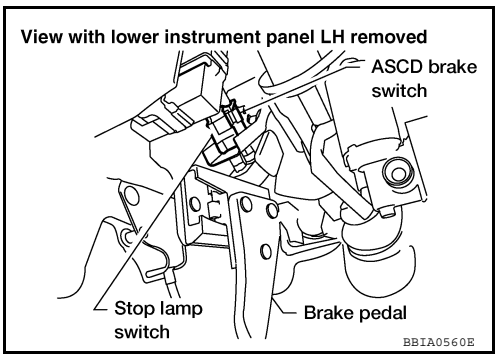
1. Disconnect ECM harness connector.
2. Disconnect stop lamp switch harness connector.
3. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

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

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



5. CHECK STOP LAMP SWITCH

Refer to EC-167, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace stop lamp switch.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

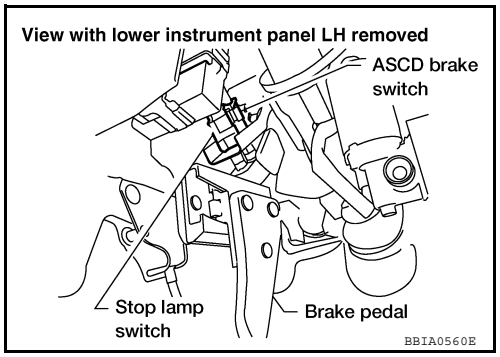
>> **INSPECTION END**

Component Inspection

INFOID:0000000005282126

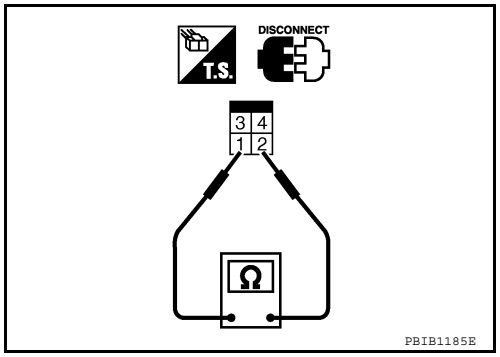
STOP LAMP SWITCH

1. Disconnect stop lamp switch harness connector.



2. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.

Conditions	Continuity
Brake pedal: Fully released	Should not exist.
Brake pedal: Slightly depressed	Should exist.



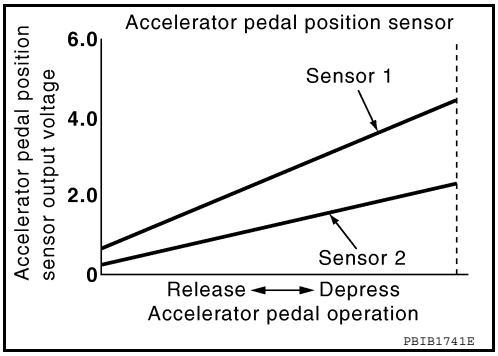
3. If NG, adjust stop lamp switch installation, refer to BR-17, "Inspection and Adjustment", and perform step 2 again.

P2122, P2123 APP SENSOR

Component Description

INFOID:0000000005282127

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. In addition, these sensors detect the opening and closing speed of the accelerator pedal and sends 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 engine conditions such as fuel cut.

On Board Diagnosis Logic

INFOID:0000000005282128

These self-diagnoses have the one trip detection logic.
NOTE:
If DTC P2122 or P2123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-132.

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 (The 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 illuminates.

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:0000000005282129

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 let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-168, "Diagnosis Procedure".

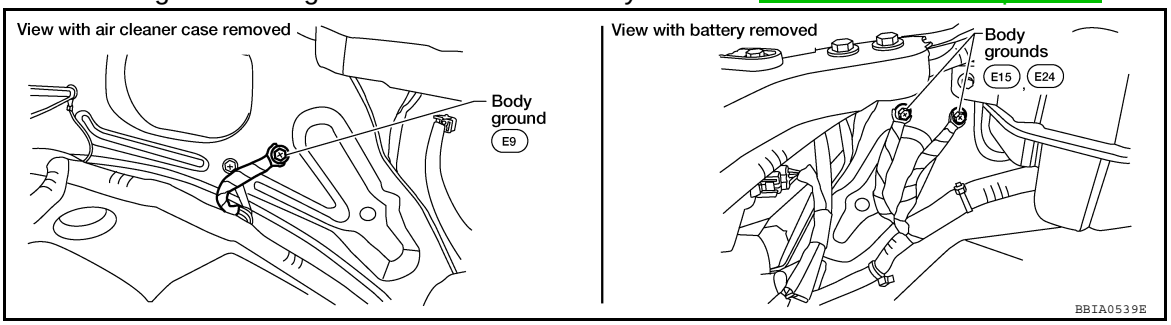
Diagnosis Procedure

INFOID:0000000005282130

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.

2. Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".

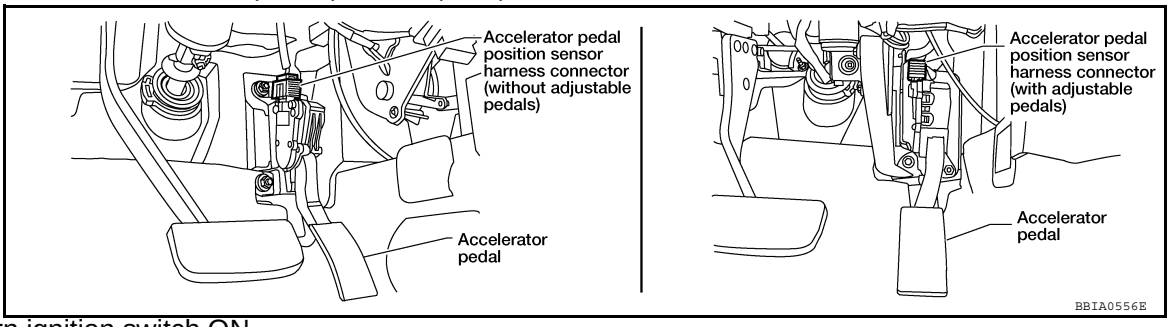


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

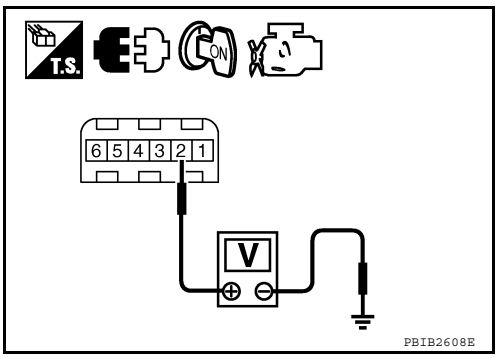
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.



2. Turn ignition switch ON.
3. Check voltage between APP sensor 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 APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 4 and ECM terminal 82. 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 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 106 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-170, "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-16, "Accelerator Pedal Released Position Learning".
3. Perform EC-17, "Throttle Valve Closed Position Learning".
4. Perform EC-17, "Idle Air Volume Learning".

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

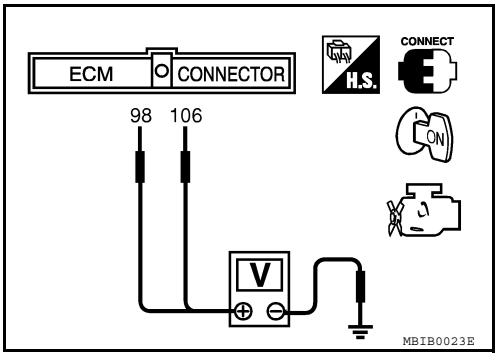
>> **INSPECTION END**

Component Inspection

INFOID:0000000005282131

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.65 - 0.87V
	Fully depressed	More than 4.3V
98 (Accelerator pedal position sensor 2)	Fully released	0.28 - 0.48V
	Fully depressed	More than 2.0V

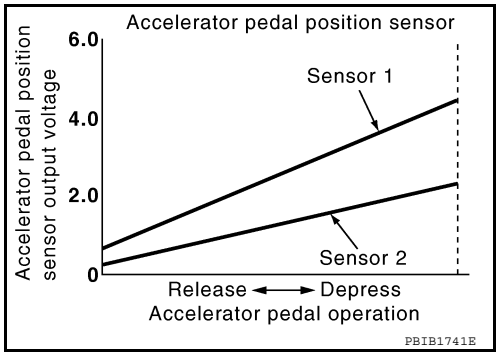
4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-16, "Accelerator Pedal Released Position Learning".
6. Perform EC-17, "Throttle Valve Closed Position Learning".
7. Perform EC-17, "Idle Air Volume Learning".

P2127, P2128 APP SENSOR

Component Description

INFOID:0000000005282132

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. In addition, these sensors detect the opening and closing speed of the accelerator pedal and sends 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 conditions such as fuel cut.



On Board Diagnosis Logic

INFOID:0000000005282133

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 (The APP sensor 2 circuit is open or shorted.) (The TP sensor circuit shorted.) • Accelerator pedal position sensor (APP sensor 2) • Electric throttle control actuator (TP sensor 1 and 2)
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 illuminates.

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:0000000005282134

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 let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-171, "Diagnosis Procedure".

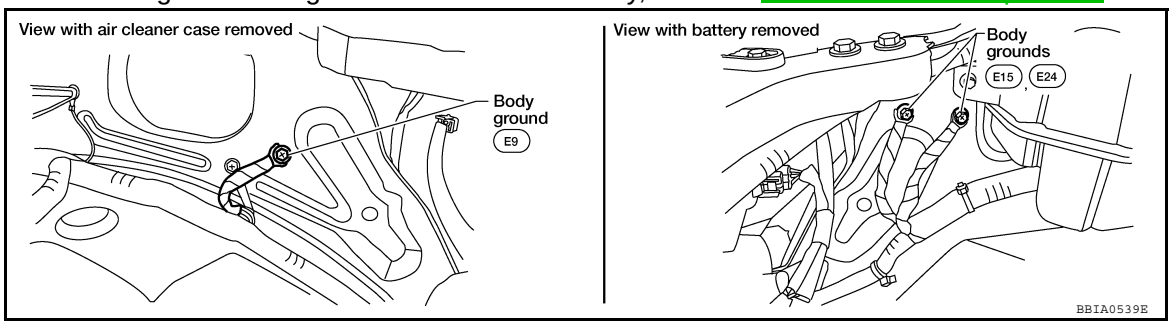
Diagnosis Procedure

INFOID:0000000005282135

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.

2. Loosen and retighten three ground screws on the body, Refer to EC-66, "Ground Inspection".

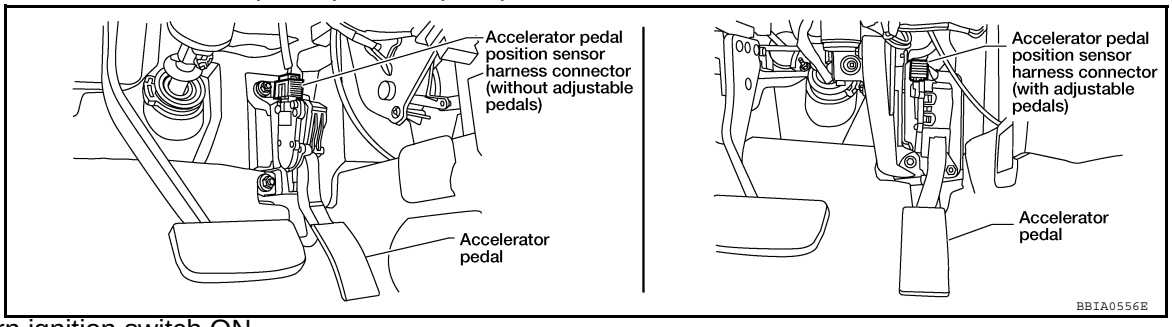


OK or NG

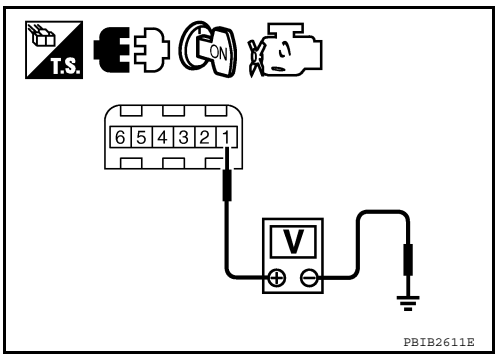
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.



2. Turn ignition switch ON.
3. Check voltage between APP sensor terminal 1 and ground with CONSULT-III or tester.



Voltage: Approximately 5V

OK or NG

OK >> GO TO 7.
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 1 and ECM terminal 91. Refer to wiring diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit.

4.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-III

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

ECM terminal	Sensor terminal
91	APP sensor terminal 1
47	Electric throttle control actuator terminal 2

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-86, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-17, "Throttle Valve Closed Position Learning".
3. Perform EC-17, "Idle Air Volume Learning".

>> **INSPECTION END**

7. 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 APP sensor terminal 5 and ECM terminal 83.
   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 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 98 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-174, "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-16, "Accelerator Pedal Released Position Learning".
3. Perform EC-17, "Throttle Valve Closed Position Learning".
4. Perform EC-17, "Idle Air Volume Learning".

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

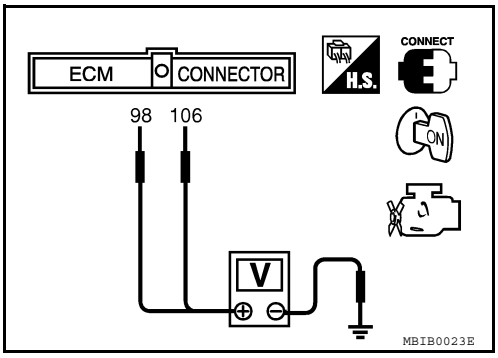
>> **INSPECTION END**

Component Inspection

INFOID:0000000005282136

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.65 - 0.87V
	Fully depressed	More than 4.3V
98 (Accelerator pedal position sensor 2)	Fully released	0.28 - 0.48V
	Fully depressed	More than 2.0V

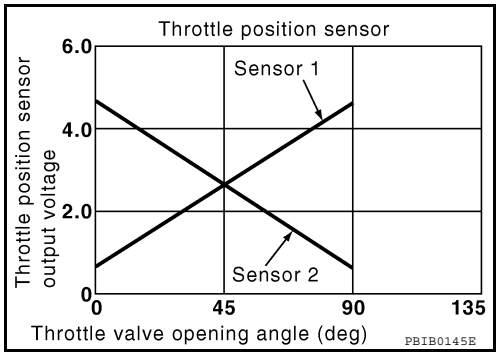
4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-16, "Accelerator Pedal Released Position Learning".
6. Perform EC-17, "Throttle Valve Closed Position Learning".
7. Perform EC-17, "Idle Air Volume Learning".

P2135 TP SENSOR

Component Description

INFOID:0000000005282137

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 the 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:0000000005282138

This self-diagnosis has the one trip detection logic.

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 (The TP sensor 1 or 2 circuit is open or shorted.) (The APP sensor 2 circuit is shorted). • Electric throttle control actuator (TP sensor 1 or 2) • Accelerator pedal position sensor (APP sensor 2)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL illuminates.

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:0000000005282139

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 let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-175, "Diagnosis Procedure".

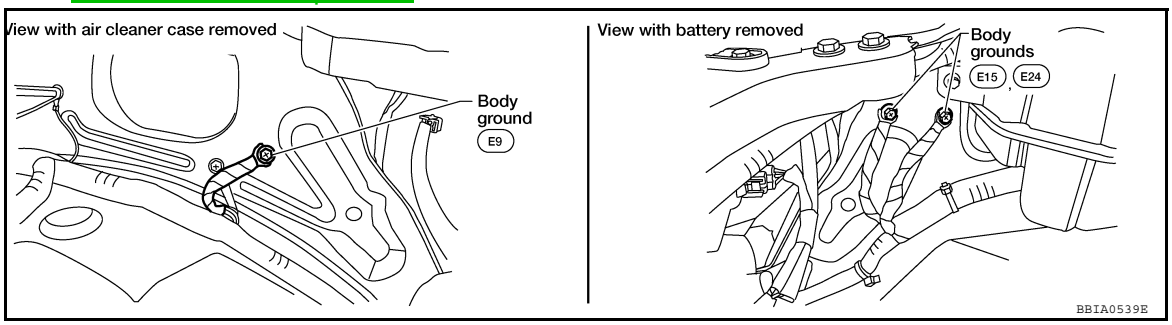
Diagnosis Procedure

INFOID:0000000005282140

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.

Refer to EC-66, "Ground Inspection".

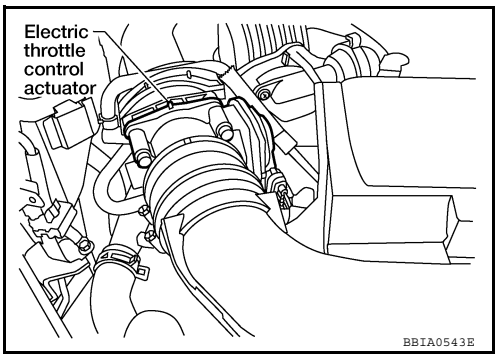


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

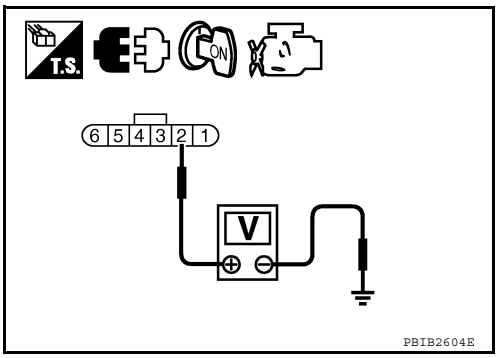
2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-1

1. Disconnect electric throttle control actuator harness connector.
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 7.
NG >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 2 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit.

4. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-III

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

ECM terminal	Sensor terminal
47	Electric throttle control actuator terminal 2
91	APP sensor terminal 1

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-174, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-16, "Accelerator Pedal Released Position Learning".
3. Perform EC-17, "Throttle Valve Closed Position Learning".
4. Perform EC-17, "Idle Air Volume Learning".

>> **INSPECTION END**

7. 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 66. 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 THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and electric throttle control actuator terminal 1, ECM terminal 69 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 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-178, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-17, "Throttle Valve Closed Position Learning".
3. Perform EC-17, "Idle Air Volume Learning".

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

>> **INSPECTION END**

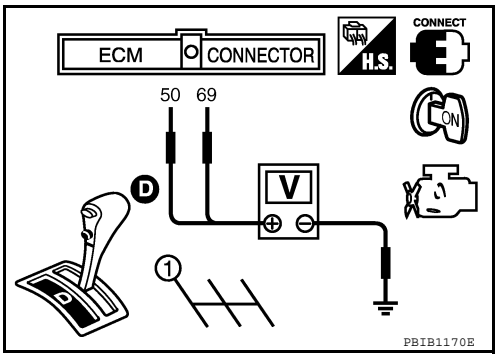
Component Inspection

INFOID:0000000005282141

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-17, "Throttle Valve Closed Position Learning".
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T), 1st position (M/T).
5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



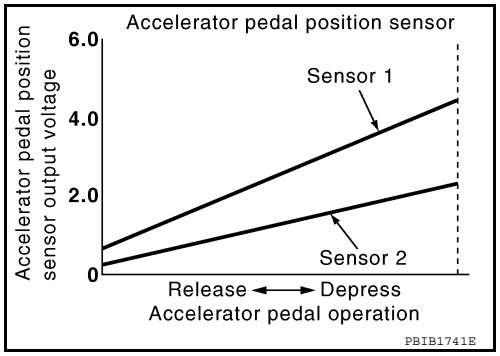
6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-17, "Throttle Valve Closed Position Learning".
8. Perform EC-17, "Idle Air Volume Learning".

P2138 APP SENSOR

Component Description

INFOID:0000000005282142

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.



On Board Diagnosis Logic

INFOID:0000000005282143

This self-diagnosis has the one trip detection logic.
NOTE:
If DTC P2138 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-132.

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 (The APP sensor 1 or 2 circuit is open or shorted.) (The TP sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 1 or 2) • Electric throttle control actuator (TP sensor 1 or 2)

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL illuminates.

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:0000000005282144

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10seconds 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 let it idle for 1 second.
2. Check DTC.
3. If DTC is detected, go to EC-179, "Diagnosis Procedure".

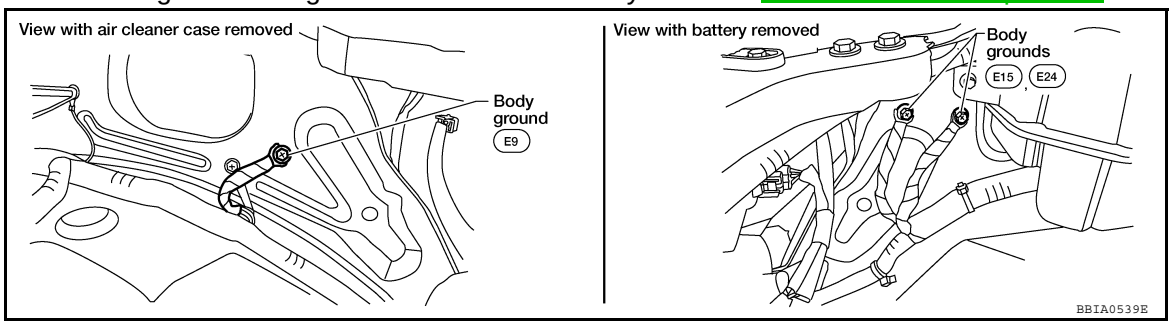
Diagnosis Procedure

INFOID:0000000005282145

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.

2. Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".

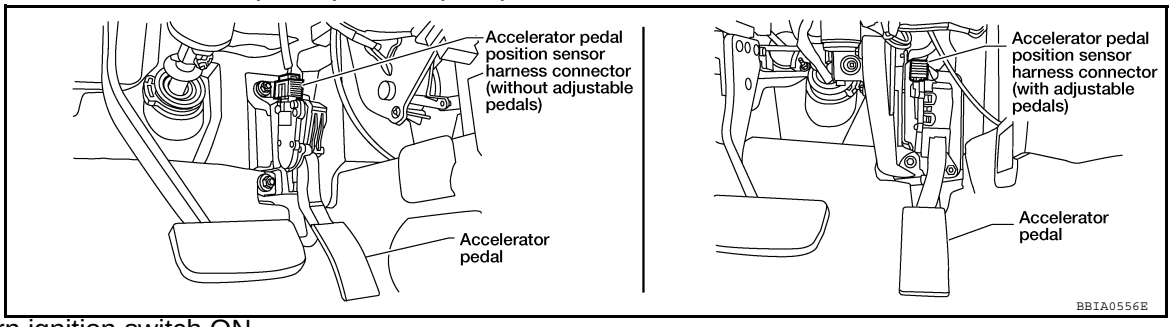


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

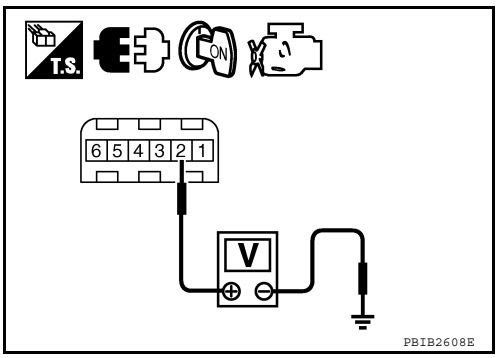
2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.



2. Turn ignition switch ON.
3. Check voltage between APP sensor terminals 2 and ground with CONSULT-III or tester.

Voltage: Approximately 5V



OK or NG

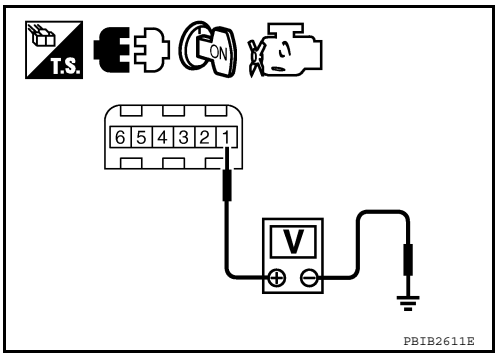
OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

Check voltage between APP sensor terminal 1 and ground with CONSULT-III or tester.

1.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 8.
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 1 and ECM terminal 91. Refer to wiring diagram.

Continuity should exist.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit.

5. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

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

ECM terminal	Sensor terminal
91	APP sensor terminal 1
47	Electric throttle control actuator terminal 2

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 THROTTLE POSITION SENSOR

Refer to EC-86, "Component Inspection".

OK or NG

OK >> GO TO 12.
NG >> GO TO 7.

7. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace electric throttle control actuator.
2. Perform EC-17, "Throttle Valve Closed Position Learning".
3. Perform EC-17, "Idle Air Volume Learning".

>> **INSPECTION END**

8. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminals 4 and ECM terminal 82, APP sensor terminal 5 and ECM terminal 83.
   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 APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 106 and APP sensor terminal 3, ECM terminal 98 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 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK APP SENSOR

Refer to EC-182, "Component Inspection".

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-16, "Accelerator Pedal Released Position Learning".
3. Perform EC-17, "Throttle Valve Closed Position Learning".
4. Perform EC-17, "Idle Air Volume Learning".

>> **INSPECTION END**

12. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

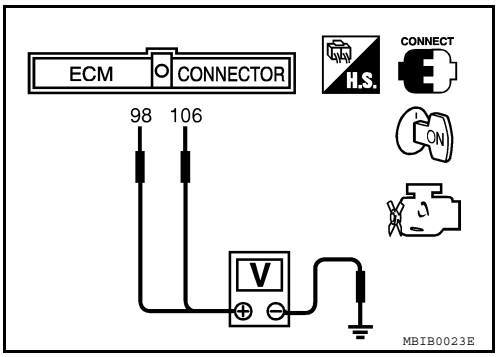
>> **INSPECTION END**

Component Inspection

INFOID:0000000005282146

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.65 - 0.87V
	Fully depressed	More than 4.3V
98 (Accelerator pedal position sensor 2)	Fully released	0.28 - 0.48V
	Fully depressed	More than 2.0V

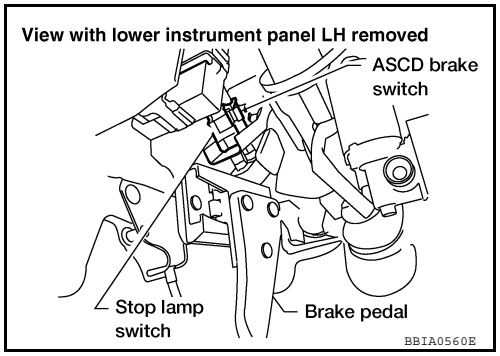
4. If NG, replace accelerator pedal assembly and go to next step.
5. Perform EC-16, "Accelerator Pedal Released Position Learning".
6. Perform EC-17, "Throttle Valve Closed Position Learning".
7. Perform EC-17, "Idle Air Volume Learning".

ASCD BRAKE SWITCH

Component Description

INFOID:0000000005282147

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal those two types input (ON/OFF signal).
Refer to EC-33, "System Description" for the ASCD function.



Diagnosis Procedure

INFOID:0000000005282148

A/T MODELS

1.CHECK OVERALL FUNCTION-I

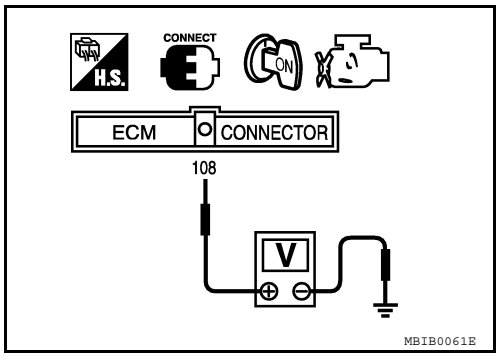
With CONSULT-III

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.

CONDITION	INDICATION
When brake pedal: Slightly depressed	OFF
When brake pedal: Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.



CONDITION	VOLTAGE
When brake pedal: Slightly depressed	Approximately 0V
When brake pedal: Fully released	Battery voltage

OK or NG

OK >> GO TO 2.
NG >> GO TO 3.

2.CHECK OVERALL FUNCTION-II

With CONSULT-III

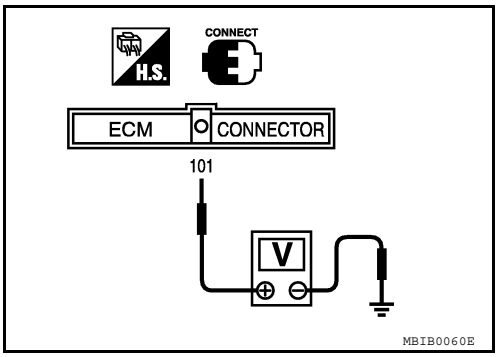
Check “BRAKE SW2” indication in “DATA MONITOR” mode.

CONDITION	INDICATION
When brake pedal: Fully released	OFF
When brake pedal: Slightly depressed	ON

Without CONSULT-III

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
When brake pedal: Fully released	Approximately 0V
When brake pedal: Slightly depressed	Battery voltage

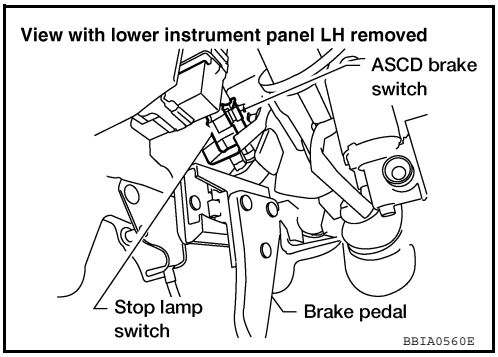


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

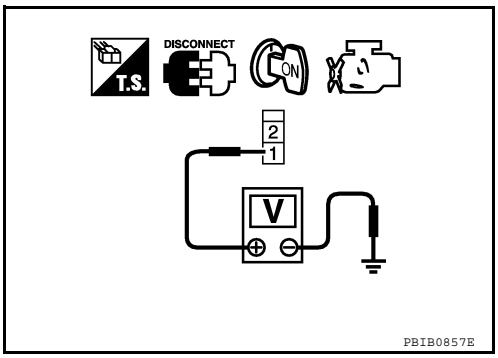
3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

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



4. Check voltage between ASCD brake switch 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.
- Fuse block (J/B) connector E160
- 10A fuse (No.12)
- Harness for open or short between ASCD brake switch and fuse

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

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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 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 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ASCD BRAKE SWITCH

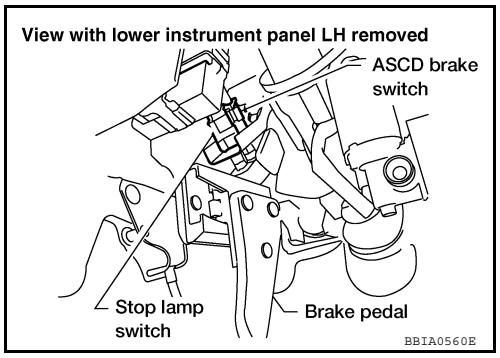
Refer to EC-189, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> Replace ASCD brake switch.

7. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.

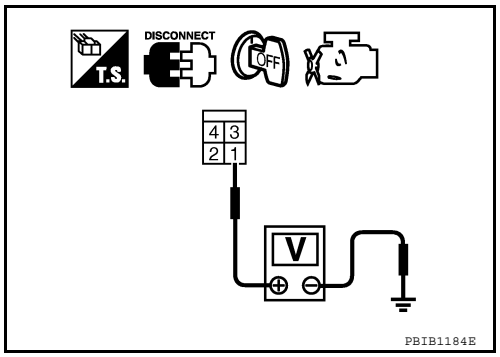


3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT -III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.



8. DETECT MALFUNCTIONING PART

Check the following.
- Fuse block (J/B) connector E160
- 10A fuse (No.20)
- 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.

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

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 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 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK STOP LAMP SWITCH

Refer to EC-189, "Component Inspection".

OK or NG

OK >> GO TO 11.
NG >> Replace stop lamp switch.

11. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

>> **INSPECTION END**

M/T MODELS

1. CHECK OVERALL FUNCTION-I

With CONSULT-III

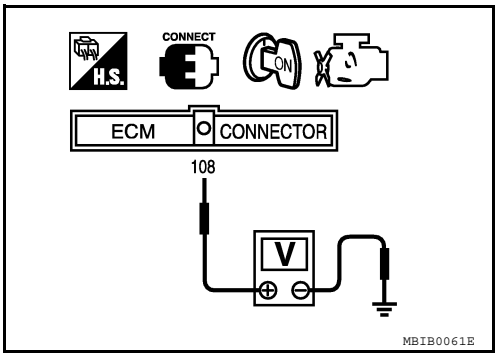
1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-III.
3. Check “BRAKE SW1” indication under the following conditions.

CONDITION	INDICATION
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON

Without CONSULT-III

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage



OK or NG

OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-III

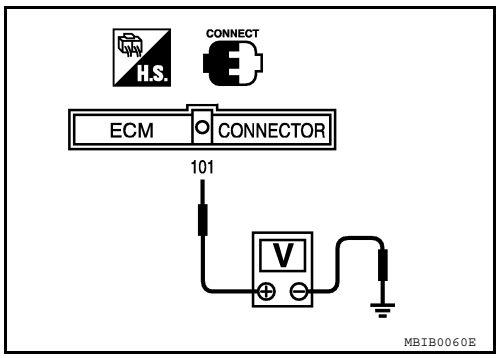
Check “BRAKE SW2” indication in “DATA MONITOR” mode.

CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON

Without CONSULT-III

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

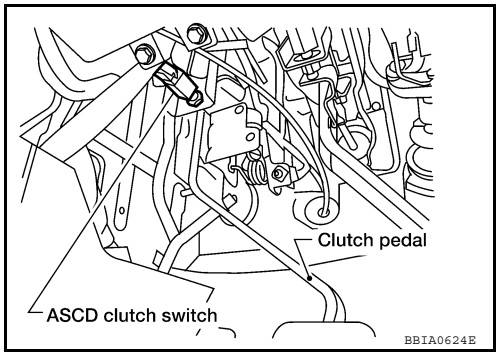


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 10.

3. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

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

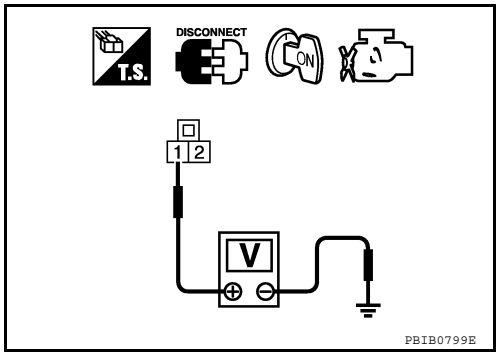


4. Check voltage between ASCD clutch switch terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

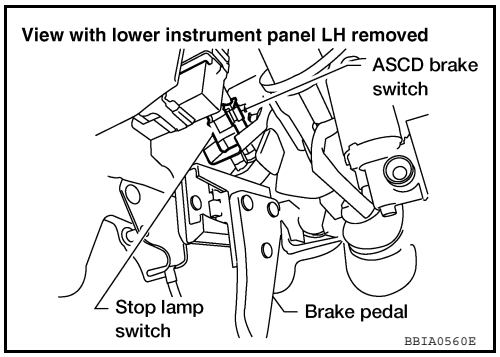
OK or NG

OK >> GO TO 8.
NG >> GO TO 4.



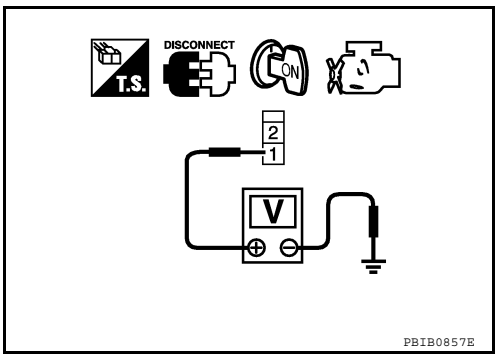
4. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

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



4. Check voltage between ASCD brake switch terminal 1 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.
- Fuse block (J/B) connector E160
- 10A fuse (No.12)
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground 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 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH

Refer to EC-189, "Component Inspection".

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD brake switch.

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

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 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 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ASCD CLUTCH SWITCH

Refer to EC-189, "Component Inspection".

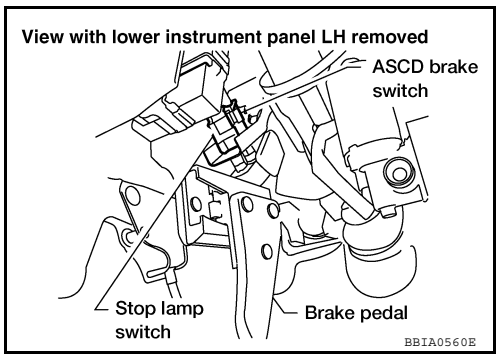
OK or NG

OK >> GO TO 14.
NG >> Replace ASCD clutch switch.

10. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

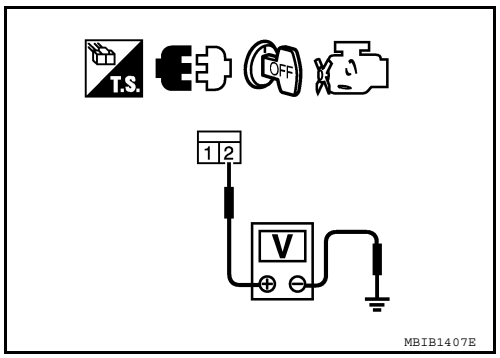
1. Turn ignition switch OFF.

2. Disconnect stop lamp switch harness connector.



3. Check voltage between stop lamp switch terminal 2 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.
- Fuse block (J/B) connector E160
- 10A fuse (No.20)
- 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.

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

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 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 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH

Refer to EC-189, "Component Inspection".

OK or NG

OK >> GO TO 14.
NG >> Replace stop lamp switch.

14. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

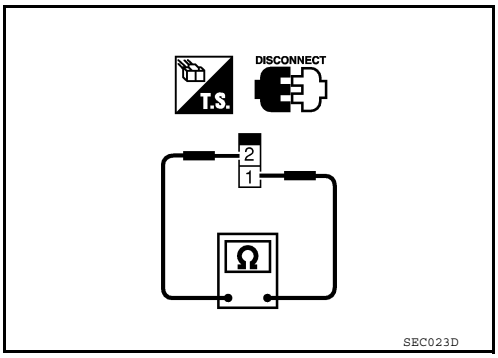
>> **INSPECTION END**

Component Inspection

INFOID:0000000005282149

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check harness continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

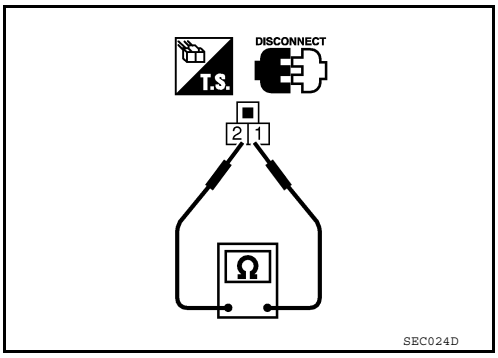


Condition	Continuity
When brake pedal: Fully released.	Should exist.
When brake pedal: Slightly depressed.	Should not exist.

If NG, adjust ASCD brake switch installation, refer to BR-17, "Inspection and Adjustment", and perform step 3 again.

ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check harness continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.



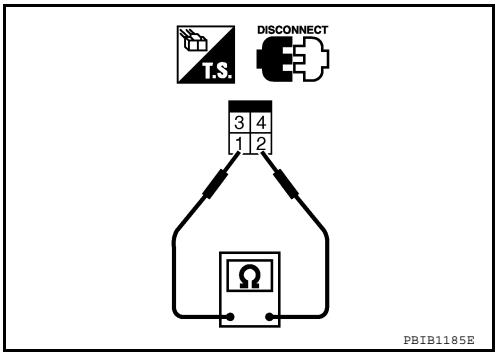
Condition	Continuity
Clutch pedal: Fully released	Should exist
Clutch pedal: Slightly depressed	Should not exist

If NG, adjust ASCD clutch switch installation, refer to CL-7, "On-Vehicle Inspection and Adjustment", and perform step 3 again.

STOP LAMP SWITCH

A/T models

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check harness continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
When brake pedal: Fully released.	Should not exist.
When brake pedal: Slightly depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to BR-17, "Inspection and Adjustment", and perform step 3 again.

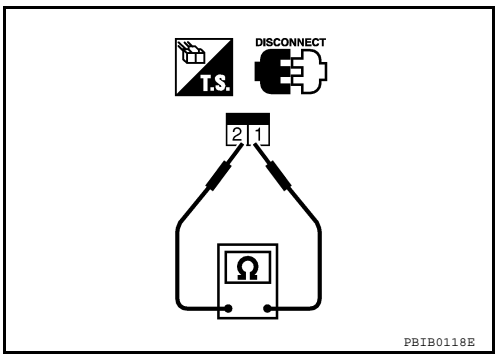
M/T models

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.

3. Check harness continuity between stop lamp switch terminals 1 and 2 under the following conditions.

Condition	Continuity
When brake pedal: Fully released.	Should not exist.
When brake pedal: Slightly depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to BR-17, "Inspection and Adjustment", and perform step 3 again.



ASCD INDICATOR

Component Description

INFOID:0000000005282150

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 indicated that ASCD system is ready for operation.
SET indicator illuminates when the 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 the ASCD setting.

SET indicator remains lit during ASCD control.
Refer to EC-33, "System Description" for the ASCD function.

Diagnosis Procedure

INFOID:0000000005282151

1.CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	• Ignition switch: ON	MAIN switch: pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • When vehicle speed is 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.

OK or NG

OK >> GO TO 3.
NG >> Perform trouble diagnoses for DTC U1000, U1001. Refer to EC-67.

3.CHECK COMBINATION METER FUNCTION

Refer to MWI-3, "Work Flow".

OK or NG

OK >> GO TO 4.
NG >> Go to MWI-17, "WARNING LAMPS/INDICATOR LAMPS : System Diagram".

4.CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

>> **INSPECTION END**

ELECTRICAL LOAD SIGNAL

Description

INFOID:0000000005282152

The electrical load signal (Headlamp switch signal, etc.) is transferred through the CAN communication line from BCM to ECM via IPDM E/R.

Diagnosis Procedure

INFOID:0000000005282153

1. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

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.

Condition	Indication
Rear window defogger switch: ON	ON
Rear window defogger 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” indication under the following conditions.

Condition	Indication
Lighting switch: ON at 2nd position	ON
Lighting switch: OFF	OFF

OK or NG

OK >> GO TO 3.
NG >> GO TO 5.

3. CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

Select “HEATER FAN SW” and check indication under the following conditions.

Condition	Indication
Heater fan control switch: ON	ON
Heater fan control switch: OFF	OFF

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 6.

4. CHECK REAR WINDOW DEFOGGER SYSTEM

Refer to DEF-2, "Repair Work Flow".

>> **INSPECTION END**

5. CHECK HEADLAMP SYSTEM

Refer to EXL-4, "Work Flow".

>> **INSPECTION END**

6. CHECK HEATER FAN CONTROL SYSTEM

Refer to HAC-53, "Symptom Matrix Chart".

>> **INSPECTION END**

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Description

INFOID:0000000005282154

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)		
Wheel sensor	Vehicle speed*2		

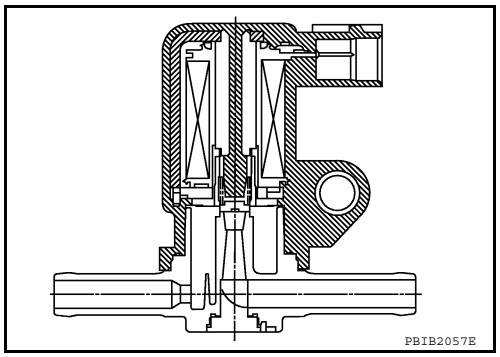
*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

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

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.

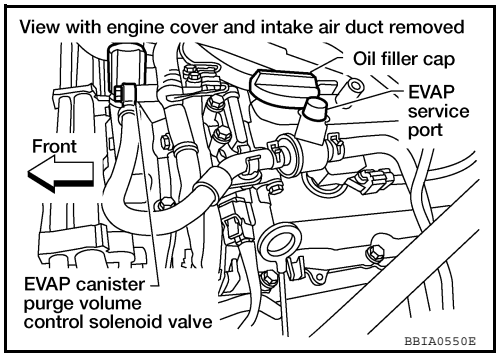


Diagnosis Procedure

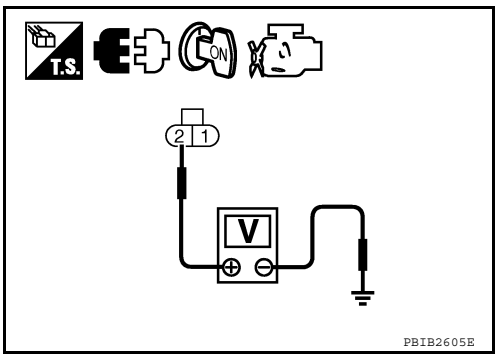
INFOID:0000000005282155

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 voltage between EVAP canister purge volume control solenoid valve 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 E2, F32
- 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 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 45 and EVAP canister purge volume control solenoid valve 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 (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-197, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace EVAP canister purge volume control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

>> **INSPECTION END**

Component Inspection

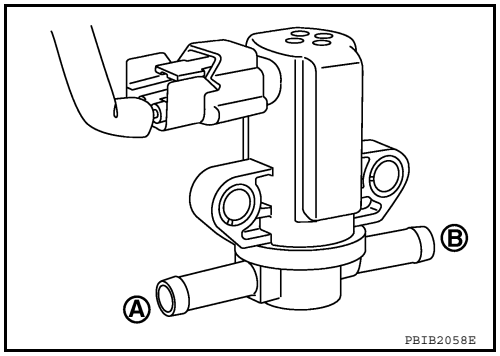
INFOID:0000000005282156

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.

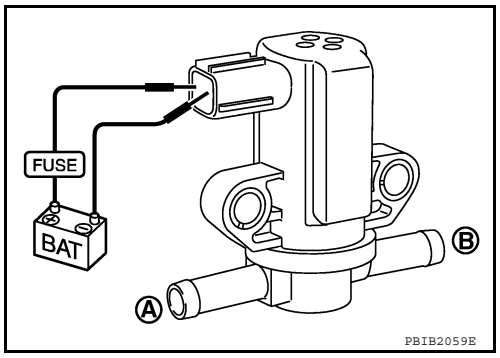
Condition (PURG VOL CONT/V value)	Air passage continuity between (A) and (B)
100%	Yes
0%	No



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

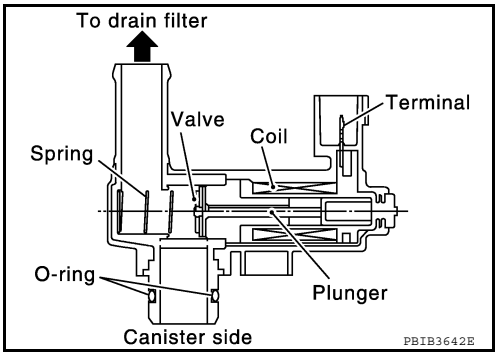


EVAP CANISTER VENT CONTROL VALVE

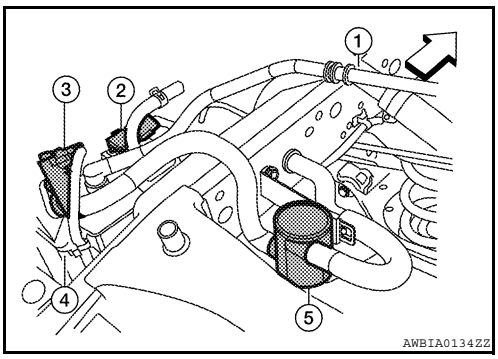
Component Description

INFOID:0000000005684599

The EVAP canister vent control valve (3) is located on the EVAP canister (4) 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.



- Fuel filler pipe (top of frame view) (1)
- EVAP control system pressure sensor (2)
- Drain filter (5)
- ⇦: Vehicle front



Diagnosis Procedure

INFOID:0000000005684600

1.INSPECTION START

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

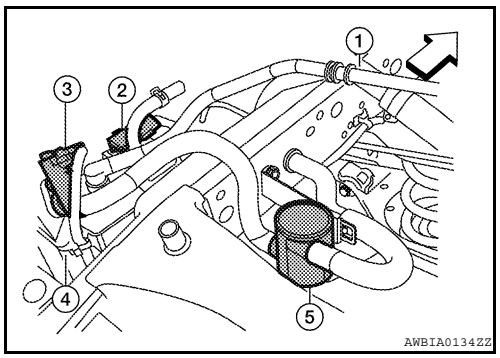
OK >> GO TO 7.
NG >> GO TO 3.

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.
- Fuel filler pipe (top of frame view) (1)
- EVAP control system pressure sensor (2)
- EVAP canister (4)
- Drain filter (5)
- ⇦: Vehicle front

3. Turn ignition switch ON.

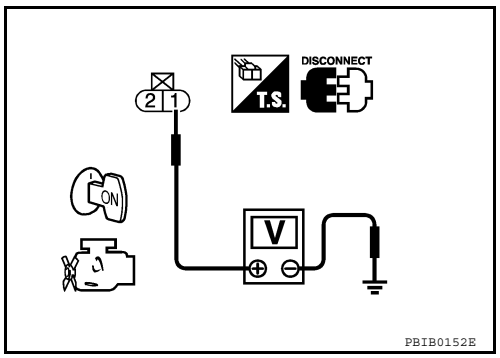


4. Check voltage between EVAP canister vent control valve terminal 1 and ground with CONSULT-III or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E41, C1
- Harness for open or short between EVAP canister vent control valve and IPDM E/R

>> Repair 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 117 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 C1, E41
- 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-200, "Component Inspection".

OK or NG

OK >> GO TO 9.
NG >> Replace drain filter.

9. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-200, "Component Inspection".

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP canister vent control valve.

10. CHECK INTERMITTENT INCIDENT

Refer to GI-38, "Intermittent Incident".

>> **INSPECTION END**

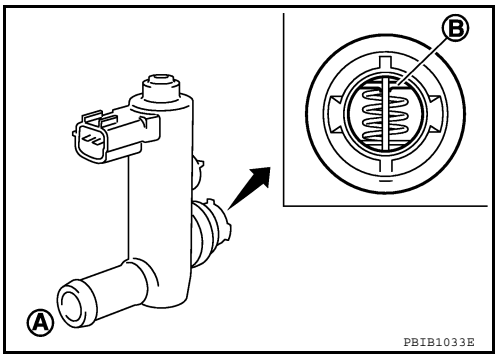
Component Inspection

INFOID:0000000005684601

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.
   Check new O-ring is installed properly.



Condition VENT CONTROL/V	Air passage continuity between (A) and (B)
ON	No
OFF	Yes

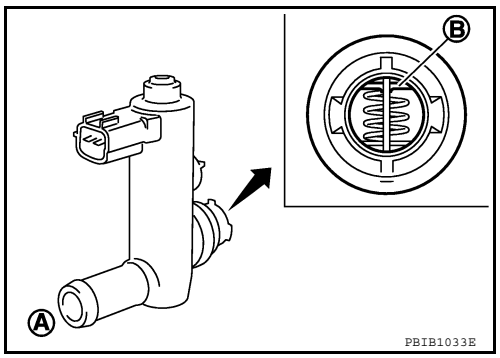
Operation takes less than 1 second.
If NG, go to next step.

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.

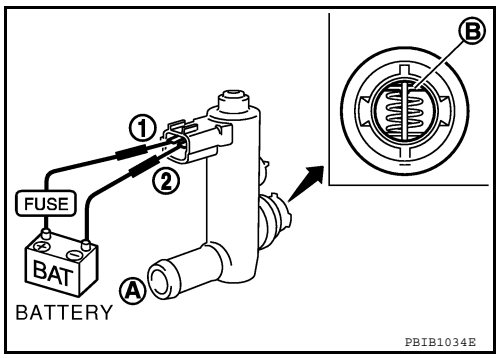
Without CONSULT-III

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.
Check new O-ring is installed properly.



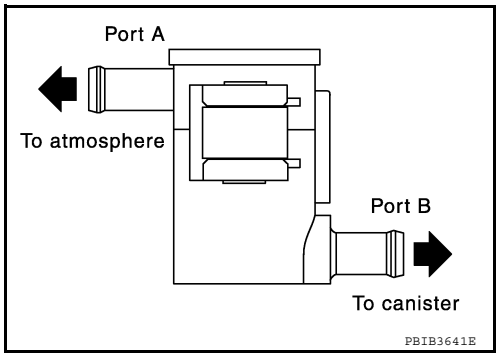
Condition	Air passage continuity between (A) and (B)
12V direct current supply between terminals 1 and 2	No
OFF	Yes

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.

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.

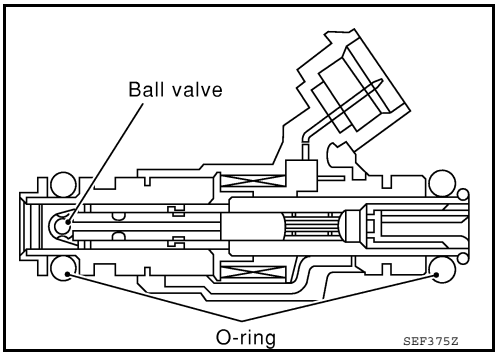


FUEL INJECTOR

Component Description

INFOID:0000000005282160

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector, 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.



Diagnosis Procedure

INFOID:0000000005282161

1.INSPECTION START

Turn ignition switch to START.
Are any cylinders ignited?

Yes or No

Yes (With CONSULT-III)>>GO TO 2.
Yes (Without CONSULT-III)>>GO TO 3.
No >> GO TO 7.

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.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

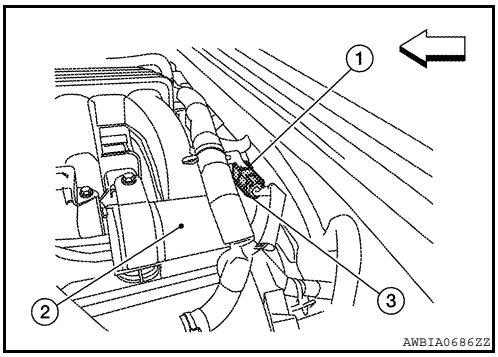
3.CHECK FUNCTION OF FUEL INJECTOR-I

Without CONSULT-III

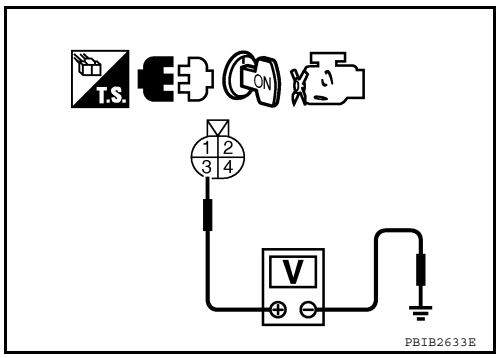
1. Stop engine.
2. Disconnect harness connector F44 (3), F201 (1)

2 : Vacuum tank
⇦ : Front

3. Turn ignition switch ON.



4. Check voltage between harness connector F44 terminal 3 and ground with CONSULT-III or tester.



Voltage: Battery voltage

5. Turn ignition switch OFF.
6. Disconnect ECM harness connector.
7. Check harness continuity between harness connector F44 and ECM as follows.
Refer to Wiring Diagram.

Cylinder	Harness connector F44 terminal	ECM terminal
1	2	23
3	1	22
5	4	21

Continuity should exist.

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

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

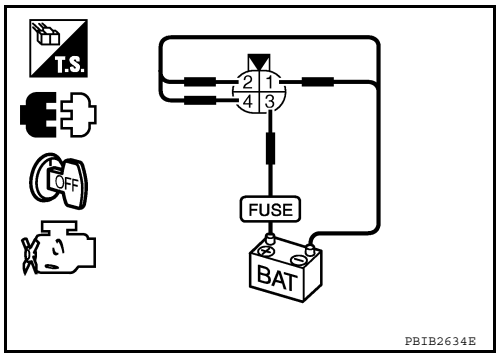
4. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E2, F32
- IPDM E/R harness connector E119
- 15 A fuse (No.55)
- Harness for open or short between harness connector F44 and fuse
- Harness for open or short between harness connector F201 and fuel injector

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

5. CHECK FUNCTION OF FUEL INJECTOR-II

Provide battery voltage between harness connector F201 as follows and then interrupt it. Listen to each fuel injector operating sound.



Cylinder	Harness connector F201 terminal	
	(+)	(–)
1	3	2
3	3	1
5	3	4

Operating sound should exist.

OK or NG

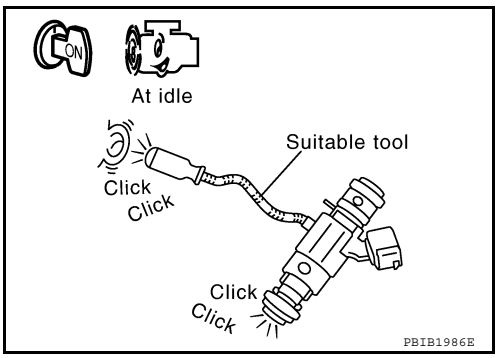
OK >> GO TO 6.
NG >> GO TO 7.

6. CHECK FUNCTION OF FUEL INJECTOR-III

1. Reconnect all harness connector disconnected.
2. Start engine.

3. Listen to fuel injectors No. 2, No. 4, No.6 operating sound.

Clicking noise should exist.

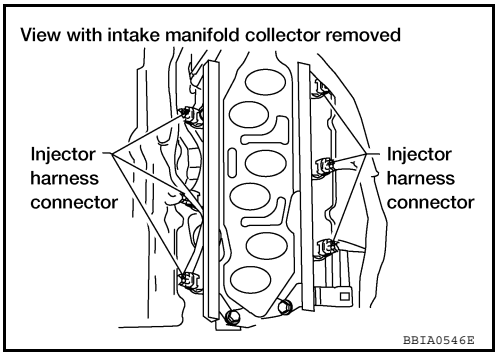


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

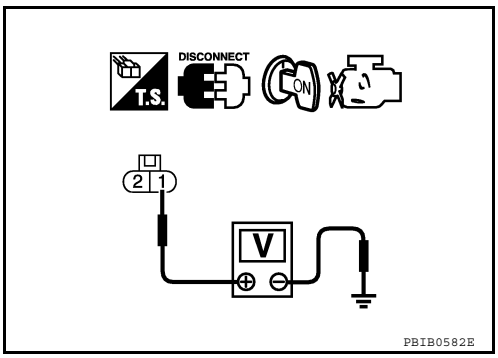
7. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector 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 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E2, F32
- Harness connectors F44, F201
- IPDM E/R harness connector E119
- 15 A fuse (No.55)
- Harness for open or short between fuel injector and fuse

>> Repair harness or connectors.

9. 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 21, 22, 23, 40, 41, 42. 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 11.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F201, F44
- Harness for open or short between fuel injector and ECM

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

11. CHECK FUEL INJECTOR

Refer to EC-205, "Component Inspection".

OK or NG

OK >> GO TO 12.
NG >> Replace fuel injector.

12. CHECK INTERMITTENT INCIDENT

Refer to GI-38, "Intermittent Incident".

>> **INSPECTION END**

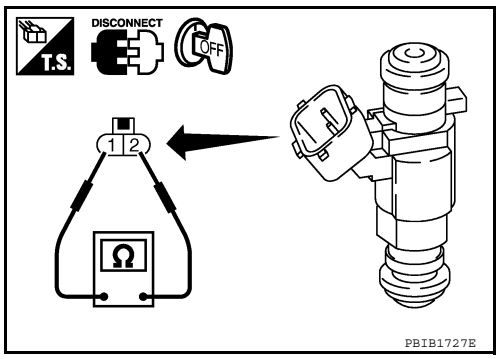
Component Inspection

INFOID:0000000005282162

FUEL INJECTOR

1. Disconnect 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)]



FUEL PUMP

Description

INFOID:0000000005282163

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*		

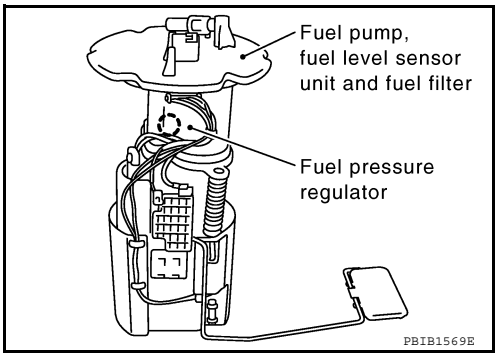
*: ECM determines the start signal status by the signals of engine speed and battery voltage.

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 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 DESCRIPTION

A turbine type design fuel pump is used in the fuel tank.

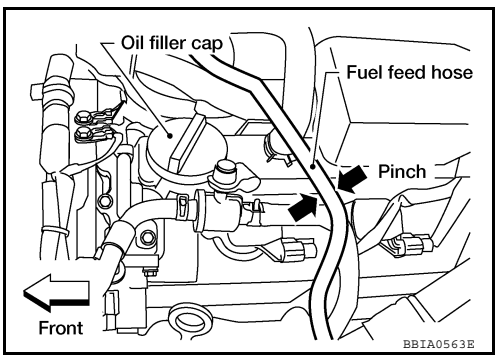


Diagnosis Procedure

INFOID:0000000005282164

1. CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.
   Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.



OK or NG

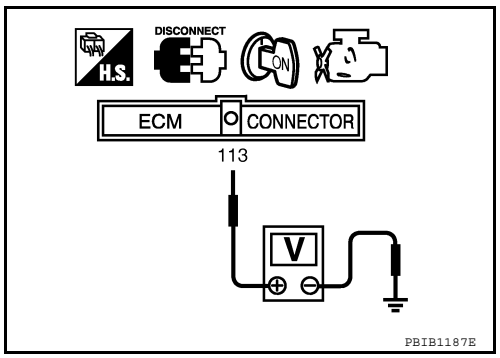
OK >> **INSPECTION END**
NG >> GO TO 2.

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 113 and ground with CONSULT-III or tester.

Voltage: Battery voltage



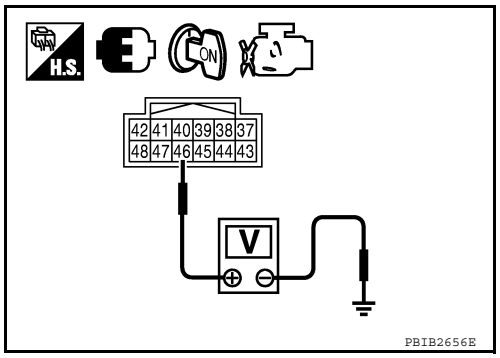
OK or NG

OK >> GO TO 5.
NG >> GO TO 3.

3. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-II

Check voltage between IPDM E/R terminal 46 and ground with CONSULT-III or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 12.

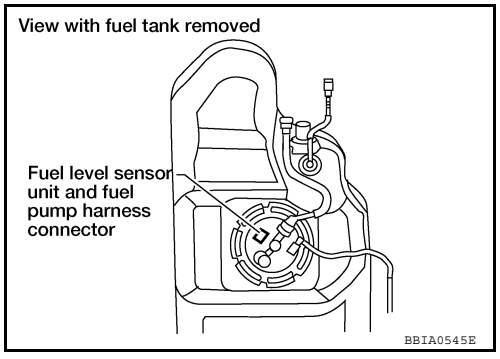
4. DETECT MALFUNCTIONING PART

Check harness for open or short between IPDM E/R and ECM

>> Repair harness or connectors.

5. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-III

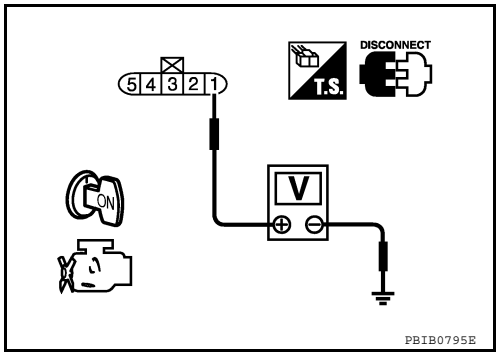
1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect “fuel level sensor unit and fuel pump” harness connector.
4. Turn ignition switch ON.



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.

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



OK or NG

OK >> GO TO 9.
NG >> GO TO 6.

6. CHECK 15A FUSE

1. Turn ignition switch OFF.

2. Disconnect 15A fuse (No.48).
3. Check 15A fuse.

OK or NG

OK >> GO TO 7.
NG >> Replace fuse.

7. CHECK FUEL PUMP POWER SUPPLY CURCUIT-IV

1. Disconnect IPDM E/R harness connector E119.
2. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 1 and IPDM E/R terminal 13.
   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 12.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors C1, E41
- Harness for open or short between “fuel level sensor unit and fuel pump” and IPDM E/R

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

9. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

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 ground.

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors C1, E41
- Harness for open or short between “fuel level sensor unit and fuel pump” and ground

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

11. CHECK FUEL PUMP

Refer to EC-209, "Component Inspection".

OK or NG

OK >> GO TO 12.
NG >> Replace fuel pump.

12. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

OK or NG

OK >> Replace IPDM E/R.
NG >> Repair or replace harness or connectors.

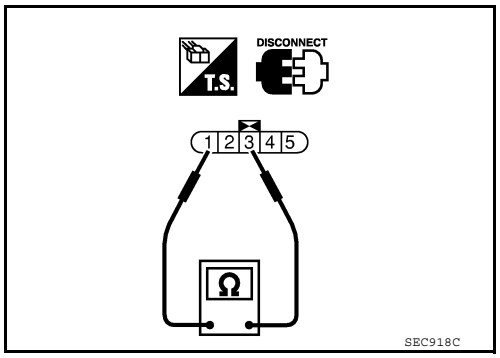
Component Inspection

INFOID:0000000005282165

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)]

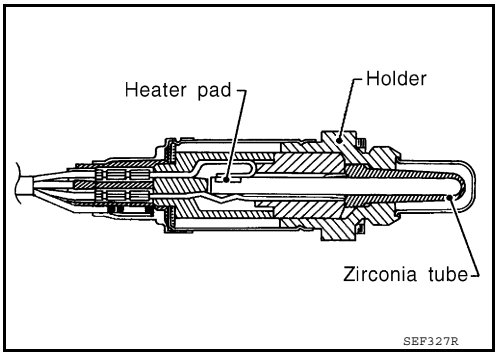


HO2S2

Component Description

INFOID:0000000005282166

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas on each bank.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



Diagnosis Procedure

INFOID:0000000005282167

1.CHECK HEATED OXYGEN SENSOR 2 FUNCTION-I

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

ECM		Ground	Condition	Voltage
Connector	Terminal			
F54	74 [HO2S2 (bank 1) signal]	Ground	Revving up to 4,000 rpm under no load at least 10 times	The voltage does not remain in the range of 0.2 - 0.4 V.
	55 [HO2S2 (bank 2) signal]			

Is the inspection result normal?

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

2.CHECK HEATED OXYGEN SENSOR 2 FUNCTION-II

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

ECM		Ground	Condition	Voltage
Connector	Terminal			
F54	74 [HO2S2 (bank 1) signal]	Ground	Keeping engine at idle for 10 minutes	The voltage does not remain in the range of 0.2 - 0.4 V.
	55 [HO2S2 (bank 2) signal]			

Is the inspection result normal?

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

3.CHECK HEATED OXYGEN SENSOR 2 FUNCTION-III

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

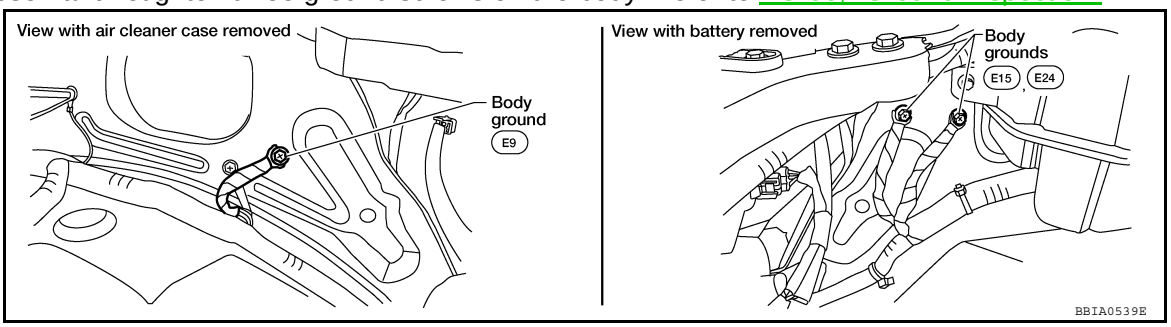
ECM		Ground	Condition	Voltage
Connector	Terminal			
F54	74 [HO2S2 (bank 1) signal]	Ground	Coasting from 80 km/h (50 MPH) in D position	The voltage does not remain in the range of 0.2 - 0.4 V.
	55 [HO2S2 (bank 2) signal]			

Is the inspection result normal?

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

4. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".

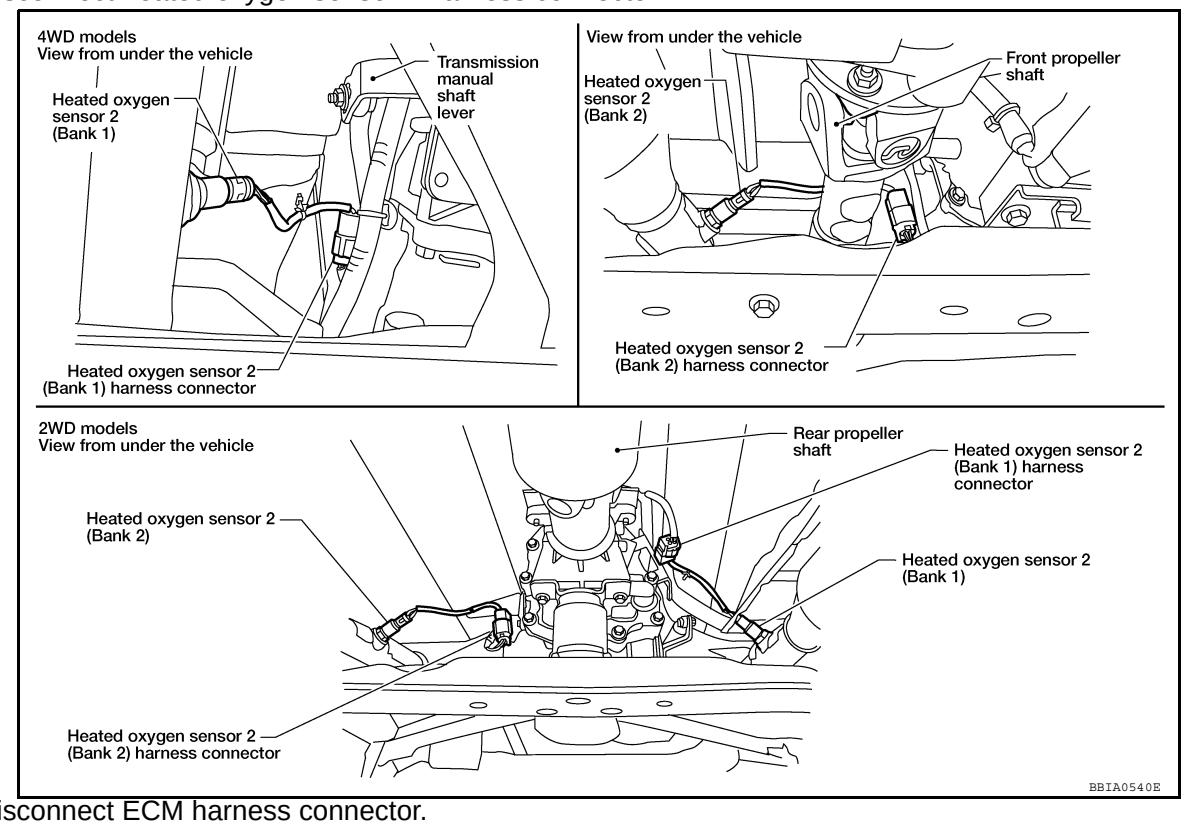


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

5. 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 harness continuity between HO2S2 terminal 4 and ECM terminal 78.

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.

6.CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal and HO2S2 terminal as follows.
Refer to Wiring Diagram.

Terminals		Bank
ECM	Sensor	
74	1	1
55	1	2

Continuity should exist.

2. Check harness continuity between the following terminals and ground.
Refer to Wiring Diagram.

Terminals		Bank
ECM	Sensor	
74	1	1
55	1	2

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.

7.CHECK HEATED OXYGEN SENSOR 2

Refer to EC-212, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace malfunctioning heated oxygen sensor 2.

8.CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

>> **INSPECTION END**

Component Inspection

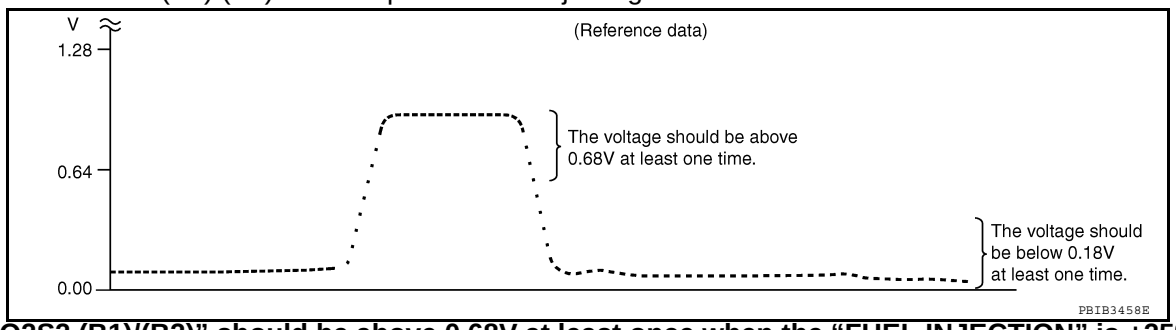
INFOID:0000000005282168

HEATED OXYGEN SENSOR 2

With CONSULT-III

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

6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)/(B2)” as the monitor item with CONSULT-III.
7. Check “HO2S2 (B1)/(B2)” at idle speed when adjusting “FUEL INJECTION” to ±25%.

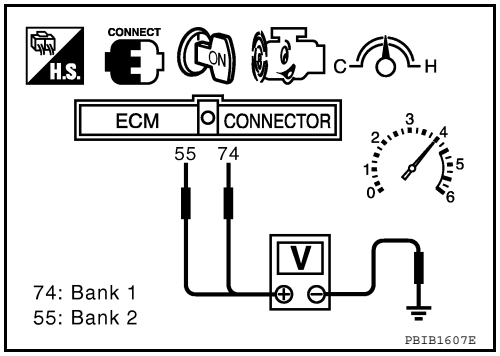


“HO2S2 (B1)/(B2)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)/(B2)” should be below 0.18V at least once when the “FUEL INJECTION” is −25%.

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 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 74 [HO2S2 (B1) signal] or 55 [HO2S2 (B2) 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 0.68 V and below 0.18 V at least once during this procedure.
   If the voltage can be confirmed at step 6, step 7 is not necessary.



7. Keep vehicle at 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), 5th gear position (M/T).
   The voltage should be above 0.68 V and below 0.18 V 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 and approved anti-seize lubricant.**

HO2S2 HEATER

Description

INFOID:0000000005282169

SYSTEM DESCRIPTION

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

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

OPERATION

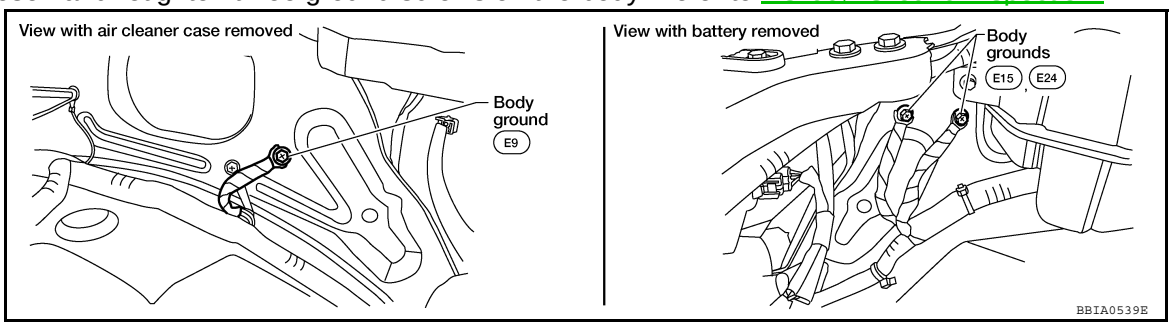
Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,600	OFF
Below 3,600 rpm after the following conditions are met. • Engine: After warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

Diagnosis Procedure

INFOID:0000000005282170

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".

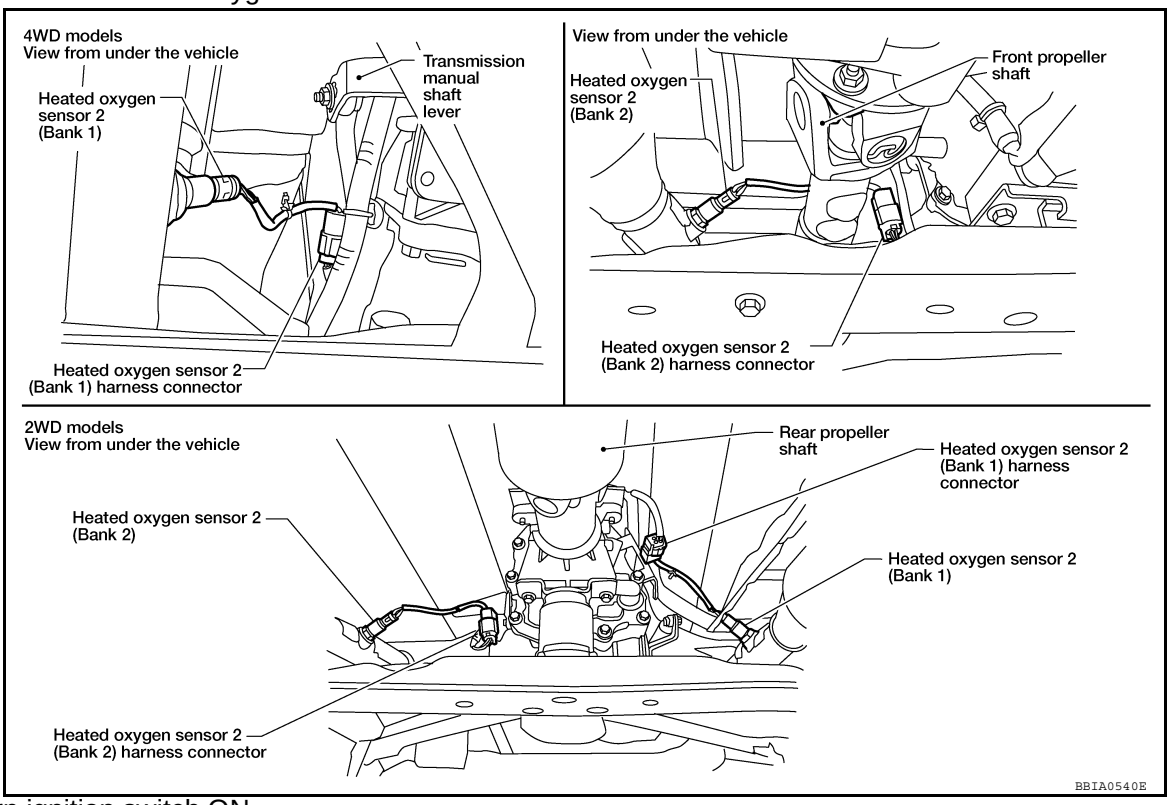


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

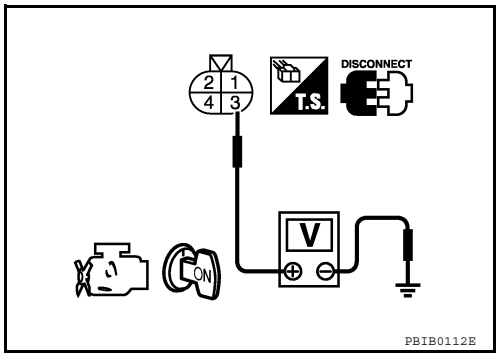
2.CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 2 harness connector.



2. Turn ignition switch ON.
3. Check voltage between HO2S2 terminal 3 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 E2, F32
- IPDM E/R harness connector E119
- 15A fuse (No.54)
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair 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 and HO2S2 terminal as follows. Refer to Wiring Diagram.

Terminals		Bank
ECM	Sensor	
25	2	1
6	2	2

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-216, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace malfunctioning heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

>> **INSPECTION END**

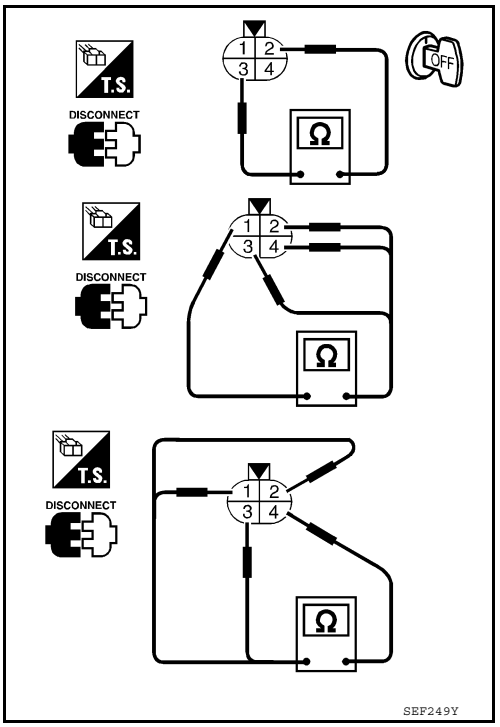
Component Inspection

INFOID:0000000005282171

HEATED OXYGEN SENSOR 2 HEATER

1. Check resistance between HO2S2 terminals as follows.

Terminal No.	Resistance
2 and 3	9.9 - 13.3 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:

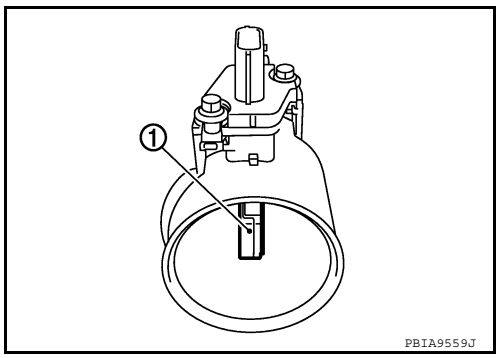
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

IAT SENSOR

Component Description

INFOID:0000000005282172

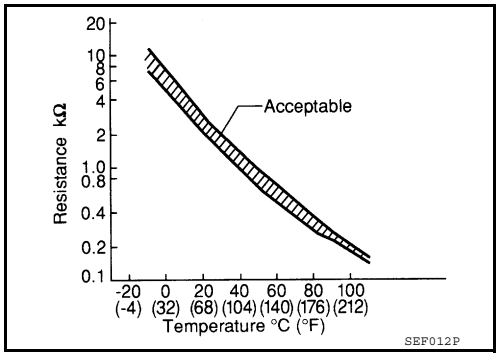
The intake air temperature sensor is built-into mass air flow sensor (1). The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response 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 34 (Intake air temperature sensor) and ground.



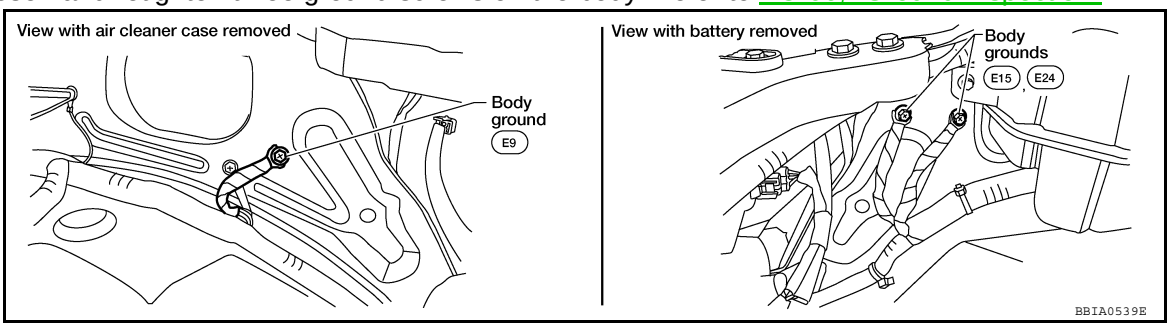
CAUTION:
Never use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

Diagnosis Procedure

INFOID:0000000005282173

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".

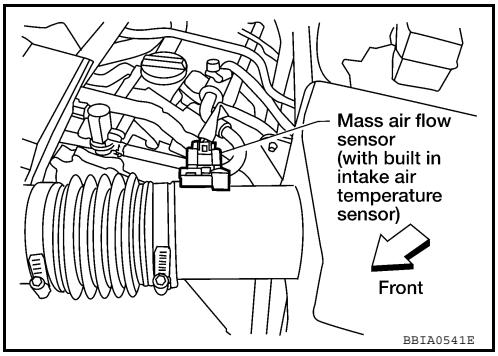


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

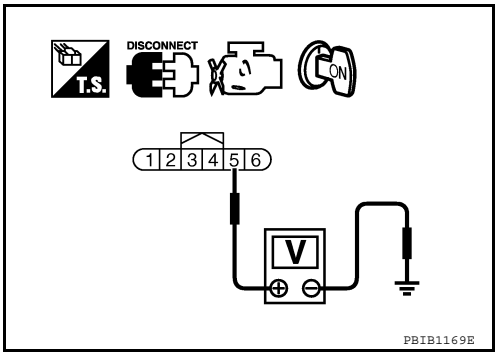
2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (intake air temperature sensor is built-into) harness connector.
2. Turn ignition switch ON.



3. Check voltage between mass air flow sensor terminal 5 and ground.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair 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 67. 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-218, "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 GI-34, "Work Flow".

>> **INSPECTION END**

Component Inspection

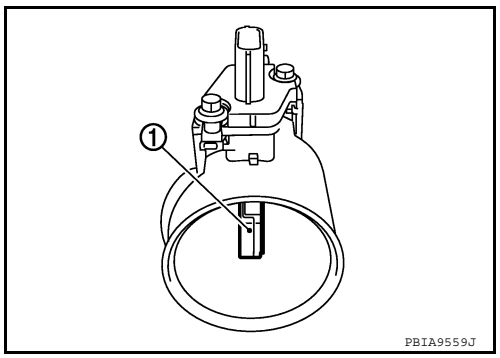
INFOID:0000000005282174

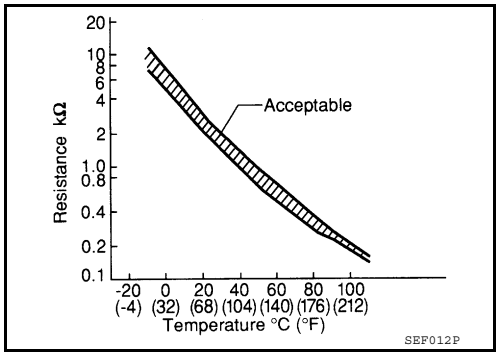
INTAKE AIR TEMPERATURE SENSOR

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).





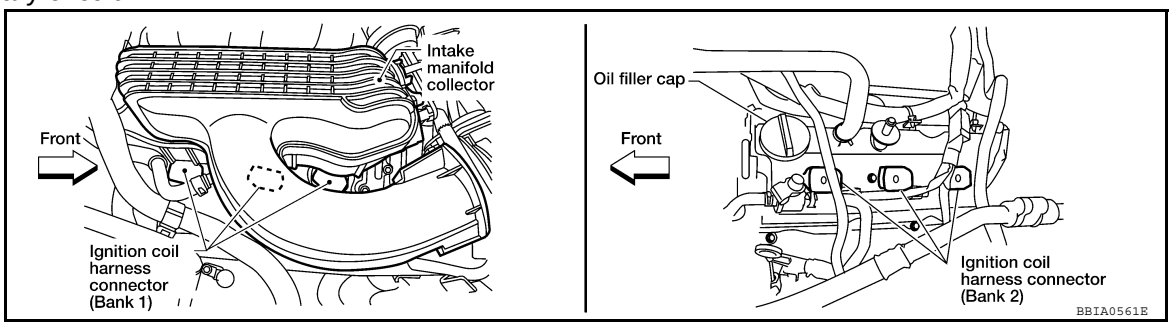
IGNITION SIGNAL

Component Description

INFOID:0000000005282175

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 primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.



Diagnosis Procedure

INFOID:0000000005282176

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. Check that each circuit produces a momentary engine speed drop.

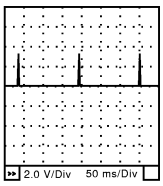
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 10.

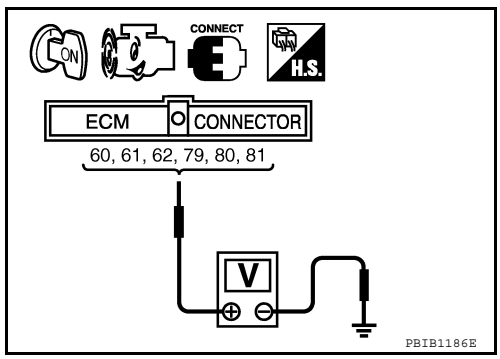
3.CHECK OVERALL FUNCTION

Without CONSULT-III

1. Let engine idle.
2. Read the voltage signal between ECM terminals 60, 61, 62, 79, 80, 81 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.



SEC986C



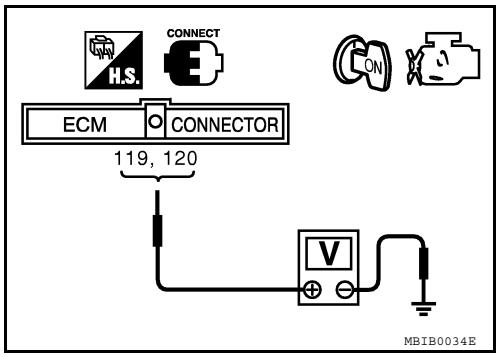
OK or NG

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 terminals 119, 120 and ground with CONSULT-III or tester.

Voltage: Battery voltage

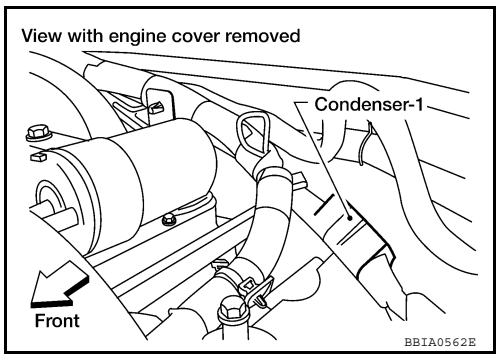


OK or NG

OK >> GO TO 5.
NG >> Go to EC-63, "Diagnosis Procedure".

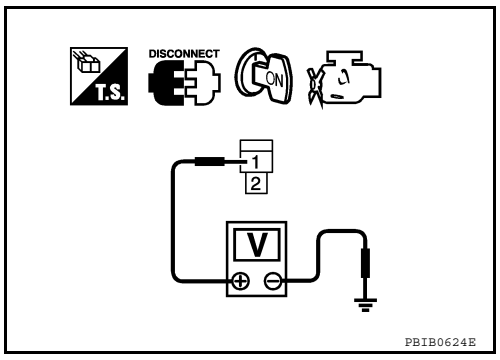
5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser-1 harness connector.
3. Turn ignition switch ON.



4. Check voltage between condenser-1 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 E119.
3. Check harness continuity between IPDM E/R terminal 3 and condenser-1 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 17.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E2, F32
- Harness for open or short between condenser-1 and IPDM E/R

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

8. CHECK CONDENSER-1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between condenser-1 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 power in harness or connectors.

9. CHECK CONDENSER-1

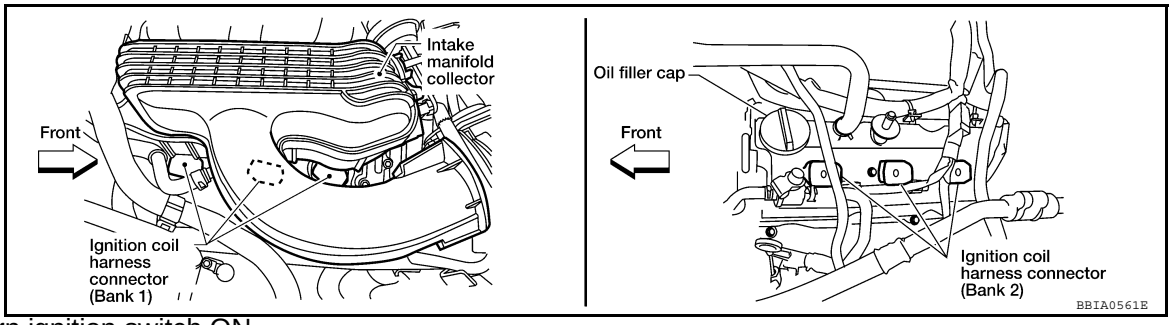
Refer to EC-223, "Component Inspection".

OK or NG

OK >> GO TO 10.
NG >> Replace condenser-1.

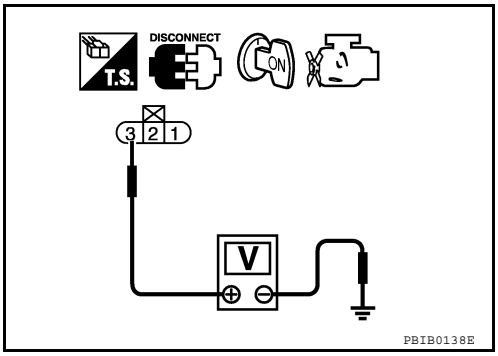
10. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect ignition coil 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 connectors F26, F225
- Harness for open or short between ignition coil and harness connector F32

>> 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 14.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F225, F26
- Harness for open or short between ignition coil and ground

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

14. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 60, 61, 62, 79, 80, 81 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 16.
NG >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors F26, F225
- Harness for open or short between ignition coil and ECM

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

16. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-223, "Component Inspection".

OK or NG

OK >> GO TO 17.
NG >> Replace ignition coil with power transistor.

17. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

>> **INSPECTION END**

Component Inspection

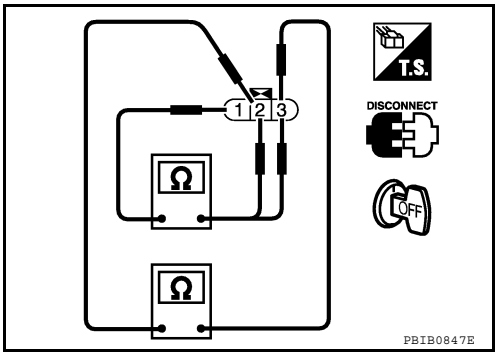
INFOID:0000000005282177

IGNITION COIL WITH POWER TRANSISTOR

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

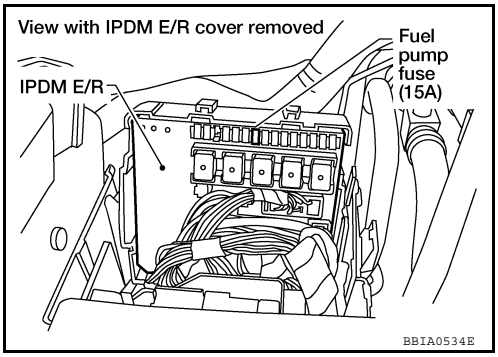
1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.

3. Check resistance between ignition coil terminals as follows.

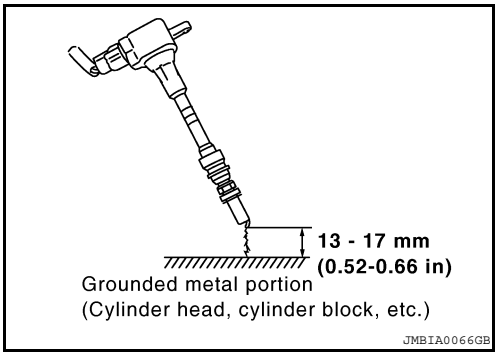


Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 and 2	Except 0 or ∞
1 and 3	Except 0
2 and 3	

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 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.
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 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 five 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 three seconds, and check whether spark is generated between the spark plug and the grounded part.



Spark should be generated.

CAUTION:

- **Never place to the spark plug and the ignition coil within 50cm (19.7 in) each other. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.**
- **It might damage the ignition coil if the gap of more than 17 mm (0.66 in) is made.**

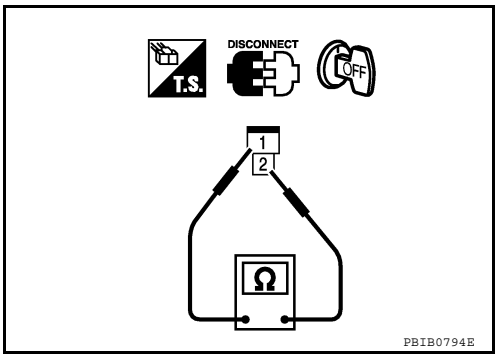
NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

17. If NG, Replace ignition coil with power transistor.

CONDENSER-1

1. Turn ignition switch OFF.
2. Disconnect condenser-1 harness connector.
3. Check resistance between condenser-1 terminals 1 and 2.



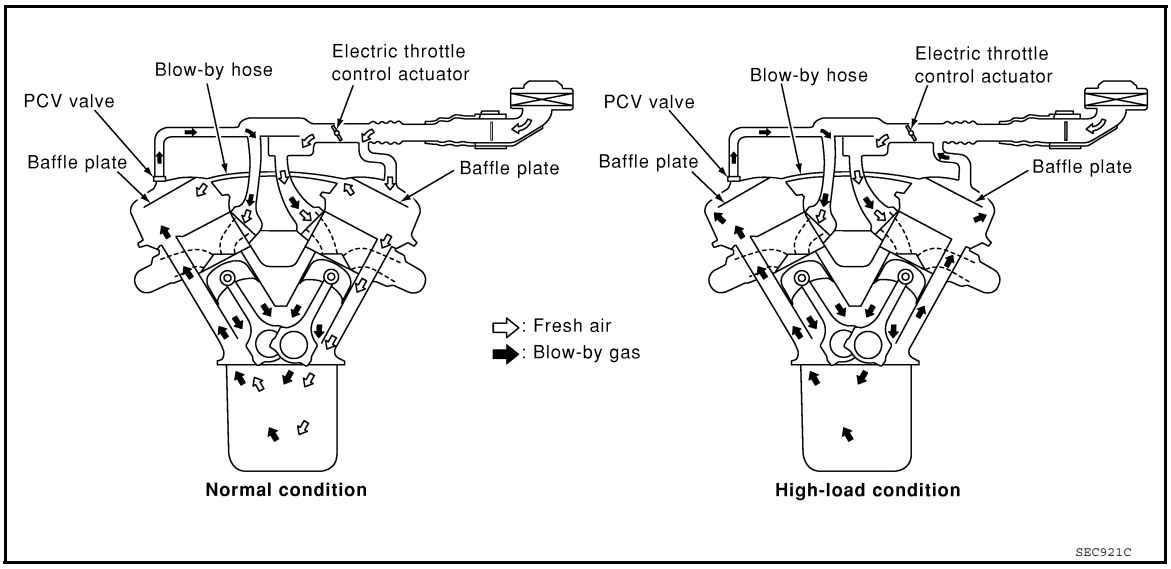
Resistance	Above 1 MΩ at 25°C (77°F)

POSITIVE CRANKCASE VENTILATION

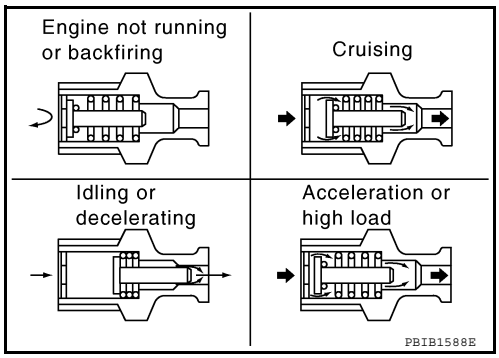
Description

INFOID:0000000005282178

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.

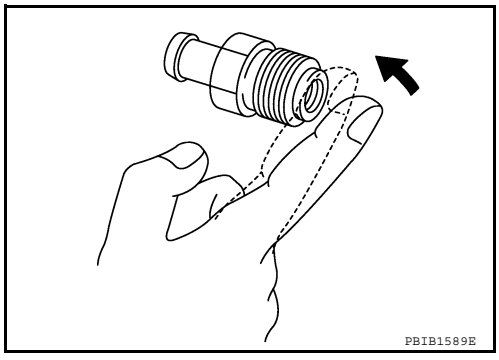


Component Inspection

INFOID:0000000005282179

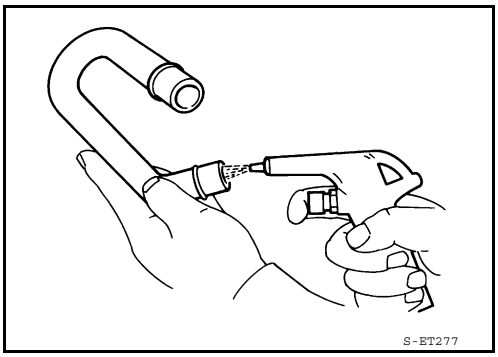
PCV (POSITIVE CRANKCASE VENTILATION) VALVE

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.

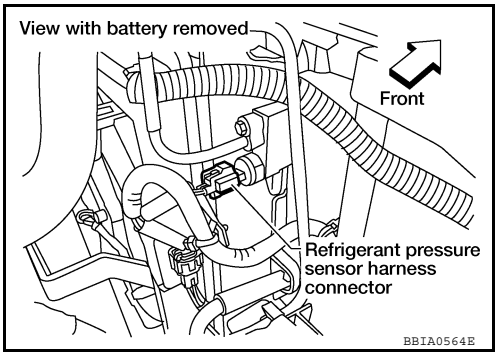


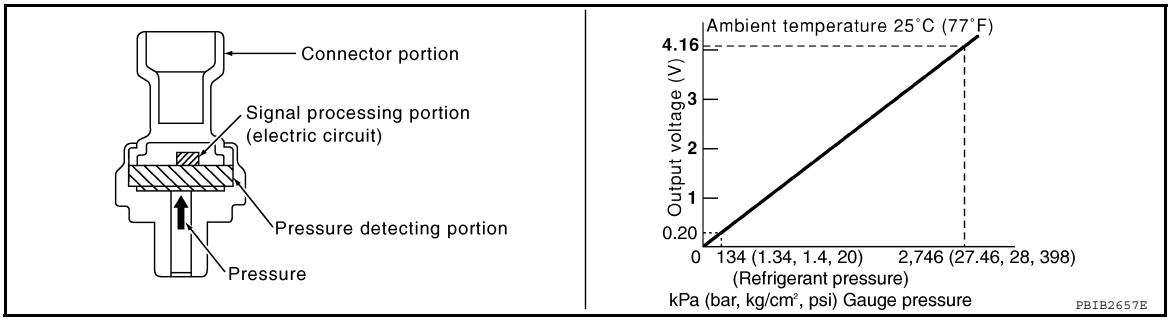
REFRIGERANT PRESSURE SENSOR

Component Description

INFOID:0000000005282180

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.





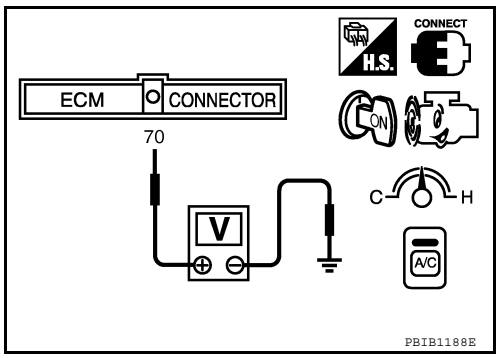
Diagnosis Procedure

INFOID:0000000005282181

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 70 and ground with CONSULT-III or tester.

Voltage: 1.0 - 4.0V

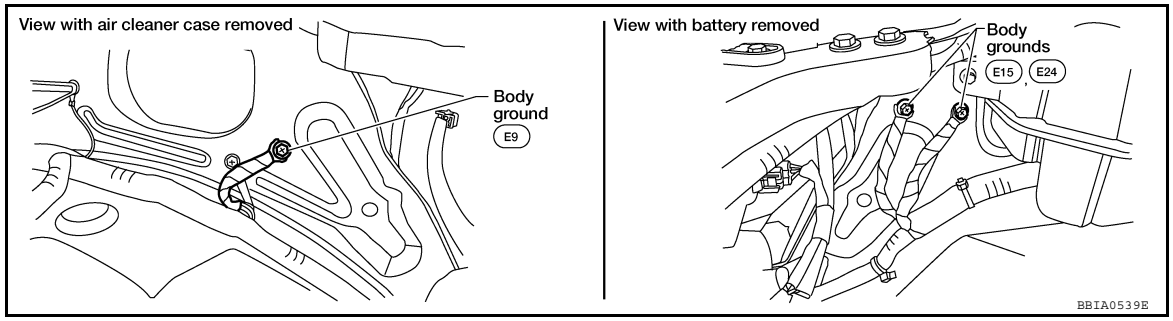


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK GROUND CONNECTIONS

1. Turn A/C switch and blower fan switch OFF.
2. Turn ignition switch OFF.
3. Loosen and retighten three ground screws on the body. Refer to EC-66, "Ground Inspection".

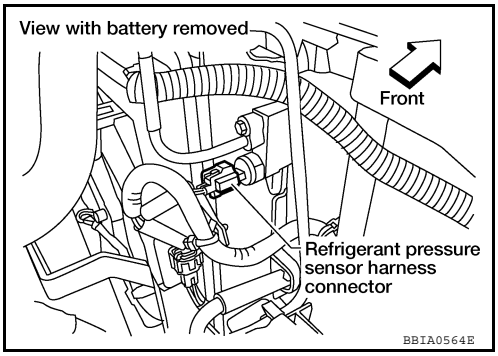


OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

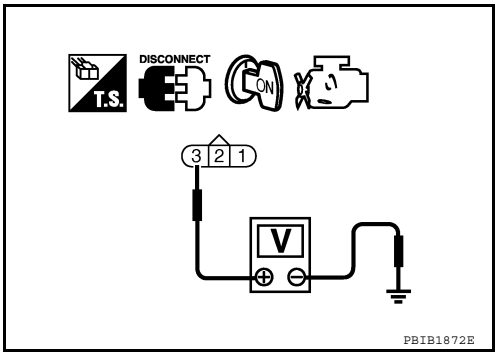
3. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
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 E5, F14
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair 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 67. 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 E5, F14
- 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.

7. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 70 and refrigerant 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 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E5, F14
- 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.

9. CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

OK or NG

OK >> Replace refrigerant pressure sensor.
NG >> Repair or replace.

VIAS

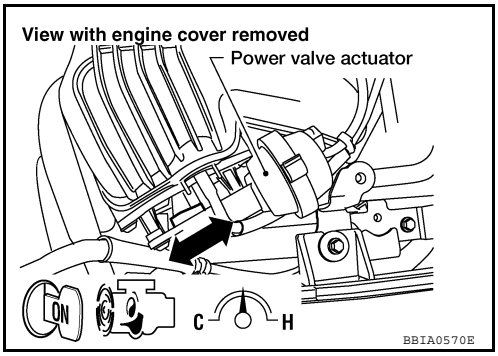
Diagnosis Procedure

INFOID:0000000005282182

1.CHECK OVERALL FUNCTION

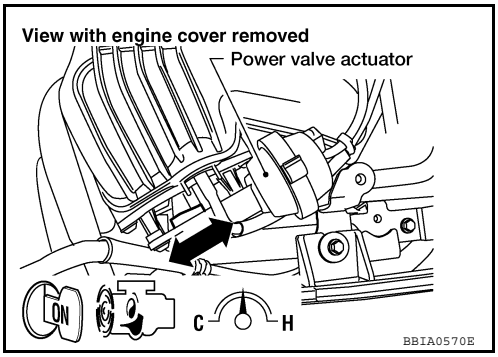
With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-III.
3. Turn VIAS control solenoid valve “ON” and “OFF”, and check that power valve actuator rod moves.



Without CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Rev engine up to between 2,200 and 3,300 rpm and check that power valve actuator rod moves.



OK or NG

OK >> **INSPECTION END**
NG (With CONSULT-III) >>GO TO 2.
NG (Without CONSULT-III) >>GO TO 3.

2.CHECK VACUUM EXISTENCE

With CONSULT-III

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Start engine and let it idle.
3. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-III.
4. Turn VIAS control solenoid valve “ON” and “OFF”, and check vacuum existence under the following conditions.

VIAS SOL VALVE	Vacuum
ON	Should exist.
OFF	Should not exist.

OK or NG

OK >> Repair or replace power valve actuator.
NG >> GO TO 4.

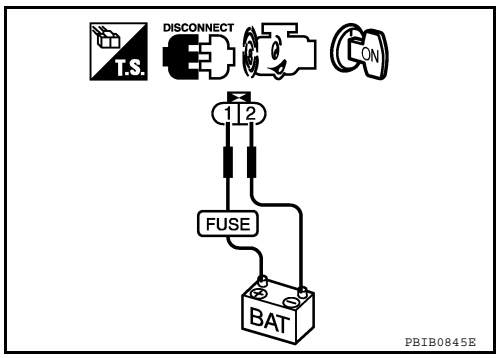
3.CHECK VACUUM EXISTENCE

Without CONSULT-III

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Disconnect VIAS control solenoid valve harness connector.
3. Start engine and let it idle.

4. Apply 12V of direct current between VIAS control solenoid valve terminals 1 and 2.
5. Check vacuum existence under the following conditions.

Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.

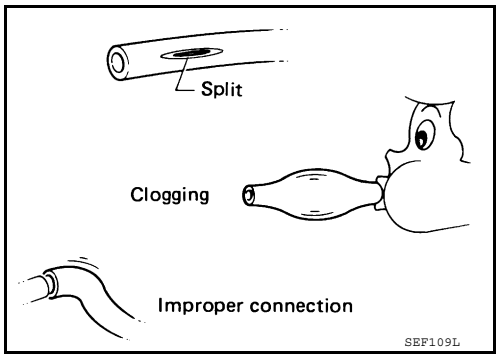


OK or NG

OK >> Repair or replace power valve actuator.
NG >> GO TO 4.

4. CHECK VACUUM HOSE

1. Stop engine.
2. Check hoses and tubes between intake manifold and power valve actuator for crack, clogging, improper connection or disconnection. Refer to EC-43, "Vacuum Hose Drawing".



OK or NG

OK >> GO TO 5.
NG >> Repair hoses or tubes.

5. CHECK VACUUM TANK

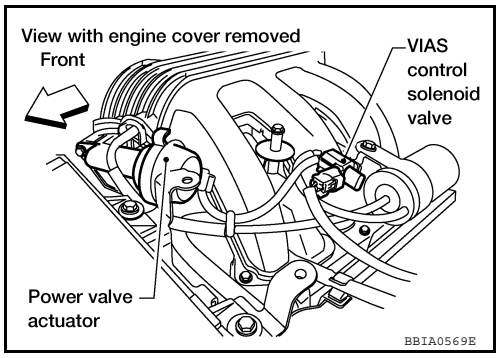
Refer to EC-232, "Component Inspection".

OK or NG

OK >> GO TO 6.
NG >> Replace vacuum tank.

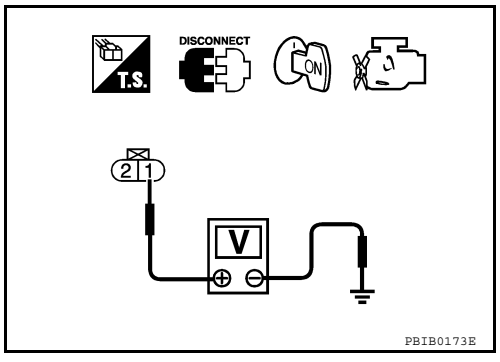
6. CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect VIAS control solenoid valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between VIAS control solenoid valve terminal 1 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 E2, F32
- Harness for open or short between VIAS control solenoid valve and IPDM E/R
- Harness for open or short between VIAS control solenoid valve and ECM

>> Repair harness or connectors.

8.CHECK VIAS 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 29 and VIAS 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 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9.CHECK VIAS CONTROL SOLENOID VALVE

Refer to EC-232, "Component Inspection".

OK or NG

OK >> GO TO 10.
NG >> Replace VIAS control solenoid valve.

10.CHECK INTERMITTENT INCIDENT

Refer to GI-34, "Work Flow".

>> **INSPECTION END**

Component Inspection

INFOID:0000000005282183

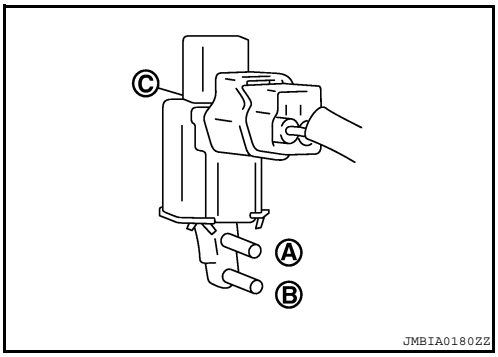
VIAS CONTROL SOLENOID VALVE

With CONSULT-III

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time under the following conditions.

Condition VIAS SOL VALVE	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
ON	Yes	No
OFF	No	Yes

Operation takes less than 1 second.

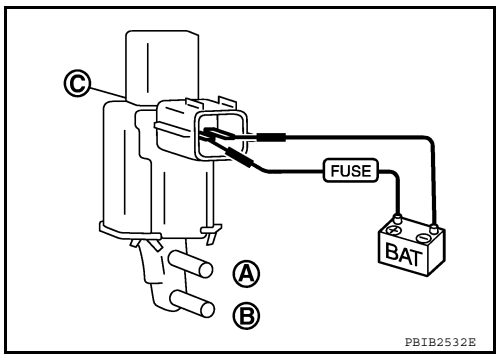


Without CONSULT-III

Check air passage continuity and operation delay time under the following conditions.

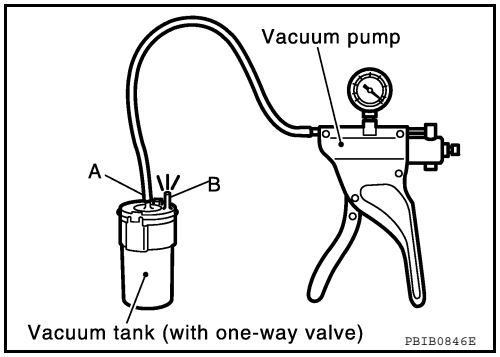
Condition	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

Operation takes less than 1 second.



VACUUM TANK

1. Disconnect vacuum hose connected to vacuum tank.
2. Connect a vacuum pump to the port (A) of vacuum tank.
3. Apply vacuum and check that vacuum exists at the port (B).



VSS

Description

INFOID:0000000005282184

The vehicle speed signal is sent to the combination meter from the “ABS actuator and electric unit (control unit)” by CAN communication line. The combination meter then sends a signal to the ECM by CAN communication line.

Diagnosis Procedure

INFOID:0000000005282185

1.INSPECTION START

Do you have CONSULT-III?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2.CHECK OVERALL FUNCTION

1. Turn ignition switch OFF.
2. Lift up the vehicle.
3. Start engine and let it idle.
4. Select “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-III.
5. Select “VHCL SPEED SE” indication when rotating wheels with suitable gear position.

“VHCL SPEED SE” indication should exceed 10 km/h (6 MPH).

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 3.

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

Refer to BRC-15, "CONSULT-III Function (ABS)" (ABS) or BRC-85, "CONSULT-III Function (ABS)" (VDC/TCS/ABS).

OK or NG

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

4.CHECK COMBINATION METER FUNCTION

Refer to GI-34, "Work Flow".

>> **INSPECTION END**

ECU DIAGNOSIS

ECM

CONSULT-III Reference Value in Data Monitor Mode

INFOID:0000000005282186

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-55.		
B/FUEL SCHDL	See EC-55.		
A/F ALPHA-B1 A/F ALPHA-B2	See EC-55.		
COOLAN TEMP/S	• Engine: After warming up		More than 70°C (158°F)
A/F SEN1 (B1) A/F SEN1 (B2)	• Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
HO2S2 (B1) HO2S2 (B2)	• Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: After warming up - 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) HO2S2 MNTR (B2)	• Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: After warming up - Keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.		LEAN ←→ RICH
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication.		Almost the same speed as the speedometer indication
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14 V
ACCEL SEN 1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.65 - 0.87 V
		Accelerator pedal: Fully depressed	More than 4.3 V
ACCEL SEN 2*1	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.56 - 0.96 V
		Accelerator pedal: Fully depressed	More than 4.0 V
TP SEN 1-B1 TP SEN 2-B1*1	• Ignition switch: ON (Engine stopped) • Shift lever: D (A/T), 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	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Shift lever: Except above	OFF
PW/ST SIGNAL	• Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned.	ON

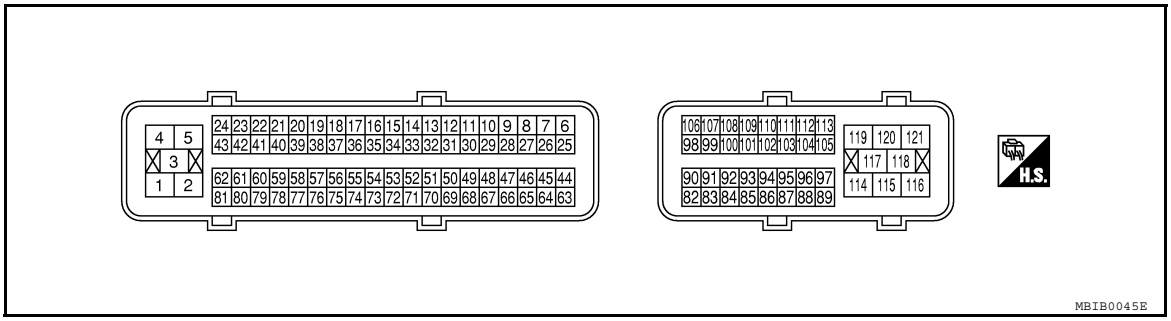
MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	• Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd	ON
		Rear window defogger switch is OFF and lighting switch is OFF	OFF
IGNITION SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	• Engine: After warming up, idle the engine	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 INJ PULSE-B2	• Engine: After warming up • Shift lever: P or N (A/T) Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	• Engine: After warming up • Shift lever: P or N (A/T) Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	13° - 18° BTDC
		2,000 rpm	25° - 45° BTDC
PURG VOL C/V	• Engine: After warming up • Shift lever: P or N (A/T) Neutral (M/T) • Air conditioner switch: OFF • No load	Idle (Accelerator pedal is not depressed even slightly, after engine starting)	0%
		2,000 rpm	—
INT/V TIM (B1) INT/V TIM (B2)	• Engine: After warming up • Shift lever: P or N (A/T) Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	–5° - 5°CA
		2,000 rpm	Approx. 0° - 30°CA
INT/V SOL (B1) INT/V SOL (B2)	• Engine: After warming up • Shift lever: P or N (A/T) Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0% - 2%
		2,000 rpm	Approx. 0% - 50%
VIAS S/V-1	• Engine: After warming up	2,200 - 3,300 rpm	ON
		Except above conditions	OFF
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
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 104°C (219°F)	LOW
		Engine coolant temperature: 105°C (221°F) or more	HI
HO2S2 HTR (B1) HO2S2 HTR (B2)	• Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		ON
	• Engine speed: Above 3,600 rpm		OFF

MONITOR ITEM	CONDITION		SPECIFICATION
I/P PULLY SPD	• Vehicle speed: More than 20 km/h (12 MPH)		Almost the same speed as the speedometer indication
VEHICLE SPEED	• Turn drive wheels and compare the CONSULT-III value with speedometer indication.		Almost the same speed as the speedometer indication
A/F S1 HTR (B1) A/F S1 HTR (B2)	• Engine: After warming up, idle the engine		0 - 100%
AC PRESS SEN	• Engine: Idle • Both A/C switch blower fan switch: ON (Compressor operates)		1.0 - 4.0 V
VHCL SPEED SE	• Turn drive wheels and compare speedometer indication with the CONSULT-III value.		Almost the same speed as the CONSULT-III value
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	ON
		Brake pedal: Slightly depressed	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
SET LAMP	• MAIN switch: ON • When vehicle speed is between 40km/h (25MPH) and 174km/h (108MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF
HO2 S2 DIAG2 (B1)	**NOTE:** The item is indicated, but not used.		—
HO2 S2 DIAG2 (B2)	**NOTE:** The item is indicated, but not used.		—

*1: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

ECM Harness Connector Terminal Layout

INFOID:0000000005282187

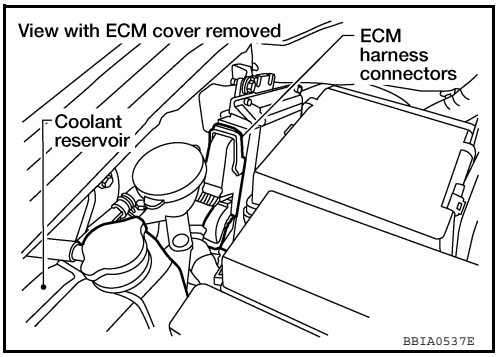


ECM Terminal and Reference Value

INFOID:0000000005282188

PREPARATION

ECM located in the engine room passenger side behind reservoir tank.

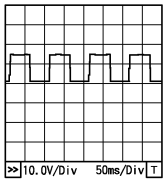
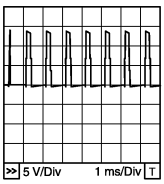
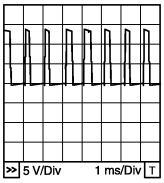


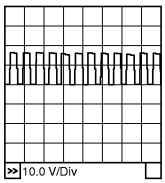
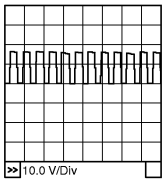
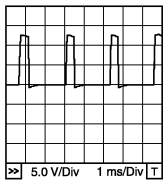
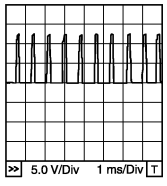
ECM INSPECTION TABLE

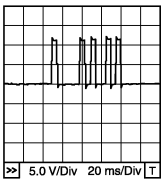
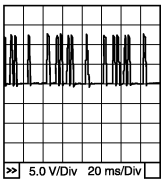
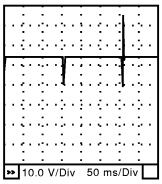
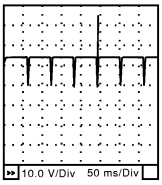
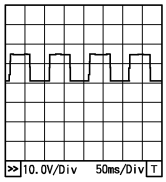
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-III.

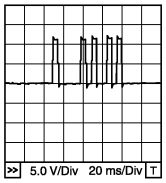
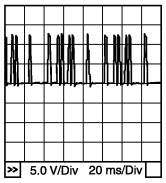
CAUTION:

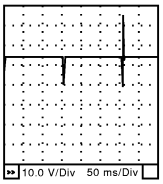
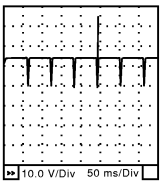
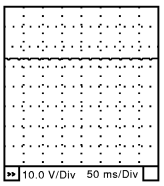
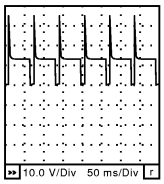
Never use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECMs transistor. Use a ground other than ECM terminals, such as the ground.

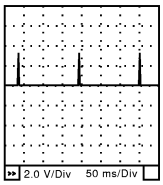
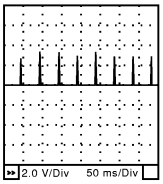
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	BR	ECM ground	**[Engine is running]** • Idle speed	Body ground
2	G	A/F sensor 1 heater (Bank 1)	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8 V★  PBIA8148J
3	V	Throttle control motor relay power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14 V)
4	L/W	Throttle control motor (Open)	**[Ignition switch: ON]** • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	0 - 14 V★  PBIB1104E
5	L/B	Throttle control motor (Close)	**[Ignition switch: ON]** • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	0 - 14 V★  PBIB1105E

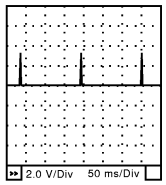
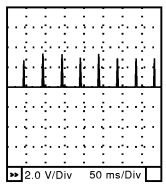
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	R	Heated oxygen sensor 2 heater (Bank 2)	**[Engine is running]** • Engine speed is below 3,600 rpm after the following conditions are met - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0 V
			[Ignition switch: ON] • Engine: Stopped **[Engine is running]** • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
10	W	Intake valve timing control solenoid valve (Bank 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	BATTERY VOLTAGE (11 - 14 V)
			[Engine is running] • **Warm-up condition** • Engine speed: 2,500 rpm	7 - 12 V★  PBIB1790E
11	LG	Intake valve timing control solenoid valve (Bank 1)	**[Engine is running]** • **Warm-up condition** • Idle speed	BATTERY VOLTAGE (11 - 14 V)
			[Engine is running] • **Warm-up condition** • Engine speed: 2,500 rpm	7 - 12 V★  PBIB1790E
12	P	Power steering pressure sensor	**[Engine is running]** • Steering wheel: Being turned	0.5 - 4.5 V
			[Engine is running] • Steering wheel: Not being turned	0.4 - 0.8 V
13	G	Crankshaft position sensor (POS)	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 10 V★  PBIB1041E
			[Engine is running] • Engine speed: 2,000 rpm	Approximately 10 V★  PBIB1042E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	Y	Camshaft position sensor (PHASE) (Bank 2)	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 4.0 V★  PBIB1039E
			[Engine is running] • Engine speed: 2,000 rpm	1.0 - 4.0 V★  PBIB1040E
15	W	Knock sensor (Bank 1)	**[Engine is running]** • Idle speed	Approximately 2.5 V
16	BR	A/F sensor 1 (Bank 1)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 3.1 V
35	O			Approximately 2.6 V
56	LG			Approximately 2.3 V
75	P			Approximately 2.3 V
21 22 23	W LG SB	Fuel injector No. 5 Fuel injector No. 3 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)★  SEC984C
			[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V)★  SEC985C
24	G	A/F sensor 1 heater (Bank 2)	**[Engine is running]** • **Warm-up condition** • Idle speed (More than 140 seconds after starting engine)	Approximately 2.9 - 8.8 V★  PBIA8148J

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	P	Heated oxygen sensor 2 heater (Bank 1)	**[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	0 - 1.0 V
			[Ignition switch: ON] • Engine: Stopped **[Engine is running]** • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
29	G	VIAS control solenoid valve	**[Engine is running]** • Idle speed	BATTERY VOLTAGE (11 - 14 V)
			[Engine is running] • Engine speed: Between 2,200 and 3,300 rpm	0 - 1.0 V
32	W	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8 V
33	L	Camshaft position sensor (PHASE) (Bank 1)	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 4.0 V★  PBIB1039E
			[Engine is running] • Engine speed: 2,000 rpm	1.0 - 4.0 V★  PBIB1040E
34	BR	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8 V Output voltage varies with intake air temperature.
36	W	Knock sensor (Bank 2)	**[Engine is running]** • Idle speed	Approximately 2.5 V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
40 41 42	V R O	Fuel injector No. 6 Fuel injector No. 4 Fuel injector No. 2	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14 V)★  SEC984C
			[Engine is running] • **Warm-up condition** • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V)★  SEC985C
45	R	EVAP canister purge volume control solenoid valve	**[Engine is running]** • Idle speed • Accelerator pedal is not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14 V)★  SEC990C
			[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine)	BATTERY VOLTAGE (11 - 14 V)★  SEC991C
47	L	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5 V
48	SB	Sensor power supply (EVAP control system pressure sensor)	**[Ignition switch: ON]**	Approximately 5 V5 V
49	P	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5 V
50	W	Throttle position sensor 1	**[Ignition switch: ON]** • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36 V
			[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75 V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	P	Mass air flow sensor	**[Engine is running]** • **Warm-up condition** • Idle speed	0.9 - 1.2 V
			[Engine is running] • **Warm-up condition** • Engine speed: 2,500 rpm	1.5 - 1.8 V
55	G	Heated oxygen sensor 2 (Bank 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 1.0 V
57	GR	A/F sensor 1 (Bank 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 2.6 V
58	O			Approximately 2.3 V
76	V			Approximately 3.1 V
77	Y			Approximately 2.3 V
60 61 62	SB L Y	Ignition signal No. 5 Ignition signal No. 3 Ignition signal No. 1	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.2 V★  SEC986C
			[Engine is running] • **Warm-up condition** • Engine speed: 2,500 rpm	0.1 - 0.4 V★  SEC987C
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0 V
67	B	Sensor ground	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0 V
68	G	Sensor power supply (Power steering pressure sensor)	**[Ignition switch: ON]**	Approximately 5 V
69	R	Throttle position sensor 2	**[Ignition switch: ON]** • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75 V
			[Ignition switch: ON] • Engine: Stopped • Shift lever: D (A/T), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36 V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
70	BR	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
73	Y	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8 V Output voltage varies with engine coolant temperature.
74	W	Heated oxygen sensor 2 (Bank 1)	**[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 1.0 V
78	GR	Sensor ground (Heated oxygen sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0 V
79 80 81	P GR G	Ignition signal No. 6 Ignition signal No. 4 Ignition signal No. 2	**[Engine is running]** • **Warm-up condition** • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.2 V★  SEC986C
			[Engine is running] • **Warm-up condition** • Engine speed: 2,500 rpm	0.1 - 0.4 V★  SEC987C
82	B	Sensor ground (APP sensor 1)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0 V
83	B	Sensor ground (APP sensor 2)	**[Engine is running]** • **Warm-up condition** • Idle speed	Approximately 0 V
85	W	Data link connector	**[Ignition switch: ON]** • CONSULT-III: disconnected	Approximately 5 V - Battery voltage (11 - 14 V)
86	P	CAN communication line	—	—
90	L	Sensor power supply (APP sensor 1)	**[Ignition switch: ON]**	Approximately 5 V
91	G	Sensor power supply (APP sensor 2)	**[Ignition switch: ON]**	Approximately 5 V
94	L	CAN communication line	—	—
98	GR	Accelerator pedal position sensor 2	**[Ignition switch: ON]** • Engine: Stopped • Accelerator pedal: Fully released	0.28 - 0.48 V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	More than 2.0

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
99	SB	ASCD steering switch	**[Ignition switch: ON]** • ASCD steering switch: OFF	Approximately 4 V
			[Ignition switch: ON] • MAIN switch: Pressed	Approximately 0 V
			[Ignition switch: ON] • CANCEL switch: Pressed	Approximately 1 V
			[Ignition switch: ON] • RESUME/ACCELERATE switch: Pressed	Approximately 3 V
			[Ignition switch: ON] • SET/COAST switch: Pressed	Approximately 2 V
101	LG	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	G*1 O*2	PNP signal	**[Ignition switch: ON]** • Shift lever: P or N (A/T), Neutral (M/T)	Approximately 0 V
			[Ignition switch: ON] • Except above position	BATTERY VOLTAGE (11 - 14 V)
104	O	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14 V)
			[Ignition switch: ON]	0 - 1.0 V
106	R	Accelerator pedal position sensor 1	**[Ignition switch: ON]** • Engine: Stopped • Accelerator pedal: Fully released	0.65 - 0.87 V
			[Ignition switch: ON] • Engine: Stopped • Accelerator pedal: Fully depressed	More than 4.3 V
107	Y	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8 V Output voltage varies with fuel tank temperature.
108	LG	ASCD brake switch	**[Ignition switch: ON]** • Brake pedal: Slightly depressed	Approximately 0 V
			[Ignition switch: ON] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)
109	W/R	Ignition switch	**[Ignition switch: OFF]**	0 V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
111	BR	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** • For a few seconds after turning ignition switch OFF	0 - 1.5 V
			[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
113	V	Fuel pump relay	**[Ignition switch: ON]** • For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.5 V
			[Ignition switch: ON] • More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14 V)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
115 116	B GR	ECM ground	**[Engine is running]** • Idle speed	Body ground
117	G	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14 V)
119 120	R P	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14 V)
121	R/B	Power supply for ECM (Back-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14 V)

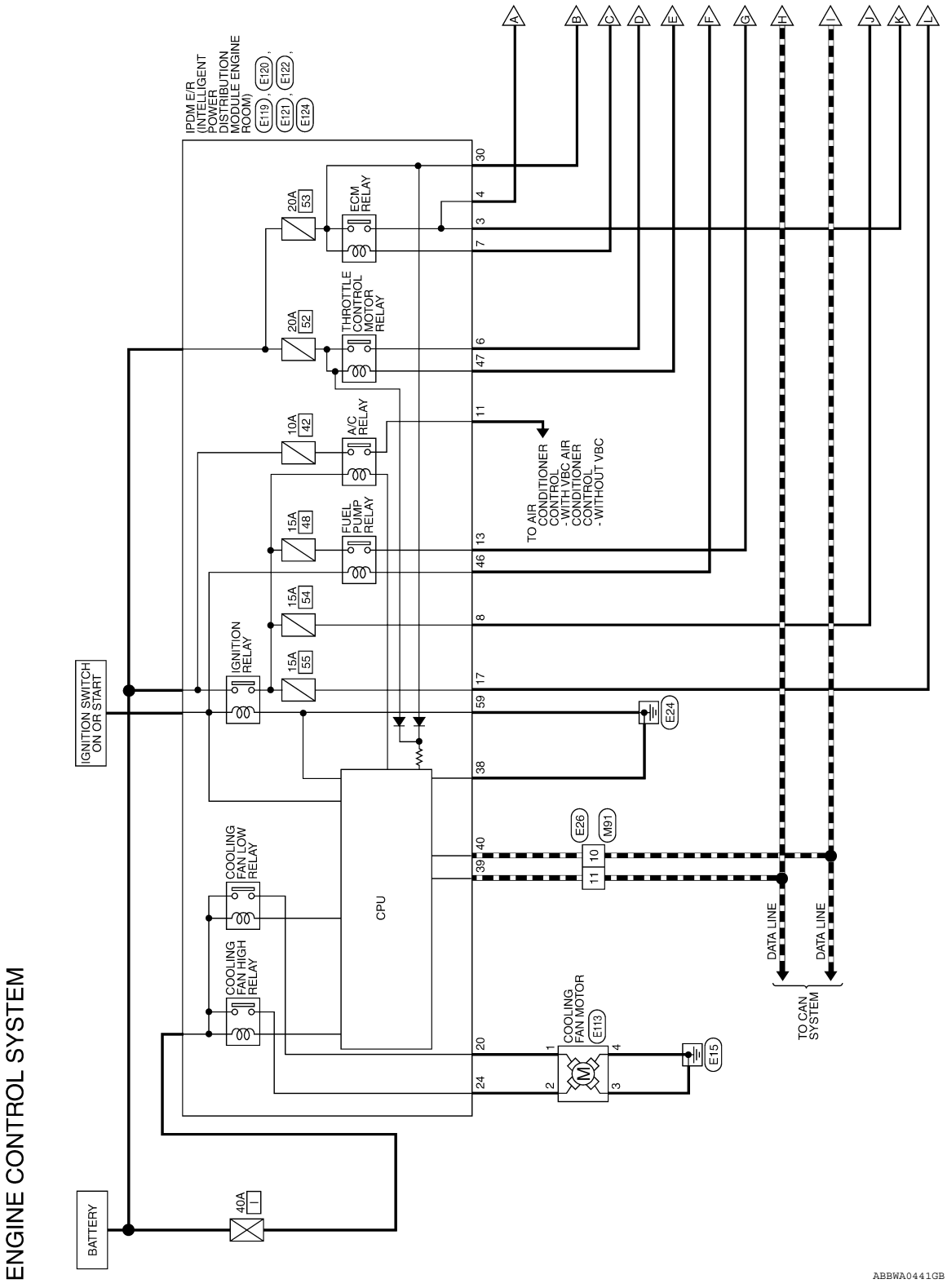
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

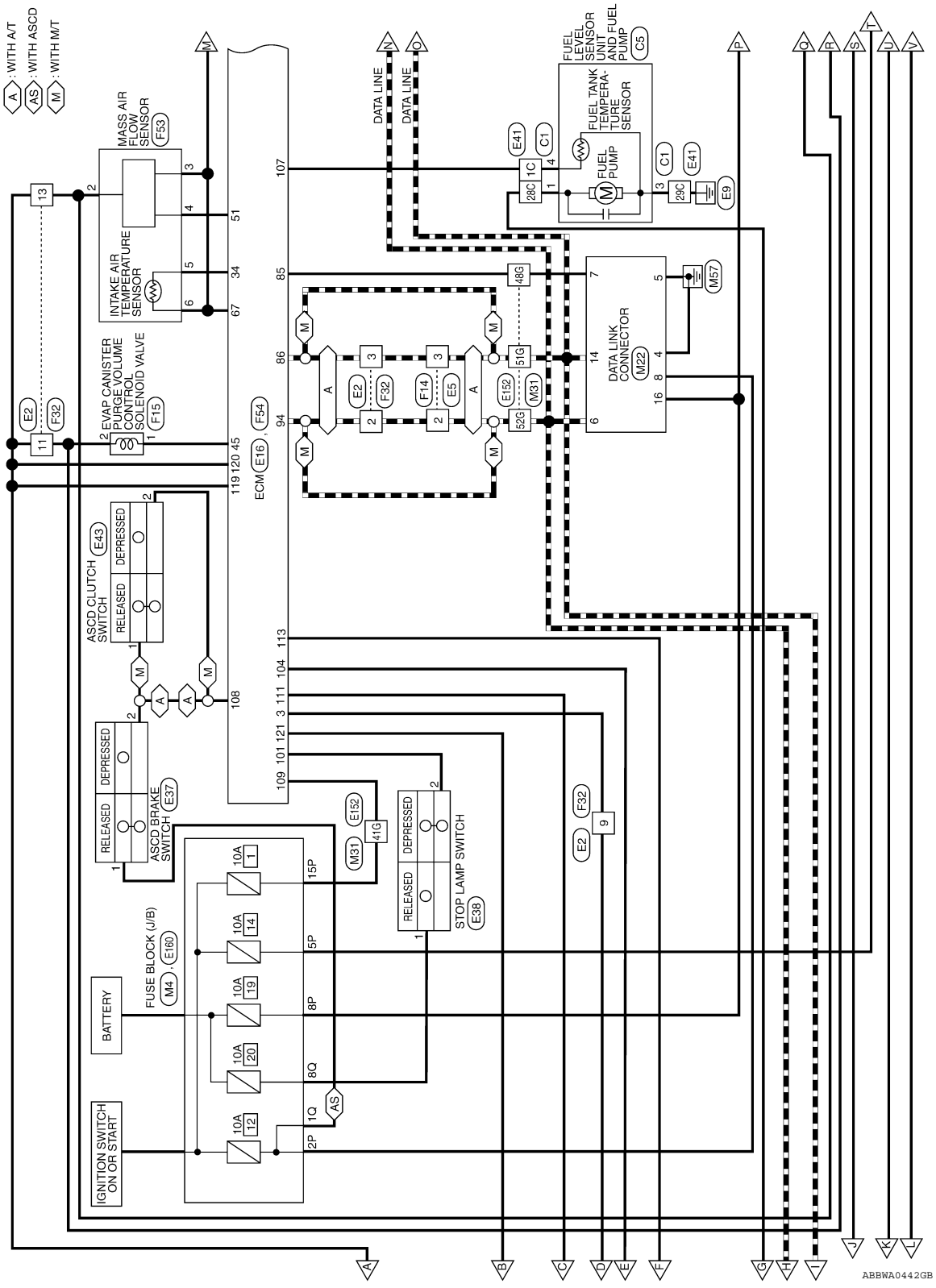
*1: A/T models

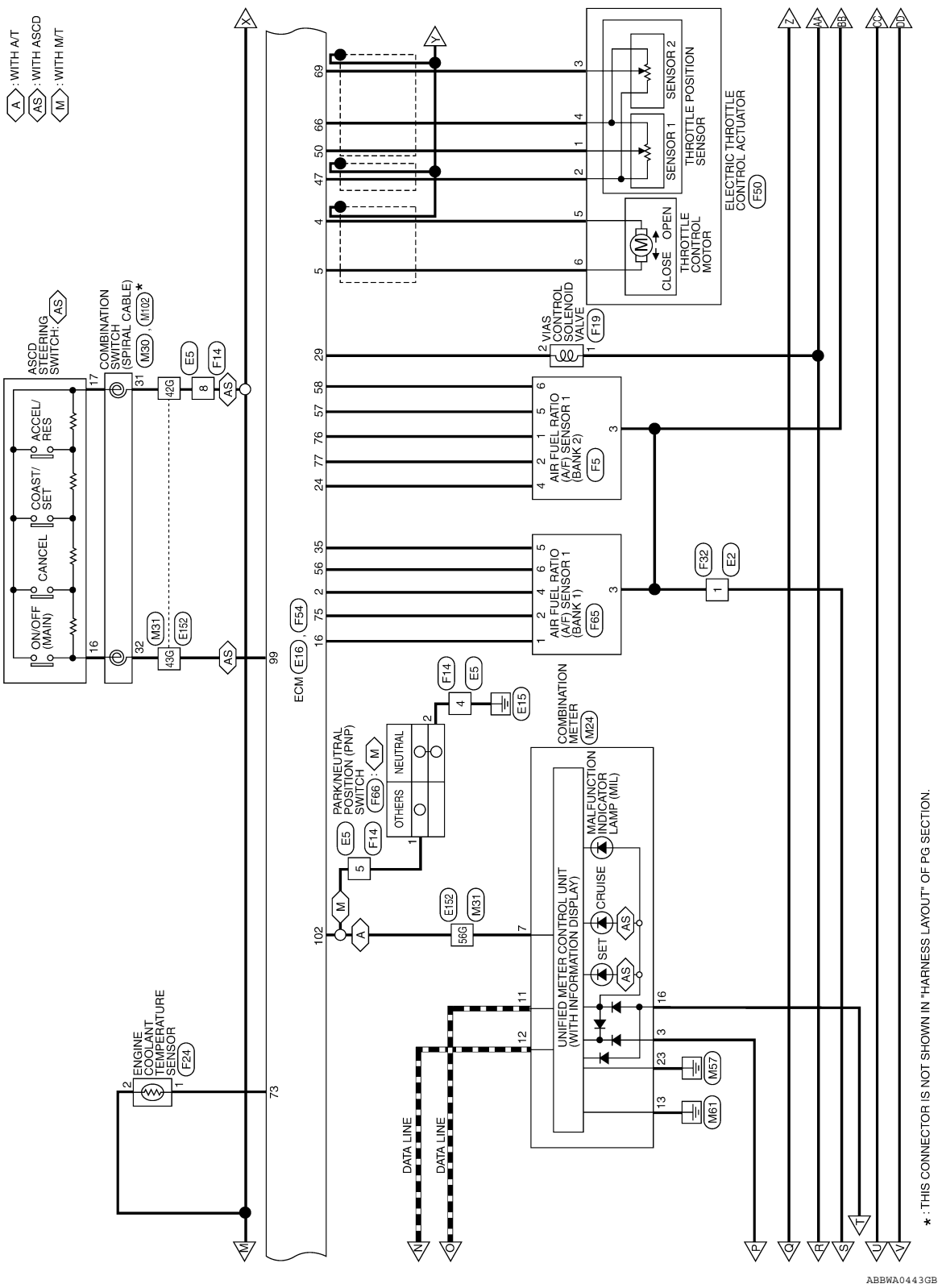
*2: M/T models

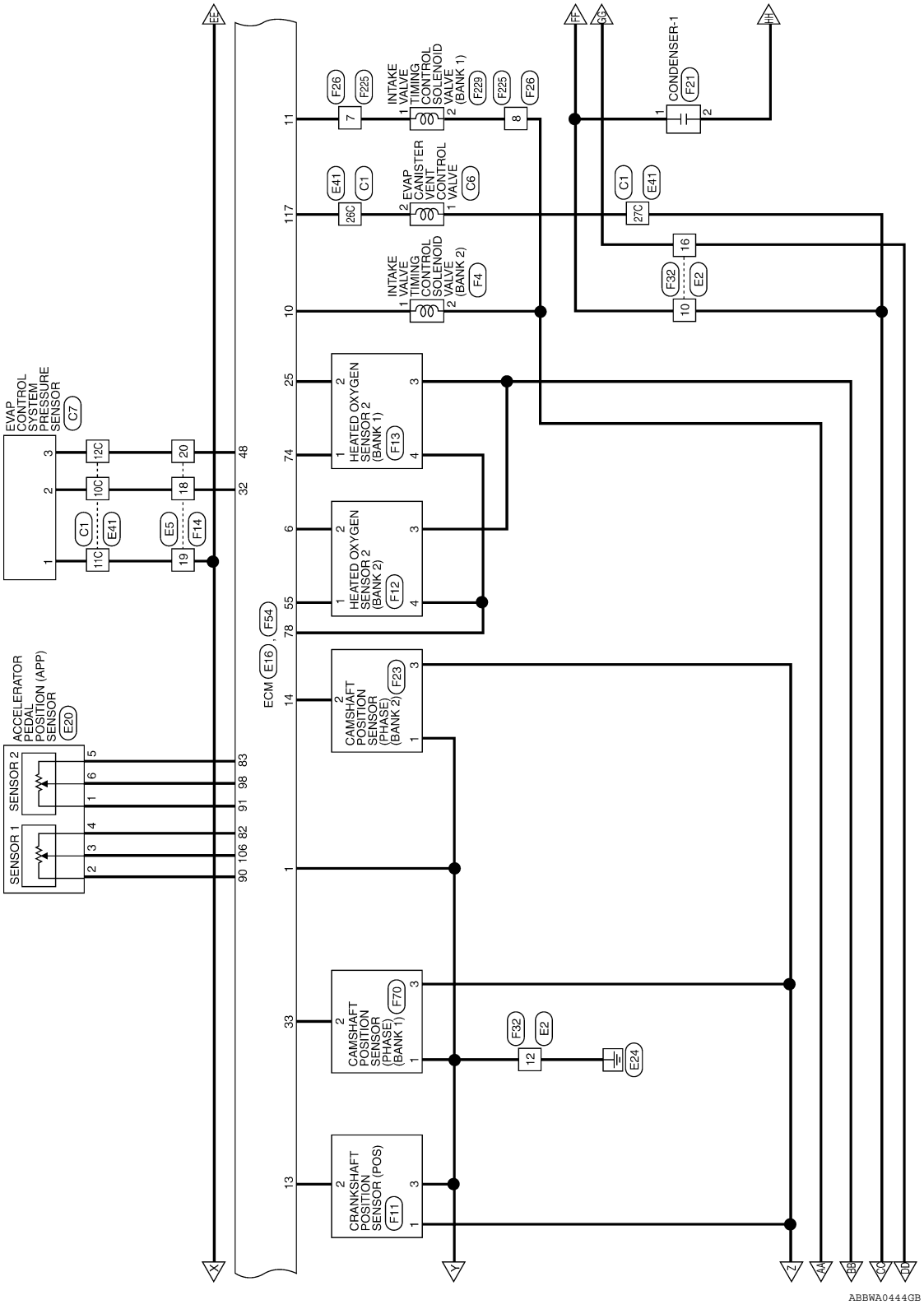
Wiring Diagram - ENGINE CONTROL SYSTEM -

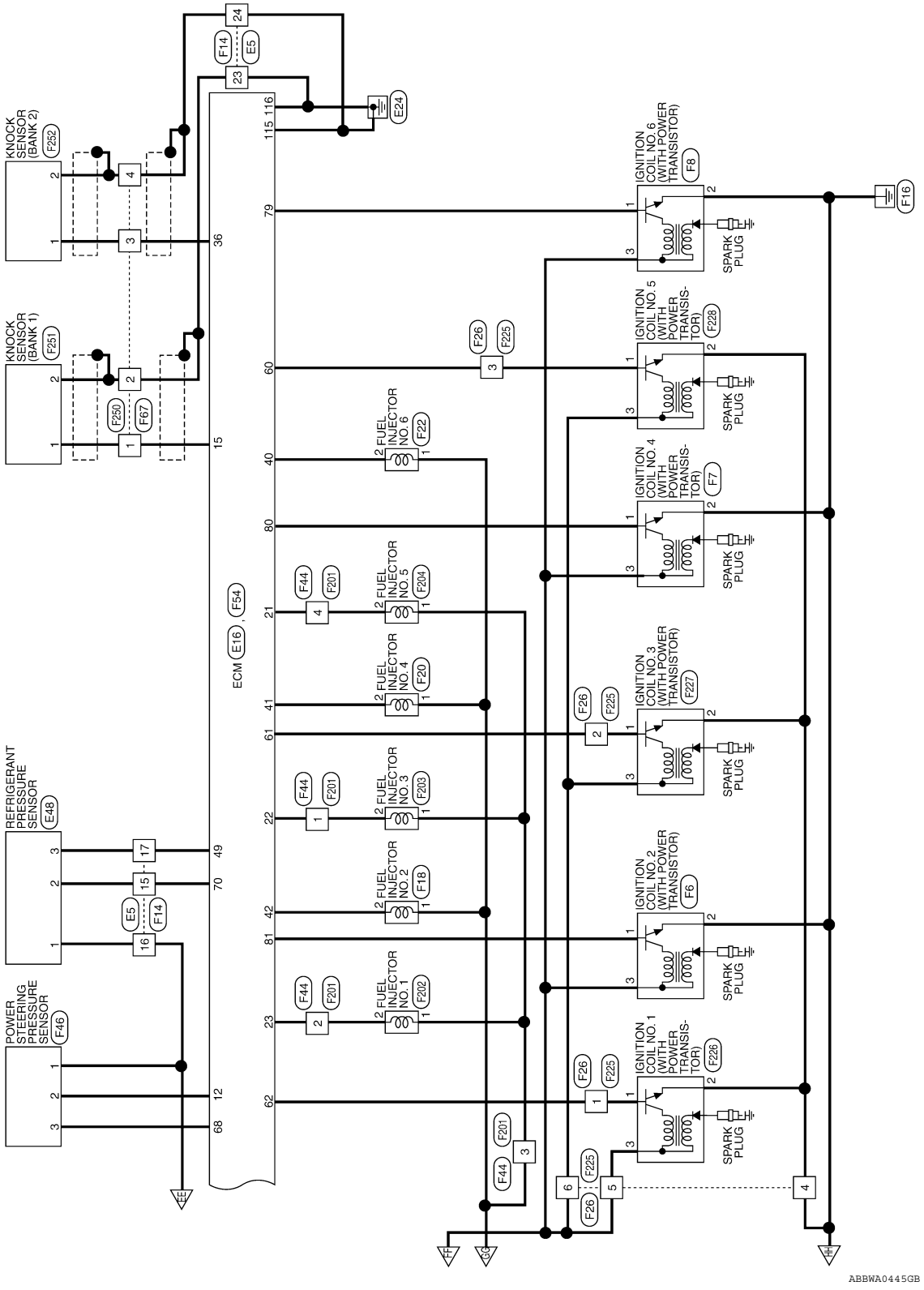
INFOID:0000000005282189




A : WITH A/T
AS : WITH ASCD
M : WITH M/T
MASS AIR FLOW SENSOR F53
INTAKE AIR TEMPERATURE SENSOR
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE F15
ECM E16, F54
DATA LINE
FUEL LEVEL SENSOR UNIT AND FUEL PUMP C5
FUEL TANK TEMPERATURE SENSOR
FUEL PUMP
DATA LINK CONNECTOR M22
ASCD CLUTCH SWITCH E43
ASCD BRAKE SWITCH E37
STOP LAMP SWITCH E38
FUSE BLOCK (J/B) M4, E160
BATTERY
IGNITION SWITCH ON OR START
DEPRESSED
RELEASED
ABBWA0442GB


A : WITH A/T
AS : WITH ASCD
M : WITH M/T
ASCD STEERING SWITCH
ON/OFF (MAIN)
CANCEL
COAST/ SET
ACCEL/ RES
COMBINATION SWITCH (SPIRAL CABLE)
ECM E16, F54
ELECTRIC THROTTLE CONTROL ACTUATOR F50
THROTTLE POSITION SENSOR
SENSOR 1
SENSOR 2
THROTTLE CONTROL MOTOR
CLOSE
OPEN
VIAS CONTROL SOLENOID VALVE F19
AIR FUEL RATIO (A/F) SENSOR 1 (BANK 2) F5
AIR FUEL RATIO (A/F) SENSOR 1 (BANK 1) F65
PARK/NEUTRAL POSITION (PNP) SWITCH F66
NEUTRAL
OTHERS
COMBINATION METER M24
UNIFIED METER CONTROL UNIT (WITH INFORMATION DISPLAY)
MALFUNCTION INDICATOR LAMP (MIL)
CRUISE
SET
ENGINE COOLANT TEMPERATURE SENSOR F24
DATA LINE
DATA LINE
* : THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT" OF PG SECTION.
ABBWA0443GB

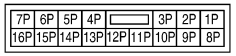

EVAP CONTROL SYSTEM PRESSURE SENSOR
C7
ACCELERATOR PEDAL POSITION (APP) SENSOR
E20
SENSOR 1
SENSOR 2
ECM
E16
F54
INTAKE VALVE TIMING CONTROL SOLENOID VALVE (BANK 1)
F26
F225
F229
INTAKE VALVE TIMING CONTROL SOLENOID VALVE (BANK 2)
F4
EVAP CANISTER VENT CONTROL VALVE
E41
C1
C6
CONDENSER-1
F21
HEATED OXYGEN SENSOR 2 (BANK 1)
F13
HEATED OXYGEN SENSOR 2 (BANK 2)
F12
CAMSHAFT POSITION SENSOR (PHASE) (BANK 2)
F23
CAMSHAFT POSITION SENSOR (PHASE) (BANK 1)
F70
CRANKSHAFT POSITION SENSOR (POS)
F11
F32
E2
E24
ABBWA0444GB


KNOCK SENSOR (BANK 2) F252
KNOCK SENSOR (BANK 1) F251
REFRIGERANT PRESSURE SENSOR E48
POWER STEERING PRESSURE SENSOR F46
ECM E16, F54
FUEL INJECTOR NO. 6 F22
FUEL INJECTOR NO. 5 F204
FUEL INJECTOR NO. 4 F20
FUEL INJECTOR NO. 3 F203
FUEL INJECTOR NO. 2 F18
FUEL INJECTOR NO. 1 F202
IGNITION COIL NO. 6 (WITH POWER TRANSISTOR) F8
IGNITION COIL NO. 5 (WITH POWER TRANSISTOR) F228
IGNITION COIL NO. 4 (WITH POWER TRANSISTOR) F7
IGNITION COIL NO. 3 (WITH POWER TRANSISTOR) F227
IGNITION COIL NO. 2 (WITH POWER TRANSISTOR) F6
IGNITION COIL NO. 1 (WITH POWER TRANSISTOR) F226
SPARK PLUG
ABBWA0445GB

ENGINE CONTROL SYSTEM CONNECTORS

Connector No.	M4
Connector Name	FUSE BLOCK (J/B)
Connector Color	WHITE

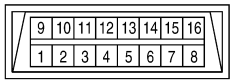
H.S.



Terminal No.	Color of Wire	Signal Name
2P	W/G	–
5P	W/G	–
8P	R/Y	–
15P	W/R	–

Connector No.	M22
Connector Name	DATA LINK CONNECTOR
Connector Color	WHITE

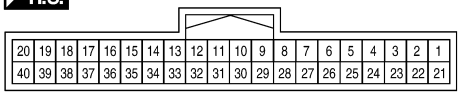
H.S.



Terminal No.	Color of Wire	Signal Name
4	B	–
5	B	–
6	L	–
7	W	–
8	W/G	–
14	P	–
16	R/Y	–

Connector No.	M24
Connector Name	COMBINATION METER
Connector Color	WHITE

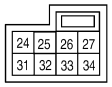
H.S.



Terminal No.	Color of Wire	Signal Name
3	R/Y	BATTERY
7	G	AT-PN ECM
11	P	CAN-L
12	L	CAN-H
13	GR	GROUND
16	W/G	RUN/START
23	B	POWER GROUND

Connector No.	M30
Connector Name	COMBINATION SWITCH
Connector Color	GRAY

H.S.



Terminal No.	Color of Wire	Signal Name
31	B	ASCD RTN
32	SB	ASCD

ABBIA0520GB

Connector No.	M91
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

7	6	5	4		3	2	1
16	15	14	13	12	11	10	9	8

Terminal No.	Color of Wire	Signal Name
10	P	–
11	L	–

Terminal No.	Color of Wire	Signal Name
1	W/R	–
2	L	–
3	P	–
9	V	–
10	G	–
11	GR	–
12	BR	–
13	LG	–
16	W/G	–

Connector No.	M31
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

	5G	4G	3G	2G	1G
		9G	8G	7G	6G
		10G			

21G	20G	19G	18G	17G	16G	15G	14G	13G	12G	11G
	30G	29G	28G	27G	26G	25G	24G	23G	22G	

41G	40G	39G	38G	37G	36G	35G	34G	33G	32G	31G
	50G	49G	48G	47G	46G	45G	44G	43G	42G	

61G	60G	59G	58G	57G	56G	55G	54G	53G	52G	51G
	70G	69G	68G	67G	66G	65G	64G	63G	62G	

	75G	74G	73G	72G	71G
		80G	79G	78G	77G	76G

Terminal No.	Color of Wire	Signal Name
41G	W/R	–
42G	B	–
43G	SB	–
48G	W	–
51G	P	–
52G	L	–
56G	G	–

Connector No.	E2
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

1	2	3		4	5	6	7
8	9	10	11	12	13	14	15	16

Connector No.	M102
Connector Name	COMBINATION SWITCH
Connector Color	GRAY

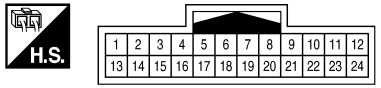
H.S.

14	15	16	17	18	19	20	21

Terminal No.	Color of Wire	Signal Name
16	R	–
17	B	–

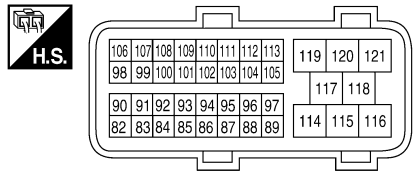
ABBIA0521GB

Connector No.	E5
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
2	L	–
3	P	–
4	B/Y	–
5	O	–
8	B	–
15	BR	–
16	B	–
17	P	–
18	W	–
19	B	–
20	SB	–
23	GR	–
24	B	–

Connector No.	E16
Connector Name	ECM
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
82	B	GND-A
83	B	GND-A2
84	–	–
85	W	K-LINE
86	P	CAN-L
87	–	–
88	–	–
89	–	–
90	L	AVCC
91	G	AVCC2
92	–	–
93	–	–
94	L	CAN-H
95	–	–
96	–	–
97	–	–
98	GR	APS2
99	SB	ASCD_SW
100	–	–
101	LG	BRAKE
102	G	NEUT (WITH A/T)
102	O	NEUT (WITH M/T)
103	–	–
104	O	MOTRLY
105	–	–
106	R	APS1
107	Y	TF
108	LG	BNCSW
109	W/R	IGNSW
110	–	–
111	BR	SSOFF
112	–	–
113	V	FPR
114	–	–
115	B	GND
116	GR	GND
117	G	CDCV
118	–	–
119	R	VB
120	P	VB
121	R/B	BATT

ABBIA0522GB

Connector No.	E20
Connector Name	ACCELERATOR PEDAL POSITION (APP) SENSOR
Connector Color	BLACK

H.S.

1	2	3	4	5	6

Terminal No.	Color of Wire	Signal Name
1	G	AVCC2
2	L	AVCC1
3	R	APS1
4	B	GND-A
5	B	GND-A2
6	GR	APS2

Connector No.	E26
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

1	2	3		4	5	6	7
8	9	10	11	12	13	14	15	16

Terminal No.	Color of Wire	Signal Name
10	P	–
11	L	–

Connector No.	E37
Connector Name	ASCD BRAKE SWITCH
Connector Color	BROWN

H.S.

2
1

Terminal No.	Color of Wire	Signal Name
1	W/G	–
2	LG	–

Connector No.	E38
Connector Name	STOP LAMP SWITCH (WITH M/T)
Connector Color	BLACK

H.S.

2	1

Terminal No.	Color of Wire	Signal Name
1	R/B	–
2	Y	–

Connector No.	E38
Connector Name	STOP LAMP SWITCH (WITH A/T)
Connector Color	WHITE

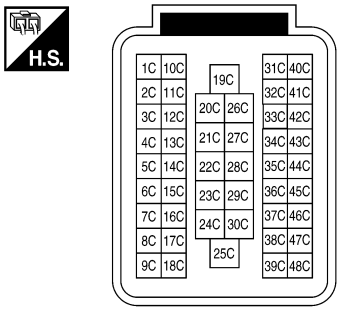
H.S.

3	4
1	2

Terminal No.	Color of Wire	Signal Name
1	R/B	–
2	Y	–

ABBIA0523GB

Connector No.	E41
Connector Name	WIRE TO WIRE
Connector Color	BLACK



Terminal No.	Color of Wire	Signal Name
1C	Y	–
10C	W	–
11C	B	–
12C	SB	–
26C	G	–
27C	W	–
28C	R	–
29C	B	–

Connector No.	E43
Connector Name	ASCD CLUTCH SWITCH
Connector Color	BLUE

Terminal No.	Color of Wire	Signal Name
1	V	–
2	LG	–

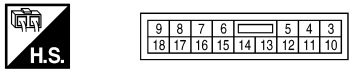
Connector No.	E48
Connector Name	REFRIGERANT PRESSURE SENSOR
Connector Color	BLACK

Terminal No.	Color of Wire	Signal Name
1	B	GND
2	BR	SIGNAL
3	P	POWER SUPPLY

Connector No.	E113
Connector Name	COOLING FAN MOTOR
Connector Color	GRAY

Terminal No.	Color of Wire	Signal Name
1	BR	–
2	P	–
3	B	–
4	B	–

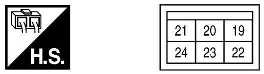
Connector No.	E119
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
3	G	IGN COIL
4	P	ENG SUPPLY
6	V	ELEC THROTTLE
7	BR	ECM RLY CONT
8	W/R	O2 SENS
11	Y	A/C COMPRESSOR
13	R	FUEL PUMP
17	W/G	INJECTION

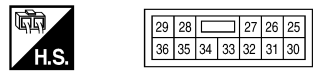
ABBIA0524GB

Connector No.	E120
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE



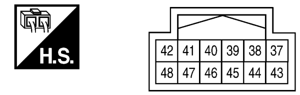
Terminal No.	Color of Wire	Signal Name
20	BR	M/FAN 1
24	P	M/FAN 2

Connector No.	E121
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BROWN



Terminal No.	Color of Wire	Signal Name
30	R/B	ECM BAT

Connector No.	E122
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	WHITE

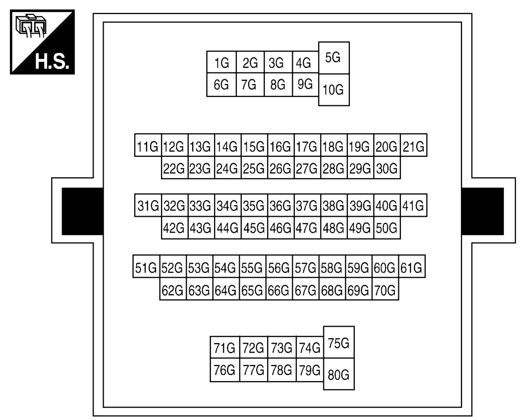


Terminal No.	Color of Wire	Signal Name
38	B	GND (SIGNAL)
39	L	CAN-H
40	P	CAN-L
46	V	ECM (FUEL PUMP RLY CONT)
47	O	ECM (ETC RLY CONT)

Connector No.	E124
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Color	BLACK

Terminal No.	Color of Wire	Signal Name
59	B	GND (POWER)

Connector No.	E152
Connector Name	WIRE TO WIRE
Connector Color	WHITE



Terminal No.	Color of Wire	Signal Name
41G	W/R	–
42G	B	–
43G	SB	–
48G	W	–
51G	P	–
52G	L	–
56G	G	–

ABBIA0525GB

Connector No.	E160
Connector Name	FUSE BLOCK (J/B)
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1Q	W/G	–
8Q	R/B	–

Connector No.	F4
Connector Name	INTAKE VALVE TIMING CONTROL SOLENOID VALVE (BANK 2)
Connector Color	GREEN

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	–
2	R	–

Connector No.	F5
Connector Name	AIR FUEL RATIO (A/F) SENSOR 1 (BANK 2)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	V	NEARNST VOLTAGE (LH)
2	Y	TRIM CURRENT (LH)
3	W/R	HEATER + (LH)
4	G	HEATER - (LH)
5	GR	VIRTUELLE GND (LH)
6	O	PUMPING CURRENT (LH)

Connector No.	F6
Connector Name	IGNITION COIL NO. 2 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	G	–
2	B	–
3	LG	–

Connector No.	F7
Connector Name	IGNITION COIL NO. 4 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	GR	–
2	B	–
3	W	–

Connector No.	F8
Connector Name	IGNITION COIL NO. 6 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	P	–
2	B	–
3	LG	–

ABBIA0526GB

Connector No.	F11
Connector Name	CRANKSHAFT POSITION SENSOR (POS)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	POWER SUPPLY
2	G	SIGNAL
3	BR	GND

Connector No.	F12
Connector Name	HEATED OXYGEN SENSOR 2 (BANK 2)
Connector Color	GREEN

H.S.

Terminal No.	Color of Wire	Signal Name
1	G	SIGNAL
2	R	HEATED GND
3	W/R	POWER SUPPLY
4	GR	GND O2

Connector No.	F13
Connector Name	HEATED OXYGEN SENSOR 2 (BANK 1)
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	SIGNAL
2	P	HEATED GND
3	W/R	POWER SUPPLY
4	GR	GND O2

Connector No.	F14
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
2	L	–
3	P	–
4	B/Y	–
5	O	–

Terminal No.	Color of Wire	Signal Name
8	B	–
15	BR	–
16	B	–
17	P	–
18	W	–
19	B	–
20	SB	–
23	GR	–
24	B	–

Connector No.	F15
Connector Name	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	–
2	GR	–

ABBIA0527GB

Connector No.	F18
Connector Name	FUEL INJECTOR NO. 2
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	W/G	–
2	O	–

Connector No.	F19
Connector Name	VIAS CONTROL SOLENOID VALVE
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	R	–
2	G	–

Connector No.	F20
Connector Name	FUEL INJECTOR NO. 4
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	W/G	–
2	R	–

Connector No.	F21
Connector Name	CONDENSER-1
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	–
2	B	–

Connector No.	F22
Connector Name	FUEL INJECTOR NO. 6
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	W/G	–
2	V	–

Connector No.	F23
Connector Name	CAMSHAFT POSITION SENSOR (PHASE) (BANK 2)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	BR	GND
2	Y	SIGNAL
3	R	POWER SUPPLY

ABBIA0528GB

Connector No.	F24
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	B	–

Connector No.	F26
Connector Name	WIRE TO WIRE
Connector Color	GREEN

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	L	–
3	SB	–
4	B	–
5	G	–
6	W	–
7	LG	–
8	R	–

Connector No.	F32
Connector Name	WIRE TO WIRE
Connector Color	WHITE

H.S.

Terminal No.	Color of Wire	Signal Name
1	W/R	–
2	L	–
3	P	–
9	V	–
10	G	–
11	GR	–
12	BR	–
13	LG	–
16	W/G	–

Connector No.	F44
Connector Name	WIRE TO WIRE
Connector Color	GREEN

H.S.

Terminal No.	Color of Wire	Signal Name
1	LG	–
2	SB	–
3	W/G	–
4	W	–

Connector No.	F46
Connector Name	POWER STEERING PRESSURE SENSOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	B	GND
2	P	SIGNAL
3	G	POWER SUPPLY

Connector No.	F50
Connector Name	ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	TPS1
2	L	AVCC2
3	R	TPS2
4	B	GND-A2
5	L/W	MOTOR 2 (CLOSE)
6	L/B	MOTOR 1 (OPEN)

ABBIA0529GB

Connector No.	F53
Connector Name	MASS AIR FLOW SENSOR
Connector Color	BLACK

Terminal No.	Color of Wire	Signal Name
2	LG	POWER SUPPLY
3	B	QA-
4	P	QA+
5	BR	AT SEN SIGNAL
6	B	GND

ABBIA0530GB

Connector No.	F54
Connector Name	ECM
Connector Color	BLACK

Terminal No.	Color of Wire	Signal Name
1	BR	GND
2	G	AF-H1
3	V	VMOT
4	L/W	MOTOR 2
5	L/B	MOTOR 1
6	R	O2HRL
7	–	–
8	–	–
9	–	–
10	W	CVTCL
11	LG	CVTCR
12	P	PSPRES
13	G	POS
14	Y	PHASE (LH)
15	W	KNK 1
16	BR	AF+2
17	–	–
18	–	–
19	–	–
20	–	–

Terminal No.	Color of Wire	Signal Name
21	W	INJ #5
22	LG	INJ #3
23	SB	INJ #1
24	G	AF-H2
25	P	O2HRR
26	–	–
27	–	–
28	–	–
29	G	VIAS
30	–	–
31	–	–
32	W	FTPRS
33	L	PHASE (RH)
34	BR	TA
35	O	AF+1
36	W	KNK 2
37	–	–
38	–	–
39	–	–
40	V	INJ #6
41	R	INJ #4
42	O	INJ #2
43	–	–
44	–	–
45	R	EVAP
46	–	–
47	L	AVCC 2
48	SB	AVCC
49	P	AVCC (PDPRES)
50	W	TPS 1
51	P	QA+
52	–	–
53	–	–

Terminal No.	Color of Wire	Signal Name
54	–	–
55	G	O2SRL
56	LG	AF-1
57	GR	AF-VM2
58	O	AF-1P2
59	–	–
60	SB	IGN #5
61	L	IGN #3
62	Y	IGN #1
63	–	–
64	–	–
65	–	–
66	B	GND-A2
67	B	GND-A
68	G	AVCC (PSPRESS)
69	R	TPS 2
70	BR	PDPRESS
71	–	–
72	–	–
73	Y	TW
74	W	O2SRR
75	P	AF-2
76	V	AF-UN2
77	Y	AF-IA2
78	GR	GND-O2
79	P	IGN #6
80	GR	IGN #4
81	G	IGN #2

ABBIA0531GB

Connector No.	F65
Connector Name	AIR FUEL RATIO (A/F) SENSOR 1 (BANK 1)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	BR	NEARNST VOLTAGE (RH)
2	P	TRIM CURRENT (RH)
3	W/R	HEATER + (RH)
4	G	HEATER - (RH)
5	O	VIRTUELLE GND (RH)
6	LG	PUMPING CURRENT (RH)

Connector No.	F66
Connector Name	PARK NEUTRAL POSITION (PNP) SWITCH
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	O	–
2	B/Y	–

Connector No.	F67
Connector Name	WIRE TO WIRE
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	–
2	GR	–
3	W	–
4	B	–

Connector No.	F70
Connector Name	CAMSHAFT POSITION SENSOR (PHASE) (BANK 1)
Connector Color	GREEN

H.S.

Terminal No.	Color of Wire	Signal Name
1	BR	GND
2	L	SIGNAL
3	R	POWER SUPPLY

Connector No.	F201
Connector Name	WIRE TO WIRE
Connector Color	GREEN

H.S.

Terminal No.	Color of Wire	Signal Name
1	V	–
2	G	–
3	W/G	–
4	L	–

Connector No.	F202
Connector Name	FUEL INJECTOR NO. 1
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	W/G	–
2	G	–

ABBIA0532GB

Connector No.	F203
Connector Name	FUEL INJECTOR NO. 3
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	W/G	–
2	V	–

Connector No.	F204
Connector Name	FUEL INJECTOR NO. 5
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	W/G	–
2	L	–

Connector No.	F225
Connector Name	WIRE TO WIRE
Connector Color	GREEN

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	L	–
3	V	–
4	B	–
5	O	–
6	W	–
7	LG	–
8	R	–

Connector No.	F226
Connector Name	IGNITION COIL NO. 1 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	Y	–
2	B	–
3	O	–

Connector No.	F227
Connector Name	IGNITION COIL NO. 3 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	L	–
2	B	–
3	W	–

Connector No.	F228
Connector Name	IGNITION COIL NO. 5 (WITH POWER TRANSISTOR)
Connector Color	GRAY

H.S.

Terminal No.	Color of Wire	Signal Name
1	V	–
2	B	–
3	W	–

ABBIA0533GB

Connector No.	F229
Connector Name	INTAKE VALVE TIMING CONTROL SOLENOID VALVE (BANK 1)
Connector Color	GREEN

H.S.

Terminal No.	Color of Wire	Signal Name
1	LG	–
2	R	–

Connector No.	F250
Connector Name	WIRE TO WIRE
Connector Color	BLUE

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	–
2	GR	–
3	W	–
4	B	–

Connector No.	F251
Connector Name	KNOCK SENSOR (BANK 1)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	KNK
2	GR	GND

Connector No.	C1
Connector Name	WIRE TO WIRE
Connector Color	BLACK

H.S.

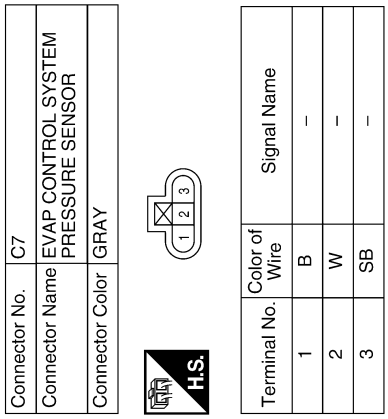
Terminal No.	Color of Wire	Signal Name
1C	Y	–
10C	W	–
11C	B	–
12C	SB	–
26C	G	–
27C	W	–
28C	R	–
29C	B	–

Connector No.	F252
Connector Name	KNOCK SENSOR (BANK2)
Connector Color	BLACK

H.S.

Terminal No.	Color of Wire	Signal Name
1	W	KNK
2	B	–

ABBIA0534GB



ABBIA0535GB

Fail-Safe Chart

INFOID:0000000005282190

When the DTC listed below is detected, the ECM enters fail-safe mode and the MIL illuminates.

<table>
<tr><th>DTC No.</th><th>Detected items</th><th colspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><td>P0102
P0103</td><td>Mass air flow sensor circuit</td><td colspan="2">Engine speed will not rise more than 2,400 rpm due to the fuel cut.</td></tr>
<tr><td rowspan="6">P0117
P0118</td><td rowspan="6">Engine coolant temperature sensor circuit</td><td colspan="2">Engine coolant temperature will be determined by ECM based on the following condition.
CONSULT-III displays the engine coolant temperature decided by ECM.</td></tr>
<tr><td>Condition</td><td>Engine coolant temperature decided
(CONSULT-III display)</td></tr>
<tr><td>Just as ignition switch is turned ON or START</td><td>40°C (104°F)</td></tr>
<tr><td>Approx. 4 minutes after engine starting</td><td>80°C (176°F)</td></tr>
<tr><td>Except as shown above</td><td>40 - 80°C (104 - 176°F)
(Depends on the time)</td></tr>
<tr><td colspan="2">When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.</td></tr>
<tr><td>P0122
P0123
P0222
P0223
P2135</td><td>Throttle position sensor</td><td colspan="2">The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.
The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.
So, the acceleration will be poor.</td></tr>
<tr><td rowspan="3">P1121</td><td rowspan="3">Electric throttle control actuator</td><td colspan="2">(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.</td></tr>
<tr><td colspan="2">(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.</td></tr>
<tr><td colspan="2">(When ECM detects the throttle valve is stuck open:)
While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls.
The engine can restart in N or P position (A/T), Neutral position (M/T), and engine speed will not exceed 1,000 rpm or more.</td></tr>
<tr><td>P1122</td><td>Electric throttle control function</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td>P1124
P1126</td><td>Throttle control motor relay</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td>P1128</td><td>Throttle control motor</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td>P1229</td><td>Sensor power supply</td><td colspan="2">ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.</td></tr>
<tr><td rowspan="4">P1805</td><td rowspan="4">Brake switch</td><td colspan="2">ECM controls the electric throttle control actuator by regulating the throttle opening to a small range.
Therefore, acceleration will be poor.</td></tr>
<tr><td>Vehicle condition</td><td>Driving condition</td></tr>
<tr><td>When engine is idling</td><td>Normal</td></tr>
<tr><td>When accelerating</td><td>Poor acceleration</td></tr>
<tr><td>P2122
P2123
P2127
P2128
P2138</td><td>Accelerator pedal position sensor</td><td colspan="2">The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees.
The ECM regulates the opening speed of the throttle valve to be slower than the normal condition.
So, the acceleration will be poor.</td></tr>
</table>

- When there is an open circuit on MIL circuit, the ECM cannot warn the driver by illuminating 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

DTC Inspection Priority Chart

INFOID:0000000005282191

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

NOTE:

- **If DTC U1000 and/or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-67.**

Priority	Detected items (DTC)
1	• U1000 U1001 CAN communication line • P0102 P0103 Mass air flow sensor • P0117 P0118 Engine coolant temperature sensor • P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor • P0327 P0328 P0332 P0333 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 P0345 Camshaft position sensor (PHASE) • P0605 ECM • P1229 Sensor power supply • P1610 - P1615 NATS • P1706 Park/neutral position (PNP) switch • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	• P0550 Power steering pressure sensor • P1031 P1032 P1051 P1052 Air fuel ratio (A/F) sensor 1 heater • P1065 ECM power supply • P1111 P1136 Intake valve timing control solenoid valve • P1122 Electric throttle control function • P1124 P1126 P1128 Electric throttle control actuator • P1217 Engine over temperature (OVERHEAT) • P1271 P1272 P1276 P1281 P1282 P1286 Air fuel ratio (A/F) sensor 1 • P1805 Brake switch
3	• P0011 P0021 Intake valve timing control • P1121 Electric throttle control actuator • P1211 TCS control unit • P1212 TCS communication line • P1564 ASCD steering switch • P1572 ASCD brake switch • P1715 INPUT SPEED SENSOR (TURBINE REVOLUTION SENSOR)

DTC Index

INFOID:0000000005282192

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

×: Applicable —: Not applicable

Items (CONSULT-III screen terms)	DTC*1		Trip	MIL	Reference page
	CONSULT-III	ECM*2			
CAN COMM CIRCUIT	U1000	1000*3	2	—	EC-67
CAN COMM CIRCUIT	U1001	1001*3	2	—	EC-67
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—	—	—
INT/V TIM CONT-B1	P0011	0011	2	—	EC-68
INT/V TIM CONT-B2	P0021	0021	2	—	EC-68
MAF SEN/CIRCUIT-B1	P0102	0102	1	×	EC-72
MAF SEN/CIRCUIT-B1	P0103	0103	1	×	EC-72

Items (CONSULT-III screen terms)	DTC*1		Trip	MIL	Reference page
	CONSULT-III	ECM*2			
ECT SEN/CIRC	P0117	0117	2	×	EC-76
ECT SEN/CIRC	P0118	0118	2	×	EC-76
TP SEN 2/CIRC-B1	P0122	0122	1	×	EC-79
TP SEN 2/CIRC-B1	P0123	0123	1	×	EC-79
TP SEN 1/CIRC-B1	P0222	0222	1	×	EC-83
TP SEN 1/CIRC-B1	P0223	0223	1	×	EC-83
KNOCK SEN/CIRC-B1	P0327	0327	2	—	EC-87
KNOCK SEN/CIRC-B1	P0328	0328	2	—	EC-87
KNOCK SEN/CIRC-B2	P0332	0332	2	—	EC-87
KNOCK SEN/CIRC-B2	P0333	0333	2	—	EC-87
CKP SEN/CIRCUIT	P0335	0335	2	×	EC-90
CMP SEN/CIRC-B1	P0340	0340	2	×	EC-94
CMP SEN/CIRC-B2	P0345	0345	2	×	EC-94
PW ST P SEN/CIRC	P0550	0550	2	—	EC-98
ECM	P0605	0605	1 or 2	× or —	EC-101
A/F SEN1 HTR (B1)	P1031	1031	2	×	EC-103
A/F SEN1 HTR (B1)	P1032	1032	2	×	EC-103
A/F SEN1 HTR (B2)	P1051	1051	2	×	EC-103
A/F SEN1 HTR (B2)	P1052	1052	2	×	EC-103
ECM BACK UP/CIRCUIT	P1065	1065	2	×	EC-106
INT/V TIM V/CIR-B1	P1111	1111	2	×	EC-108
ETC ACTR-B1	P1121	1121	1	×	EC-111
ETC FUNCTION/CIRC-B1	P1122	1122	1	×	EC-113
ETC MOT PWR	P1124	1124	1	×	EC-117
ETC MOT PWR-B1	P1126	1126	1	×	EC-117
ETC MOT-B1	P1128	1128	1	×	EC-120
INT/V TIM V/CIR-B2	P1136	1136	2	×	EC-108
TCS C/U FUNCTION	P1211	1211	2	—	EC-122
TCS/CIRC	P1212	1212	2	—	EC-123
ENG OVER TEMP	P1217	1217	1	×	EC-124
CTP LEARNING-B1	P1225	1225	2	—	EC-128
CTP LEARNING-B1	P1226	1226	2	—	EC-130
SENSOR POWER/CIRCUIT	P1229	1229	1	×	EC-132
A/F SENSOR1 (B1)	P1271	1271	2	×	EC-135
A/F SENSOR1 (B1)	P1272	1272	2	×	EC-139
A/F SENSOR1 (B1)	P1276	1276	2	×	EC-143
A/F SENSOR1 (B2)	P1281	1281	2	×	EC-135
A/F SENSOR1 (B2)	P1282	1282	2	×	EC-139
A/F SENSOR1 (B2)	P1286	1286	2	×	EC-143
ASCD SW	P1564	1564	1	—	EC-147
ASCD BRAKE SW	P1572	1572	1	—	EC-151
LOCK MODE	P1610	1610	2	—	SEC-25
ID DISCORD IMMU-ECM	P1611	1611	2	—	SEC-22

Items (CONSULT-III screen terms)	DTC*1		Trip	MIL	Reference page
	CONSULT-III	ECM*2			
CHAIN OF ECM-IMMU	P1612	1612	2	—	SEC-24
CHAIN OF IMMU-KEY	P1614	1614	2	—	SEC-18
DIFFERENCE OF KEY	P1615	1615	2	—	SEC-21
P-N POS SW/CIRCUIT	P1706	1706	2	×	EC-161
IN PLUY SPEED	P1715	1715	2	—	EC-164
BRAKE SW/CIRCUIT	P1805	1805	1	×	EC-165
APP SEN 1/CIRC	P2122	2122	1	×	EC-168
APP SEN 1/CIRC	P2123	2123	1	×	EC-168
APP SEN 2/CIRC	P2127	2127	1	×	EC-171
APP SEN 2/CIRC	P2128	2128	1	×	EC-171
TP SENSOR-B1	P2135	2135	1	×	EC-175
APP SENSOR	P2138	2138	1	×	EC-179

*1: 1st trip DTC No. is the same as DTC No.

*2: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*3: The troubleshooting for this DTC need CONSULT-III.

Emission-related Diagnostic Information

INFOID:0000000005282193

DTC AND 1ST TRIP DTC

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

If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not illuminate (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 illuminates. In other words, the DTC is stored in the ECM memory and the MIL illuminates 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 illuminate 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”.

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-6, "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

CONSULT-III display the DTC in “SELF-DIAG RESULTS” mode. Examples: P0340, P1706, etc.
(CONSULT-III also displays the malfunctioning component or system.)

Without CONSULT-III

The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0340, 1706, etc.

These DTCs are controlled by NISSAN.

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

DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT-III. Time data indicates how many times the vehicle was driven after the last detection of a DTC.

If the DTC is being detected currently, the time data will be [0].
If a 1st trip DTC is stored in the ECM, the time data will be [1t].

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. For details, see Freeze Frame Data.
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.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in “HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION”.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

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 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 (see EC-269, "DTC Index"), skip step 1.

1. Erase DTC in TCM. Refer to TM-95, "CONSULT-III Function (TRANSMISSION)".
2. Select “ENGINE” with CONSULT-III.
3. Select “SELF-DIAG RESULTS”.
4. Touch “ERASE”. (DTC in ECM will be erased.)

Without 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 (see EC-269, "DTC Index"), skip step 1.**

1. Erase DTC in ECM. Refer to HOW TO ERASE DIAGNOSTIC TEST MODE II (SELF-DIAGNOSTIC RESULTS).
2. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal.

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

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

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.

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM SYMPTOMS

Symptom Matrix Chart

INFOID:0000000005282194

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-206
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-284
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-202
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-37
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-225
	Incorrect idle speed adjustment						1	1	1	1		1			EC-12
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-113, EC-111
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-12
	Ignition circuit	1	1	2	2	2		2	2			2			EC-220
Power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-63
Mass air flow sensor circuit		1			2										EC-72
Engine coolant temperature sensor circuit							3			3					EC-76
Air fuel ratio (A/F) sensor 1			1	2	3	2		2	2			2			EC-143 EC-135 EC-139
Throttle position sensor circuit							2			2					EC-79, EC-83, EC-128, EC-130, EC-175
Accelerator pedal position sensor circuit				3	2	1									EC-63, EC-168, EC-171, EC-179
Knock sensor circuit				2								3			EC-87
Crankshaft position sensor (POS) circuit		2	2												EC-90
Camshaft position sensor (PHASE) circuit		3	2												EC-94

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Vehicle speed signal circuit		2	3		3						3			EC-234
Power steering pressure sensor circuit		2					3	3						EC-98
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-106, EC-101
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-108
PNP signal circuit			3		3		3	3			3			EC-161
VIAS control solenoid valve circuit					1									EC-230
Refrigerant pressure sensor circuit		2				3			3		4			EC-227
Electrical load signal circuit							3							EC-193
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-53
ABS actuator and electric unit (control unit)			4											BRC-6, BRC-65

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FL-6
	Fuel piping			5	5	5		5	5			5			FL-5
	Vapor lock														—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—
Air	Air duct	5	5	5	5	5	5	5	5	5		5			EM-24
	Air cleaner														EM-24
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)														EM-24
	Electric throttle control actuator														EM-25
	Air leakage from intake manifold/ Collector/Gasket														EM-25, EM-28
Cranking	Battery	1	1	1		1		1	1			1		1	PG-6
	Generator circuit														CHG-4
	Starter circuit	3													STR-4
	Signal plate	6													EM-109
	PNP signal	4													TM-108
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-90
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-109
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			EM-58
	Camshaft														EM-72
	Intake valve timing control														EM-58
	Intake valve												3		EM-90
	Exhaust valve														

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			EM-84, EM-31
	Three way catalyst														
Lubrica-tion	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-34, EM-109, LU-10, LU-6
	Oil level (Low)/Filthy oil														LU-7
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-10
	Thermostat									5					CO-26
	Water pump														CO-21
	Water gallery														CO-28
	Cooling fan									5					CO-18
	Coolant level (Low)/Contaminat-ed coolant									5					CO-10
NATS (Nissan Anti-Theft system)		1	1												SEC-3

1 - 6: The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

Fuel Cut Control (at No Load and High Engine Speed)

INFOID:0000000005282195

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Park/neutral position (PNP) signal	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		
Wheel sensor	Vehicle speed*		

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

SYSTEM DESCRIPTION

If the engine speed is above 1,800 rpm under no load (for example, the shift position is neutral and engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under EC-28, "System Description".

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000005683356

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the “SRS AIR BAG” and “SEAT BELT” of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the “SRS AIR BAG”.**
- **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

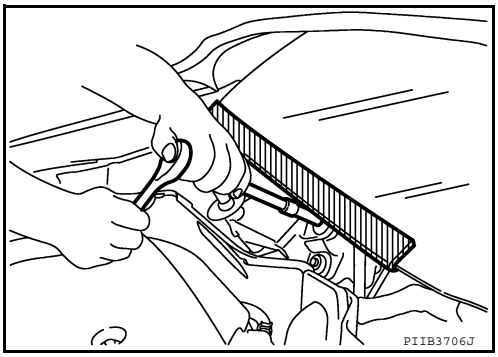
WARNING:

- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag 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:0000000005683370

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:0000000005282198

The ECM has an on board diagnostic system. It will illuminate the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

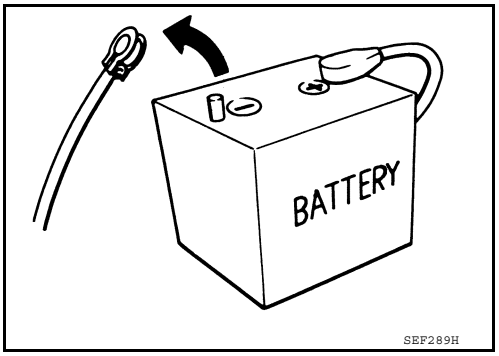
- **Always to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to illuminate.**
- **Always to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to illuminate due to the open circuit. (Always the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-61.**

- **Always to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to illuminate due to the short circuit.**
- **Always to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to illuminate due to the malfunction of the EVAP system or fuel injection system, etc.**
- **Always to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

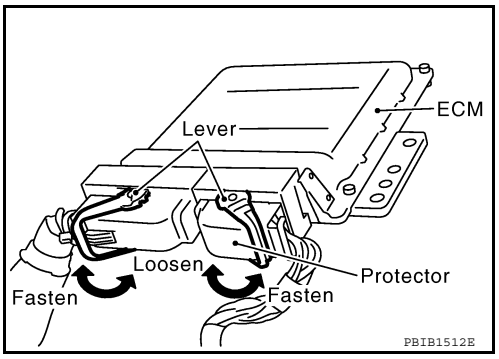
Precaution

INFOID:0000000005282199

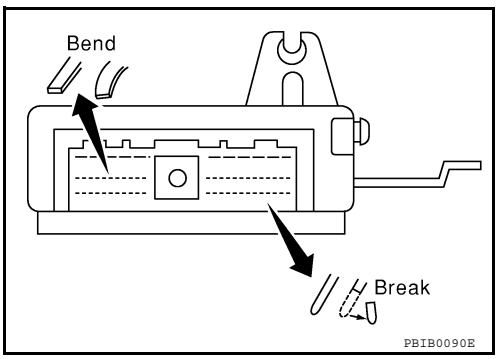
- **Always use a 12 volt battery as power source.**
- **Never attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect negative battery cable.**



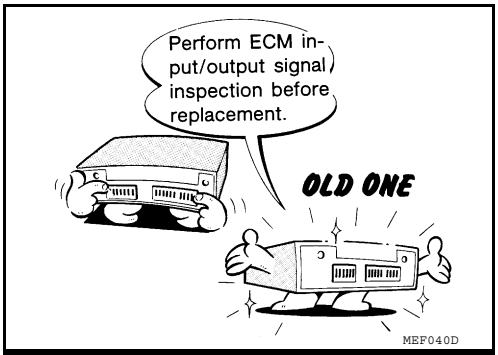
- **Never disassemble ECM.**
- **If a battery cable is disconnected, the memory will return to the ECM value.**
  The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Never replace parts because of a slight variation.
- **If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.**
  - **Diagnostic trouble codes**
  - **1st trip diagnostic trouble codes**
  - **Freeze frame data**
  - **1st trip freeze frame data**
- **When connecting ECM harness connector, fasten it securely with levers as far as they will go as shown in the figure.**



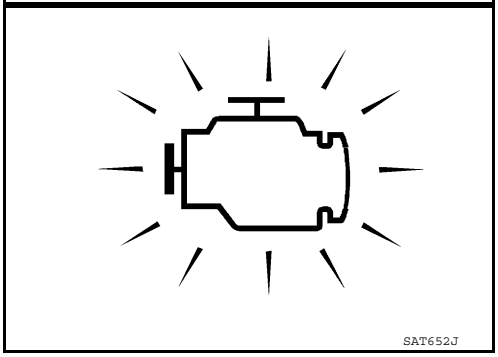
- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Check that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause 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.**



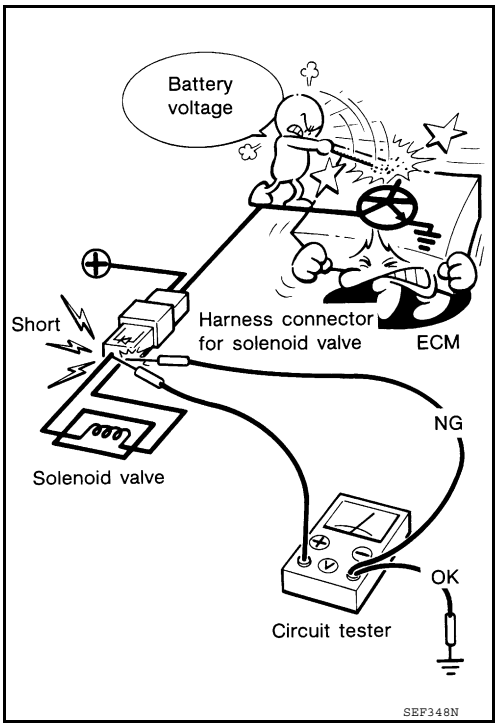
- **Before replacing ECM, perform “ECM Terminals and Reference Value” inspection and check ECM functions properly. Refer to EC-238, "ECM Terminal and Reference Value".**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Never clean mass air flow sensor with any type of detergent.**
- **Never disassemble electric throttle control actuator.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Never shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**



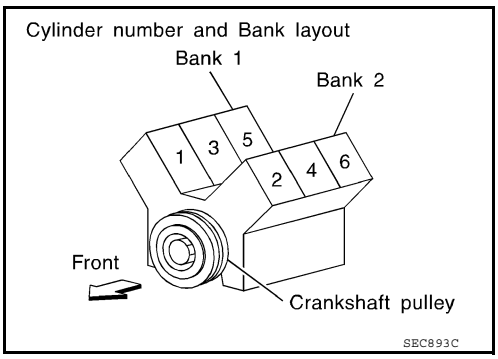
- **After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Overall Function Check.**
  The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Overall Function Check should be a good result if the repair is completed.



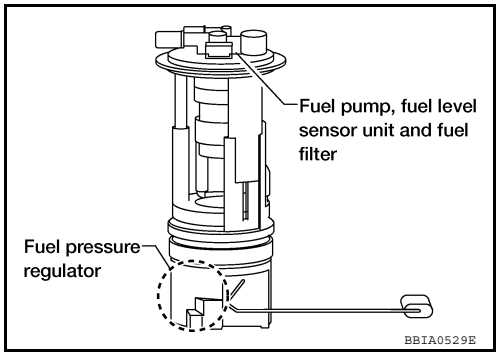
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Never use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**



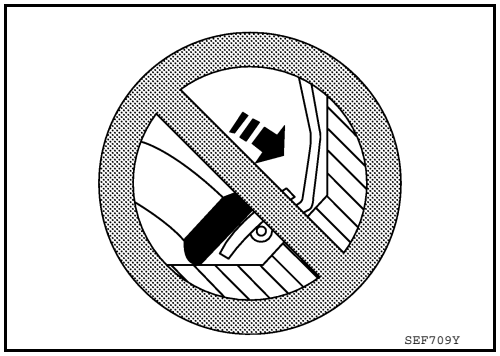
- **B1 indicates the bank 1, B2 indicates the bank 2 as shown in the figure.**



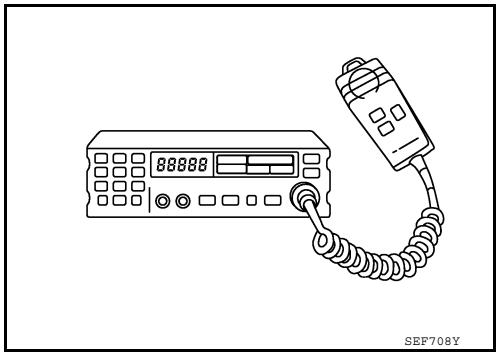
- **Never operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**



- **Never depress accelerator pedal when starting.**
- **Immediately after starting, never rev up engine unnecessarily.**
- **Never rev up engine just prior to shutdown.**



- **When installing C.B. ham radio or a mobile phone, always to observe the following as it may adversely affect electronic control systems depending on installation location.**
  - **Keep the antenna as far as possible from the electronic control units.**
  - **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
    Never let them run parallel for a long distance.
  - **Adjust the antenna and feeder line so that the standing-wave radio can be kept smaller.**
  - **Always to ground the radio to vehicle body.**



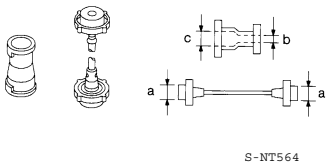
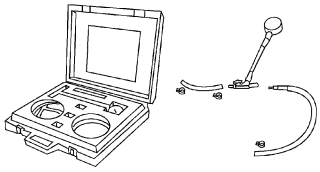
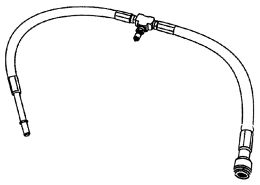
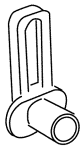
PREPARATION

PREPARATION

Special Service Tool

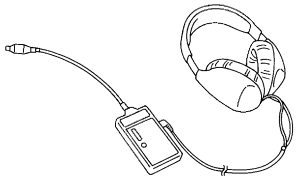
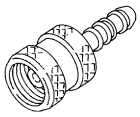
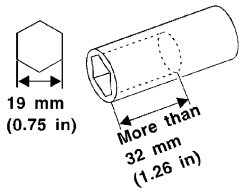
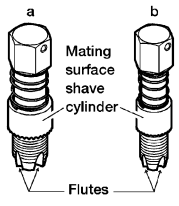
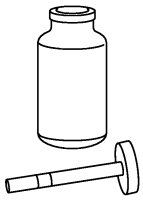
INFOID:0000000005282200

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (SPX-North America No.) Tool name	Description
EG17650301 (J-33984-A) Radiator cap tester adapter  S-NT564	Adapts radiator cap tester to radiator cap and radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)
(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.
(J-45488) Quick connector release  PBIC0198E	Remove fuel tube quick connectors in engine room

Commercial Service Tool

INFOID:0000000005282201

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
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)	 AEM488	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)	 S-NT779	Lubricates oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

ON-VEHICLE MAINTENANCE

FUEL PRESSURE

Fuel Pressure Check

INFOID:0000000005282202

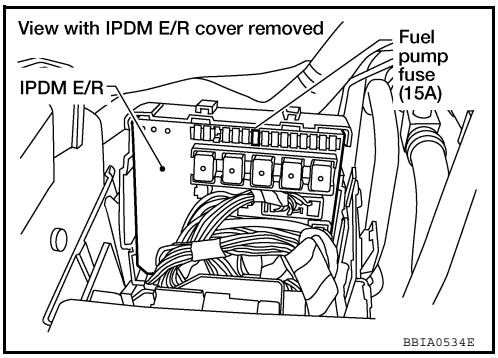
FUEL PRESSURE RELEASE

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

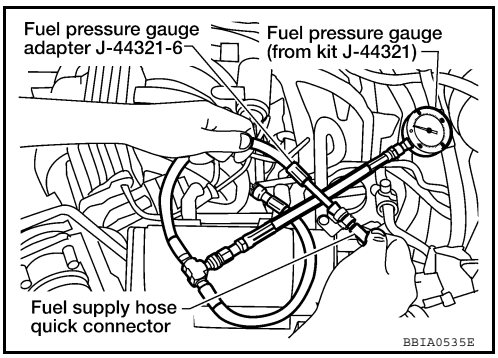
CAUTION:

Never scratch or get the fuel hose connection area dirty when servicing, so that the quick connector o-ring maintains sealability.

NOTE:

- **Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because N50 models do not have fuel return system.**
- **Use Fuel Pressure Gauge Kit J-44321 and Fuel Pressure Adapter J-44321-6 to check fuel pressure.**

1. Release fuel pressure to zero. Refer to “FUEL PRESSURE RELEASE”.
2. Remove fuel hose using Quick Connector Release J-45488. Refer to EM-28.
   - Do not twist or kink fuel hose because it is plastic hose.
   - Do not remove fuel hose from quick connector.
   - Keep fuel hose connections clean.
3. Install Fuel Pressure Adapter J-44321-6 and Fuel Pressure Gauge (from kit J-44321) as shown in figure.
   - Do not distort or bend fuel rail tube when installing fuel pressure gauge adapter.
   - When reconnecting fuel hose, check the original fuel hose for damage and abnormality.
4. Turn ignition switch ON (reactivate fuel pump), and check for fuel leakage.
5. Start engine and check for fuel leakage.
6. Read the indication of fuel pressure gauge.
   - During fuel pressure check, check for fuel leakage from fuel connection every 3 minutes.



At idling: Approximately 350 kPa (3.57 kg/cm^2, 51 psi)

7. If result is unsatisfactory, go to next step.

8. Check the following.
   - Fuel hoses and fuel tubes for clogging
   - Fuel filter for clogging
   - Fuel pump
   - Fuel pressure regulator for clogging

   If OK, replace fuel pressure regulator.
   If NG, repair or replace.
9. 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

How to Detect Fuel Vapor Leakage

INFOID:0000000005282203

CAUTION:

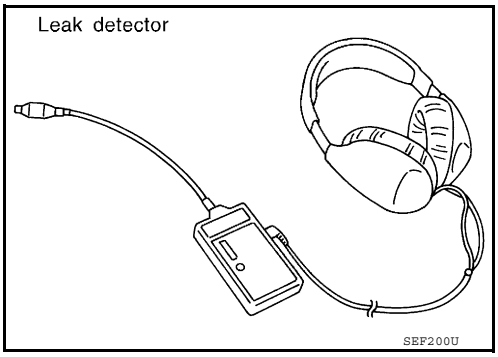
- **Never use compressed air or a high pressure pump.**
- **Never exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in EVAP system.**

NOTE:

- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

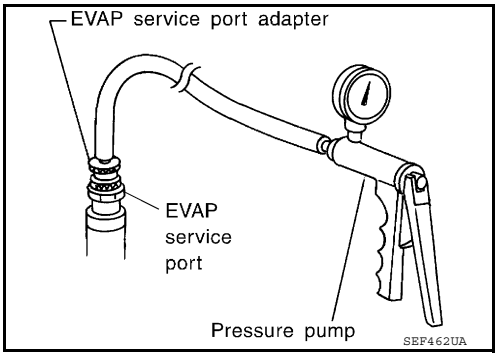
WITH CONSULT-III

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-37, "Description".



WITHOUT CONSULT-III

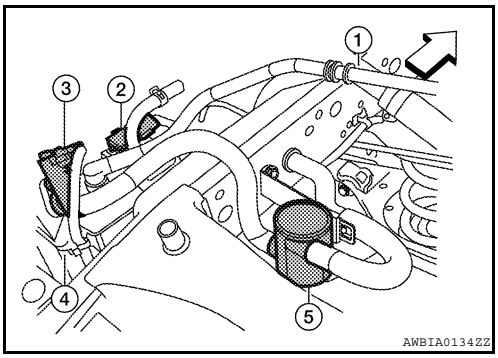
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump with pressure gauge to the EVAP service port adapter.



3. Apply battery voltage between the terminals of EVAP canister vent control valve (3) to make a closed EVAP system.

- Fuel filler pipe (top of frame view) (1)
- EVAP control system pressure sensor (2)
- EVAP canister (4)
- Drain filter (5)
- ⇦: Vehicle front

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-37, "Description".



ON-VEHICLE REPAIR

EVAP CANISTER

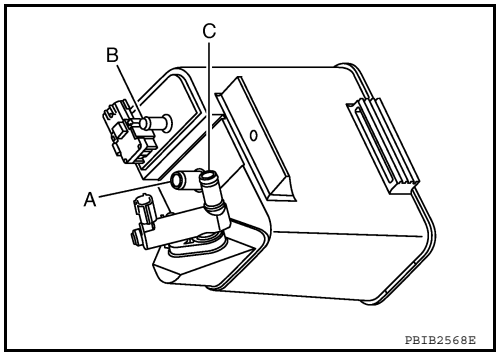
Component Inspection

INFOID:0000000005282204

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.

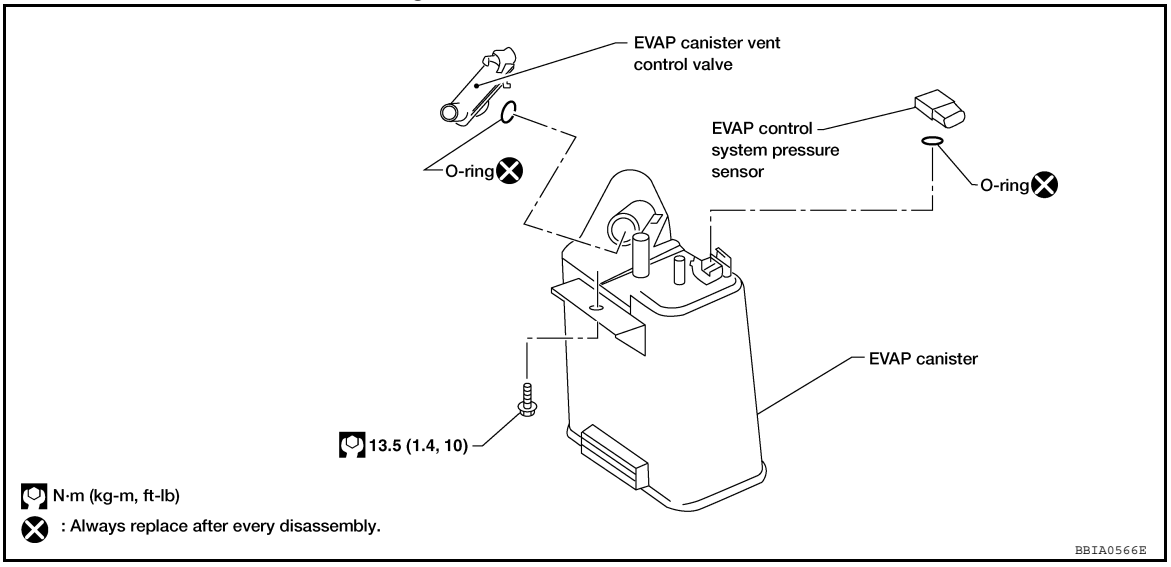


Removal and Installation

INFOID:0000000005282205

EVAP CANISTER

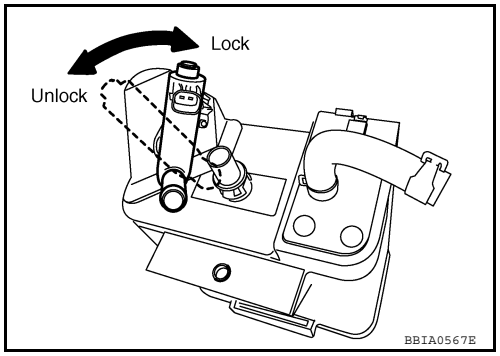
Tighten EVAP canister as shown in the figure.



EVAP CANISTER VENT CONTROL VALVE

1. Turn EVAP canister vent control valve counterclockwise.
2. Remove the EVAP canister vent control valve.

Always replace O-ring with a new one.



SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Fuel Pressure

INFOID:0000000005282206

Fuel pressure at idling kPa (kg/cm^2, psi)	Approximately 350 (3.57, 51)

Idle Speed and Ignition Timing

INFOID:0000000005282207

Target idle speed	No load* [in P or N position (A/T), Neutral position (M/T)]	625 ± 50 rpm
Air conditioner: ON	In P or N position (A/T), Neutral position (M/T)	625 rpm or more
Ignition timing	In P or N position (A/T), Neutral position (M/T)	15 ± 5° BTDC

*: 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:0000000005282208

Condition	Calculated load value% (Using CONSULT-III)
At idle	5 - 35
At 2,500 rpm	5 - 35

Mass Air Flow Sensor

INFOID:0000000005282209

Supply voltage	Battery voltage (11 - 14V)
Output voltage at idle	0.9 - 1.2*V
Mass air flow (Using CONSULT-III)	2.0 - 6.0 g·m/sec at idle* 7.0 - 20.0 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:0000000005282210

Temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

Engine Coolant Temperature Sensor

INFOID:0000000005282211

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:0000000005282212

Resistance [at 25°C (77°F)]	1.80 - 2.44Ω

Heated Oxygen sensor 2 Heater

INFOID:0000000005282213

Resistance [at 25°C (77°F)]	9.9 - 13.3Ω

Crankshaft Position Sensor (POS)

INFOID:0000000005282214

Refer to EC-92, "Component Inspection".

Camshaft Position Sensor (PHASE)

INFOID:0000000005282215

Refer to EC-97, "Component Inspection".

Throttle Control Motor

INFOID:0000000005282216

Resistance [at 25°C (77°F)]	Approximately 1 - 15Ω

Fuel Injector

INFOID:0000000005282217

Resistance [at 10 - 60°C (50 - 140°F)]	11.1 - 14.5Ω

Fuel Pump

INFOID:0000000005282218

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω