

SECTION **EC**
ENGINE CONTROL SYSTEM

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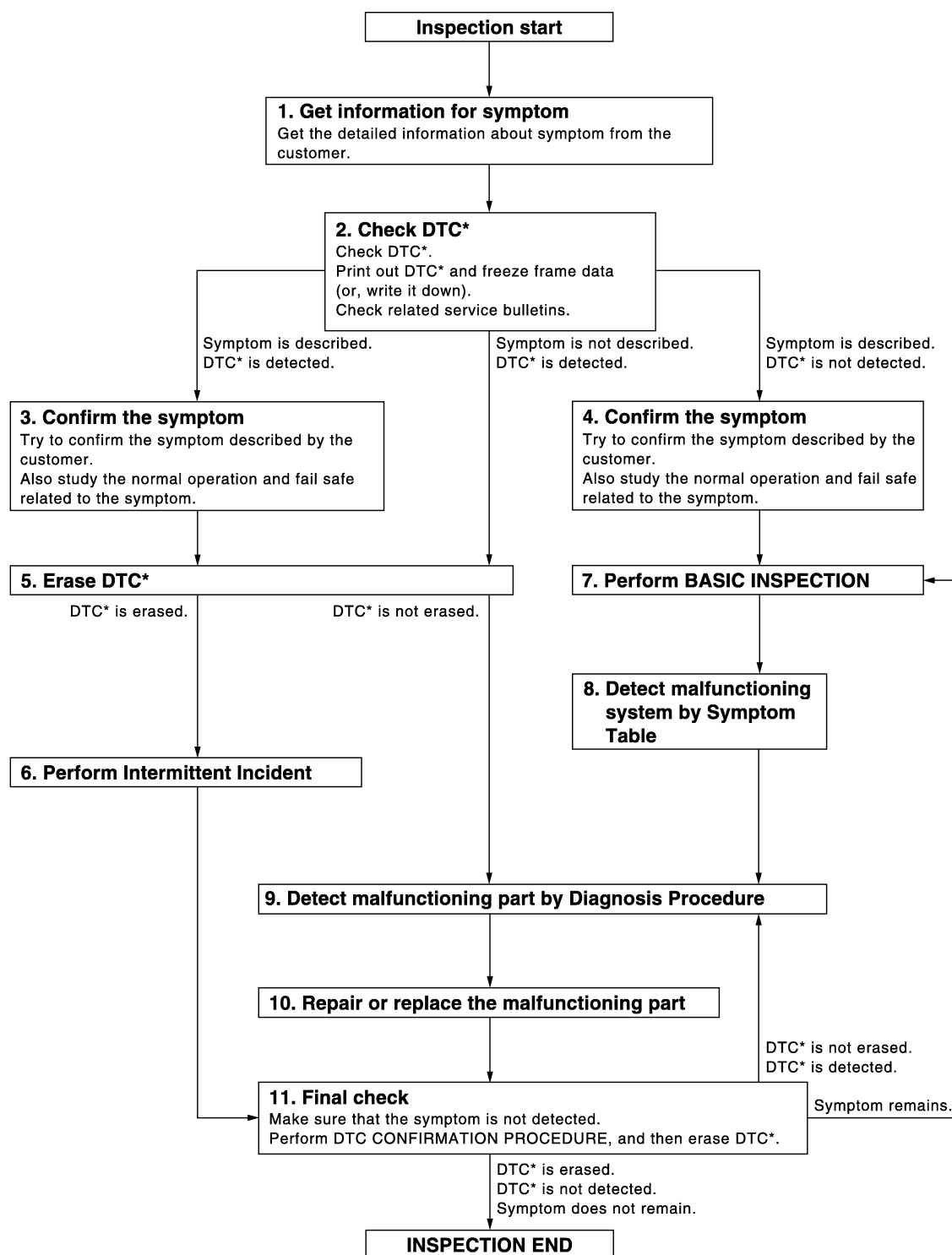
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORK FLOW

Work Flow

INFOID:000000004942081

OVERALL SEQUENCE



*: Include 1st/2nd trip DTC.

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DETAILED FLOW

< BASIC INSPECTION >

1.GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the "Diagnostic Work Sheet". (Refer to [EC-7, "Diagnostic Work Sheet"](#).)

>> GO TO 2.

2.CHECK DTC

1. Check DTC.
2. Perform the following procedure if DTC is displayed.
 - Record DTC and freeze frame data. (Print them out with CONSULT-III or GST.)
 - Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Matrix Chart is useful. Refer to [EC-240, "Symptom Table"](#).)
3. Check related service bulletins for information.

Is any symptom described and is any DTC detected?

Symptom is described, DTC is detected>>GO TO 3.

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

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

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MI ON).

Also study the normal operation related to the symptom. Refer to [EC-243, "Description"](#).

Diagnostic Work Sheet is useful to verify the incident.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.

Also study the normal operation related to the symptom. Refer to [EC-243, "Description"](#).

Diagnostic Work Sheet is useful to verify the incident.

Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 7.

5.ERASE DTC

Erase DTC.

NOTE:

DTC cannot be erased while it is being detected. DTC can only be erased when ECM judges that a malfunction causing the applicable DTC is repaired.

Is DTC erased?

YES >> GO TO 6.

NO >> GO TO 9.

6.PERFORM INTERMITTENT INCIDENT

Perform Intermittent Incident. Refer to [EC-54, "Description"](#).

>> GO TO 11.

7.PERFORM BASIC INSPECTION

Perform [EC-9, "BASIC INSPECTION : Special Repair Requirement"](#).

>> GO TO 8.

8.DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to [EC-240, "Symptom Table"](#) based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 9.

9. DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure. For details, refer to [GI-22, "How to Perform Efficient Diagnosis for an Electrical Incident"](#).

Is malfunctioning part detected?

YES >> GO TO 10.

NO >> Monitor input data from related sensors or check voltage of related ECM terminals using CONSULT-III. Refer to [EC-226, "Reference Value"](#).

10. REPAIR OR REPLACE THE MALFUNCTIONING PART

Repair or replace the malfunctioning part.

Another DTC may be detected if parts or connectors are disconnected during the inspection. After repair and replacement, reconnect parts or connectors that are disconnected during the inspection. If DTC is displayed, perform DTC Confirmation Procedure for the applicable DTC, and then erase it.

>> GO TO 11.

11. FINAL CHECK

Erase DTC after performing DTC Confirmation Procedure for the applicable DTC, or perform Component Function Check and check that the repair is complete.

When symptom is described from the customer, refer to confirmed symptom in step 3 or 4, and check that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 9.

YES-2 >> Symptom remains: GO TO 7.

NO >> Before returning the vehicle to the customer, check that DTC is erased.

Diagnostic Work Sheet

INFOID:000000004942082

DESCRIPTION

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.

In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.

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

Some conditions may cause the MI to come on steady and DTC to be detected.

KEY POINTS

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

SEF907L

WORKSHEET SAMPLE

MTBL0533

< BASIC INSPECTION >

INSPECTION AND ADJUSTMENT

BASIC INSPECTION

BASIC INSPECTION : Special Repair Requirement

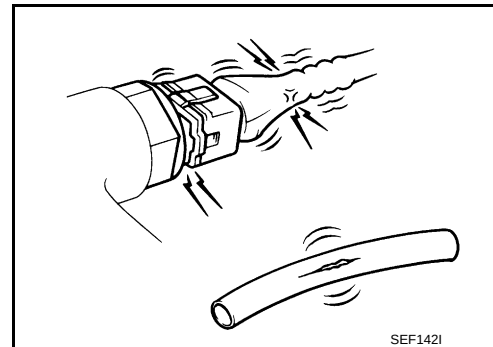
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EC

1.INSPECTION START

1. Check service records for any recent repairs that may indicate a related incident.
2. Check the current need for scheduled maintenance, especially for fuel filter and air cleaner filter. Refer to [MA-6, "Periodic Maintenance"](#).
3. Open engine hood and check the following:
 - Harness connectors for improper connections
 - Vacuum hoses for splits, kinks, or improper connections
 - Wiring for improper connections, pinches, or cuts
4. Confirm that electrical or mechanical loads are not applied.
 - Headlamp switch is OFF.
 - Air conditioner switch is OFF.
 - Steering wheel is in the straight-ahead position, etc.
5. Start engine and warm it up to the normal operating temperature.

>> GO TO 2.



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2.CHECK IDLE SPEED

Check idle speed.

For procedure, refer to [EC-11, "IDLE SPEED : Special Repair Requirement"](#).

For specification, refer to [EC-247, "Idle Speed"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 3.

3.CHECK FOR INTAKE AIR LEAK

Listen for intake air leakage after the mass air flow sensor.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace.

4.BLEED AIR FROM FUEL SYSTEM

1. Stop engine.
2. Use priming pump to bleed air from fuel system. Refer to [FL-4, "Air Bleeding"](#).

>> GO TO 5.

5.CHECK IDLE SPEED AGAIN

1. Start engine.
2. Check idle speed.
 - For procedure, refer to [EC-11, "IDLE SPEED : Special Repair Requirement"](#).
 - For specification, refer to [EC-247, "Idle Speed"](#).

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

6.DRAIN WATER FROM FUEL FILTER

1. Stop engine.
2. Drain water from fuel filter. Refer to [FL-5, "Draining Water"](#).

< BASIC INSPECTION >

>> GO TO 7.

7.CHECK IDLE SPEED AGAIN

1. Start engine.
2. Check idle speed.
For procedure, refer to [EC-11, "IDLE SPEED : Special Repair Requirement"](#).
For specification, refer to [EC-247, "Idle Speed"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >> GO TO 8.

8.CHECK AIR CLEANER FILTER

1. Stop engine.
2. Check air cleaner filter for clogging or breaks.

Is the inspection result normal?

- YES >> GO TO 9.
NO >> Replace air cleaner filter.

9.CHECK BATTERY VOLTAGE

Check battery voltage.

Voltage: More than 12.13V

Is the inspection result normal?

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

10.CHECK BATTERY

Refer to [SC-4, "Battery Test and Charging Chart"](#).

Is the inspection result normal?

- YES >> Check charging system. Refer to [SC-11, "Trouble Diagnosis"](#).
NO >> Repair or replace.

11.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to [EM-73, "On-Vehicle Service"](#).

Is the inspection result normal?

- YES >> GO TO 12.
NO >> Follow the instruction of "CHECKING COMPRESSION PRESSURE".

12.CHECK IDLE SPEED AGAIN

Check idle speed.

For procedure, refer to [EC-11, "IDLE SPEED : Special Repair Requirement"](#).
For specification, refer to [EC-247, "Idle Speed"](#).

Is the inspection result normal?

- YES >> INSPECTION END
NO >>
 1. Replace fuel injector.
 2. Perform [EC-11, "INJECTOR ADJUSTMENT VALUE REGISTRATION : Special Repair Requirement"](#).
 3. GO TO 2.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Description

INFOID:000000004942084

When replacing ECM, this procedure must be performed.

ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Re-

Requirement

INFOID:000000004942085

1.PERFORM INJECTOR ADJUSTMENT VALUE REGISTRATION

Refer to [EC-11, "INJECTOR ADJUSTMENT VALUE REGISTRATION : Special Repair Requirement"](#).

>> GO TO 2.

2.PERFORM EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING

Refer to [EC-12, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).

>> END

IDLE SPEED

IDLE SPEED : Description

INFOID:000000004942086

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

IDLE SPEED : Special Repair Requirement

INFOID:000000004942087

1.CHECK IDLE SPEED

With CONSULT-III

Check "CKPS-RPM(TDC)" in "DATA MONITOR" mode with CONSULT-III.

With GST

Check idle speed with Service \$01 of GST.

>> INSPECTION END

INJECTOR ADJUSTMENT VALUE REGISTRATION

INJECTOR ADJUSTMENT VALUE REGISTRATION : Description

INFOID:000000004942088

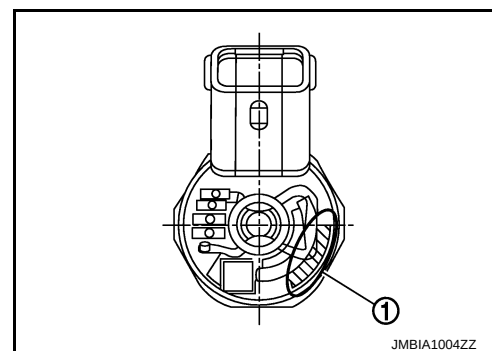
Injector adjustment value (1) indicates manufacturing tolerance and the value is printed on the top of fuel injector. (Example: C1TGMA)
The injector adjustment value which is correctly stored in ECM is needed for precise fuel injection control.

A performance of emission control and a drivability may effect when there is a mismatch between the following two values.

- The injector adjustment value stored in ECM
- The injector adjustment value of the injector which is installed on the vehicle

Injector adjustment value registration must be performed after the following cases.

- Fuel injector(s) are replaced.
In this case, injector adjustment value registration for the replaced fuel injector must be performed.
- ECM is replaced.
In this case, injector adjustment value registration for all the fuel injectors must be performed.



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INJECTOR ADJUSTMENT VALUE REGISTRATION : Special Repair Requirement

INFOID:000000004942089

1.START

NOTE:

- Before performing this procedure, record injector adjustment value printed on a fuel injector.

1. Turn ignition switch ON (engine stopped).
2. Select "ENTER INJCTR CALIB DATA" in "WORK SUPPORT" mode with CONSULT-III.
3. Touch "START".

NOTE:

When touching "START", CONSULT-III reads injector adjustment values stored in ECM.

4. Select the number of the cylinder which needs injector adjustment value registration.
5. Input injector adjustment value.

NOTE:

Input injector adjustment value is stored in CONSULT-III.

6. Repeat step 4 - 5 till there is no cylinder which needs injector adjustment value registration, and touch "START".

NOTE:

When touching "START", injector adjustment values stored in CONSULT-III are written onto ECM memory.

7. After "CMND FINISHED" is displayed, check that the following values are same for each cylinder.
 - Injector adjustment value which is printed on a fuel injector.
 - Injector adjustment value which is displayed on CONSULT-III screen.

NOTE:

- In this step, CONSULT-III reads injector adjustment values stored in ECM and displays the values on the CONSULT-III screen. This is for checking if injector adjustment values are written onto ECM memory correctly.
 - If DTC is detected, perform DTC CONFIRMATION PROCEDURE for the DTC, and then erase DTC.
8. Turn ignition switch OFF and wait at least 30 seconds.

>> END

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING VALUE CLEAR

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING VALUE CLEAR : Description

INFOID:0000000004942090

EGR volume control valve closed position learning value should be cleared under the following cases.

- EGR volume control valve is removed.
- EGR volume control valve is replaced.

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING VALUE CLEAR : Special Repair Requirement

INFOID:0000000004942091

1.START

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Turn ignition switch ON.
4. Select "EGR/V LEARN CLR" in "WORK SUPPORT" mode with CONSULT-III.
5. Touch "CLEAR" and wait a few seconds.
6. Check that the "CMPLT" is displayed on CONSULT-III screen.

>> END

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Description

INFOID:0000000004942092

EGR Volume Control Valve Closed Position Learning is an operation to learn the fully closed position of the EGR volume control valve by monitoring the EGR volume control valve control position sensor output signal. It must be performed under any of the following conditions:

- EGR volume control valve is removed.
- EGR volume control valve is replaced.
- ECM is replaced.

EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair

Requirement

INFOID:000000004942093

1.START

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 30 seconds.
Check that EGR volume control valve moves during above 30 seconds by confirming the operating sound.

>> END

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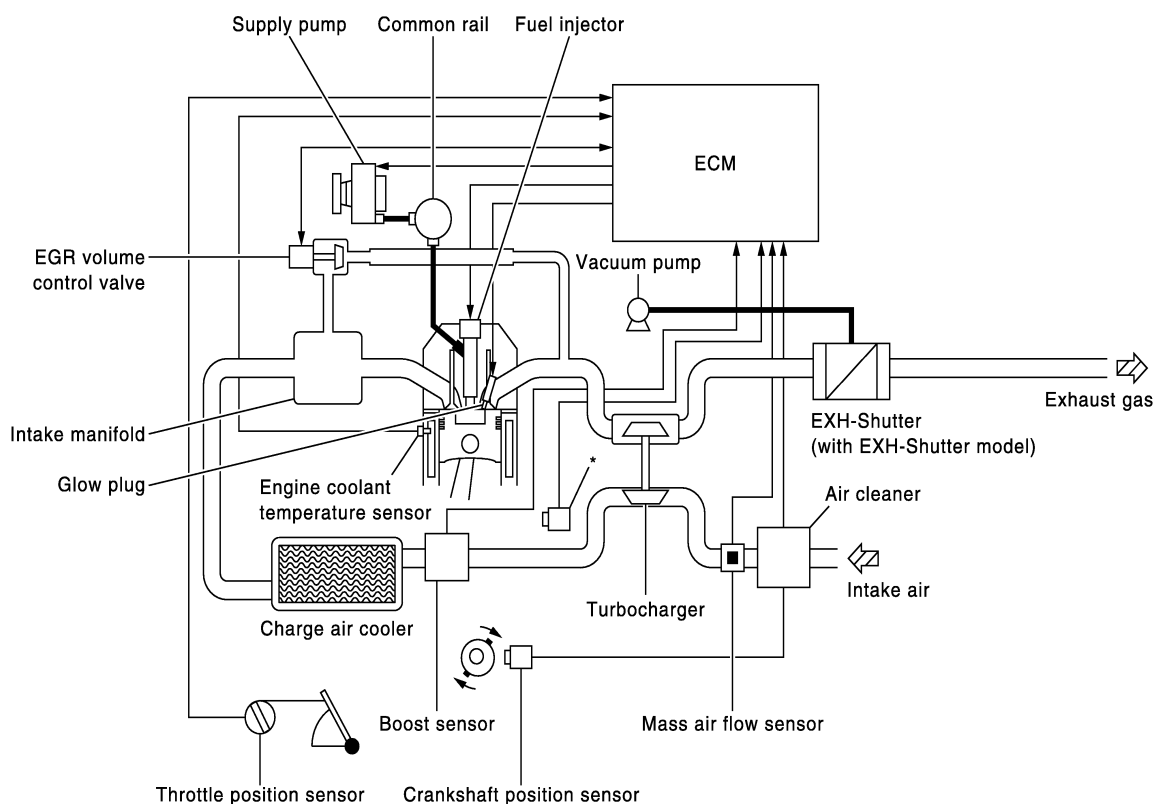
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FUNCTION DIAGNOSIS

ENGINE CONTROL SYSTEM

System Diagram

INFOID:000000004942096



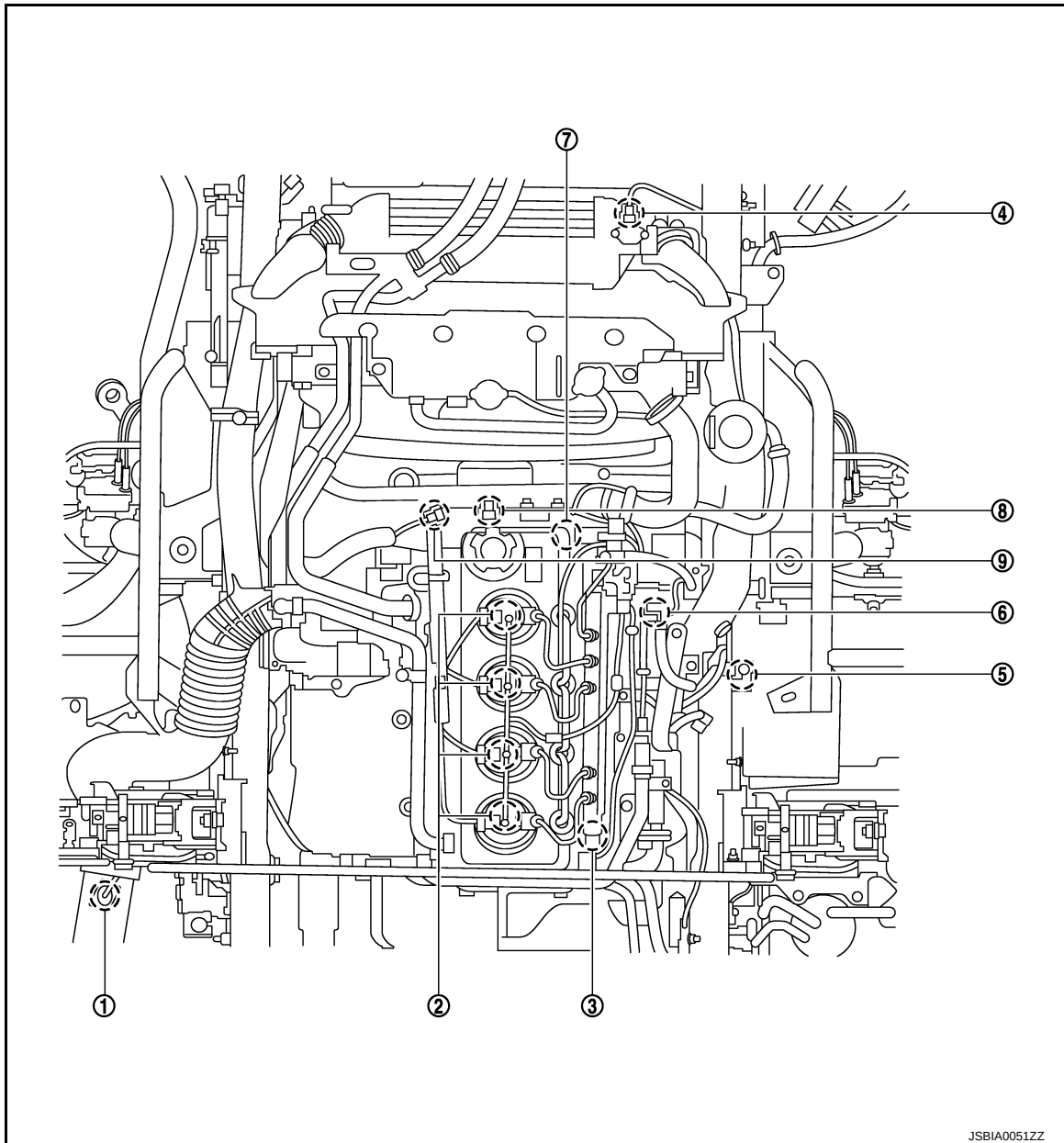
System Description

INFOID:000000004942097

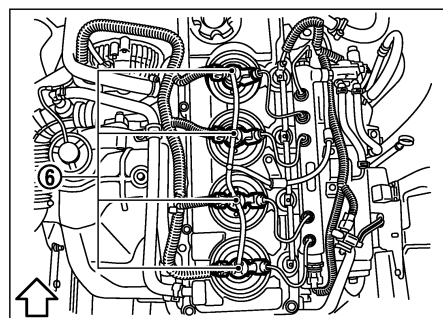
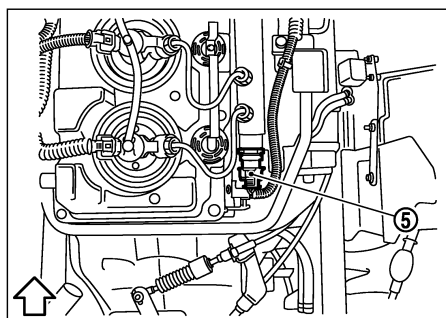
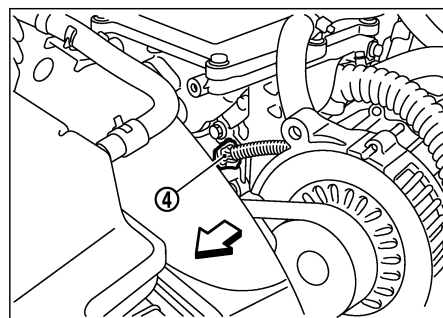
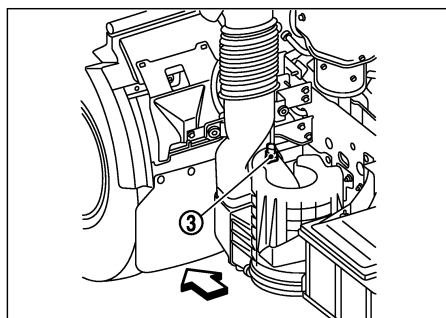
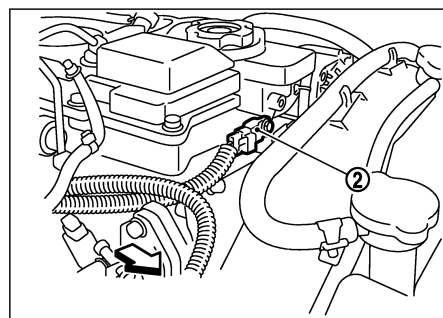
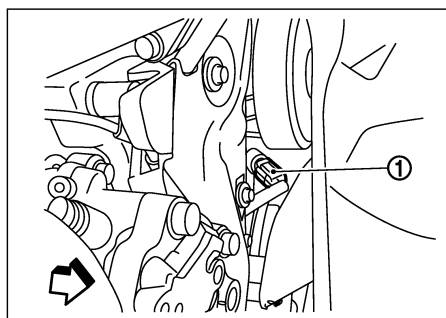
ECM performs various controls such as fuel injection control and fuel pressure control.

Component Parts Location

INFOID:000000004942098



- | | | |
|---|-----------------------------|--------------------------------------|
| 1. Mass air flow sensor (with built in intake air temperature sensor) | 2. Fuel injector | 3. Fuel rail pressure sensor |
| 4. Turbocharger boost sensor | 5. Glow relay | 6. EGR volume control valve |
| 7. Crankshaft position sensor | 8. Camshaft position sensor | 9. Engine coolant temperature sensor |



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1. Crankshaft position sensor

2. Camshaft position sensor

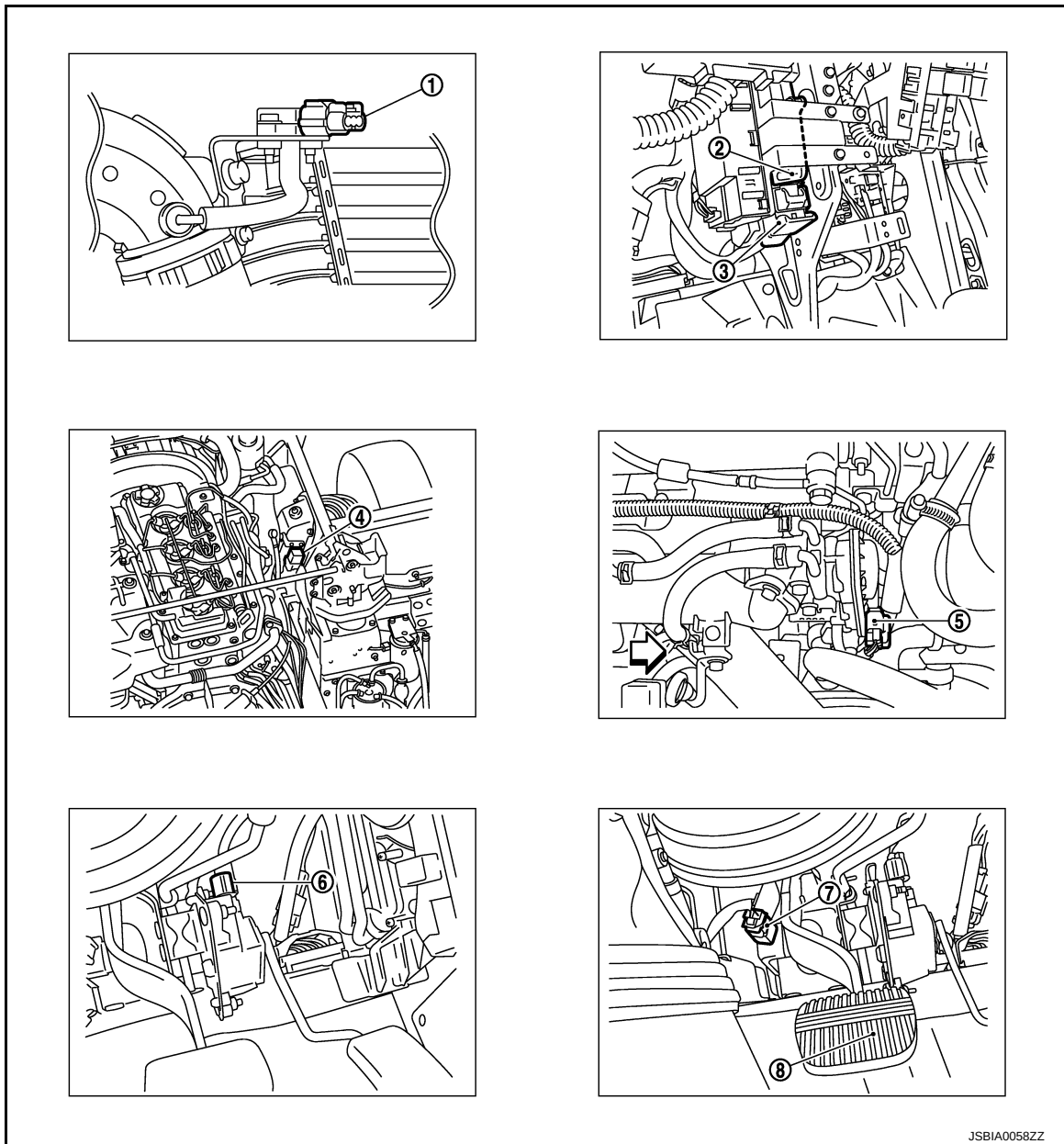
3. Mass air flow sensor (with built in intake air temperature sensor)

4. Engine coolant temperature sensor

5. Fuel rail pressure sensor

6. Fuel injector

↖ : Vehicle front



1. Turbocharger boost sensor
2. ECM
3. ECM harness connector
4. Glow relay
5. EGR volume control valve control position sensor
6. Accelerator pedal position sensor
7. Stop lamp switch
8. Brake pedal

↩ : Vehicle front

Component Description

INFOID:000000004942099

Component	Reference
Accelerator pedal position sensor	EC-97, "Description"
Barometric pressure sensor	EC-199, "Description"
Camshaft position sensor	EC-132, "Description"
Clutch pedal position switch	EC-200, "Description"
Crankshaft position sensor	EC-128, "Description"
EGR volume control valve	EC-154, "Description"

Component	Reference
EGR volume control valve control position sensor	EC-158, "Description"
Engine coolant temperature sensor	EC-93, "Description"
Fuel injector	EC-106, "Description"
Fuel pump	EC-72, "Description"
Fuel rail pressure sensor	EC-101, "Description"
Glow plug	EC-207, "Description"
Intake air temperature sensor	EC-89, "Description"
Mass air flow sensor	EC-83, "Description"
Park/Neutral position switch	EC-215, "Description"
Stop lamp switch	EC-221, "Description"
Turbocharger boost sensor	EC-119, "Description"

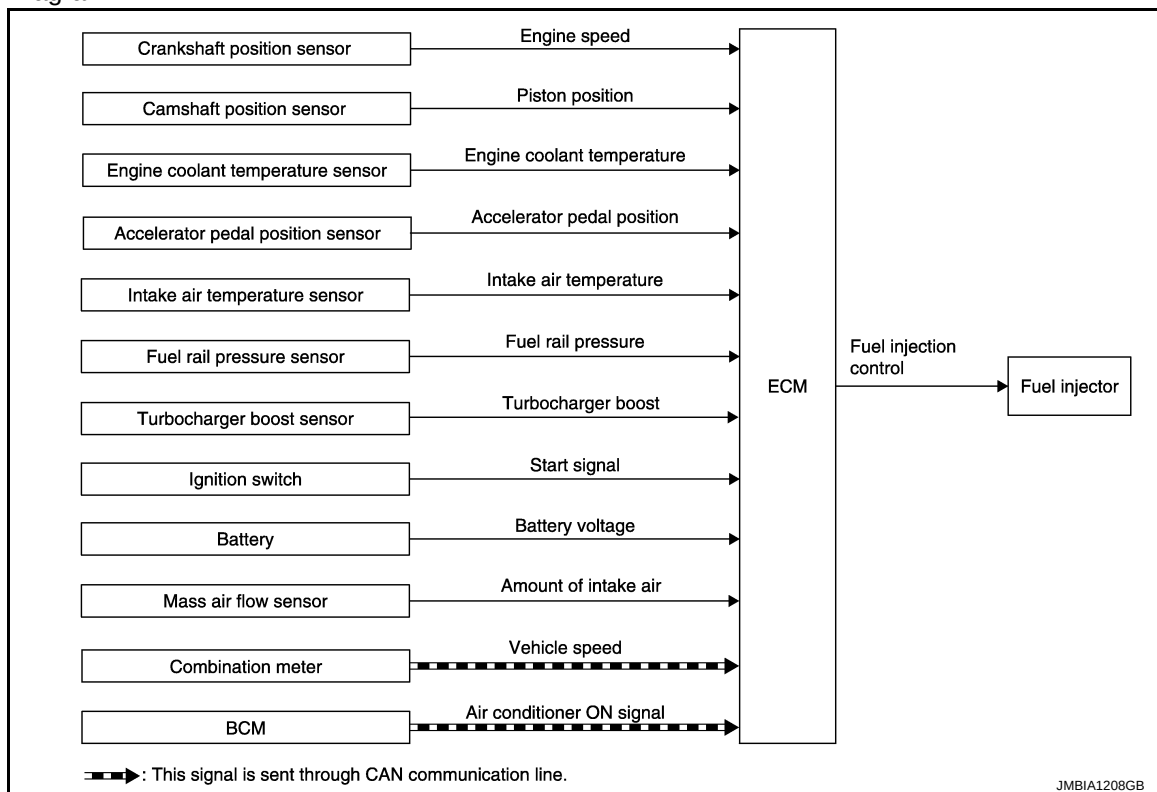
FUEL INJECTION CONTROL

System Description

INFOID:000000004942100

FUEL INJECTION CONTROL

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Fuel injection control	Fuel injector
Camshaft position sensor	Piston position		
Engine coolant temperature sensor	Engine coolant temperature		
Accelerator pedal position sensor	Accelerator pedal position		
Intake air temperature sensor	Intake air temperature		
Fuel rail pressure sensor	Fuel rail pressure		
Turbocharger boost sensor	Turbocharger boost		
Ignition switch	Start signal		
Battery	Battery voltage		
Mass air flow sensor	Amount of intake air		
Combination meter	Vehicle speed*		
BCM	Air conditioner ON signal*		

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

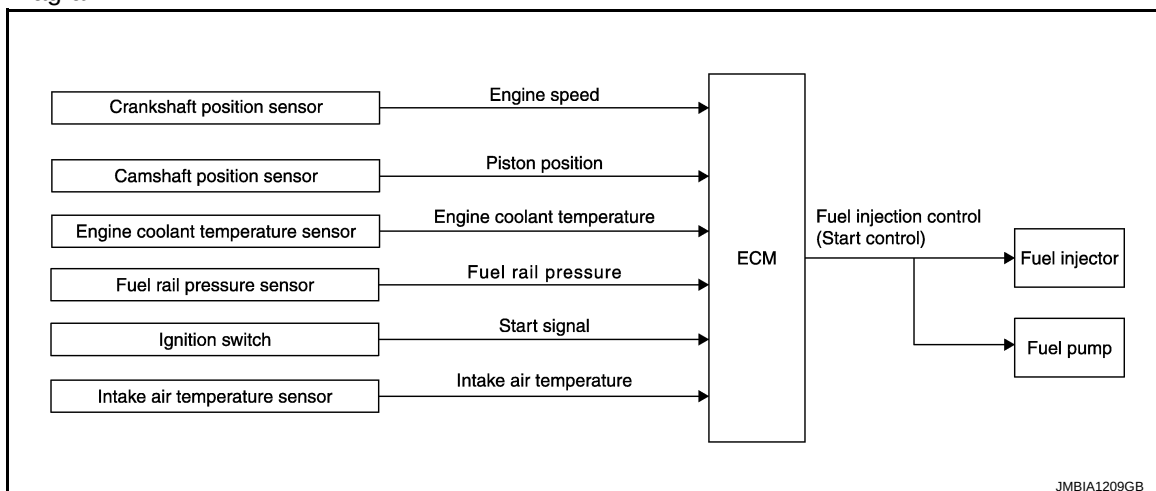
SYSTEM DESCRIPTION

Three types of fuel injection control are provided to accommodate engine operating conditions; normal control, idle control and start control. The ECM determines the appropriate fuel injection control. Above each control, the amount of fuel injected is adjusted to improve engine performance. Pulse signals are sent to fuel injectors according to the input signals to adjust the amount of fuel injected to preset value.

< FUNCTION DIAGNOSIS >

START CONTROL

System Diagram



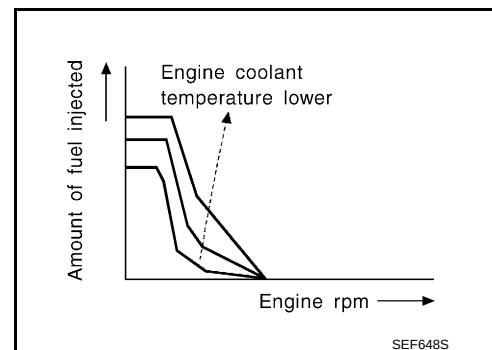
System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Fuel injection control (Start control)	Fuel injector Fuel pump
Camshaft position sensor	Piston position		
Engine coolant temperature sensor	Engine coolant temperature		
Fuel rail pressure sensor	Fuel rail pressure		
Ignition switch	Start signal		
Intake air temperature sensor	Intake air temperature		

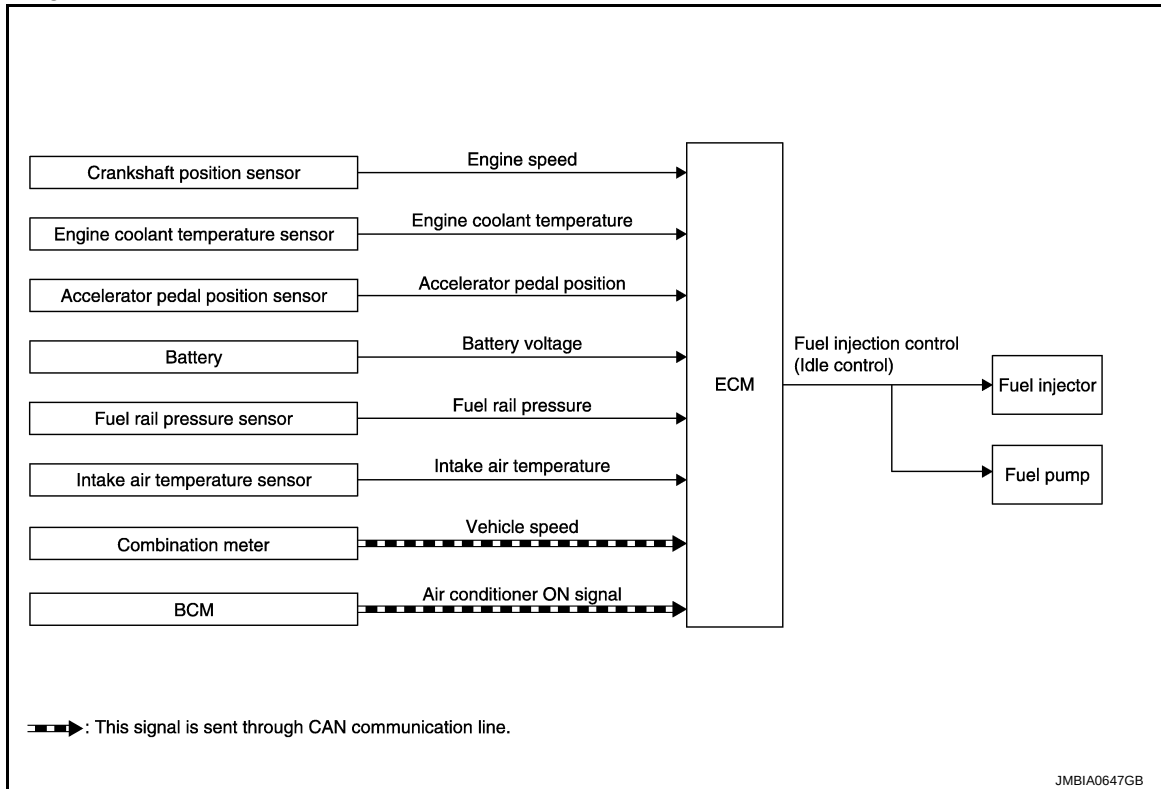
SYSTEM DESCRIPTION

When ECM detected the engine revolution pulse at engine cranking, the ECM adapts the fuel injection system for the start control. The amount of fuel injected at engine starting is a preset program value in the ECM. The program is determined by the engine speed, engine coolant temperature, intake air temperature and fuel rail pressure. For better start ability under cool engine conditions, the lower the coolant temperature becomes, the greater the amount of fuel injected. The ECM ends the start control when the engine speed reaches the specific value, and shifts the control to the normal or idle control.



IDLE CONTROL

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Fuel injection control (Idle control)	Fuel injector Fuel pump
Engine coolant temperature sensor	Engine coolant temperature		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage		
Fuel rail pressure sensor	Fuel rail pressure		
Intake air temperature sensor	Intake air temperature		
Combination meter	Vehicle speed*		
BCM	Air conditioner ON signal*		

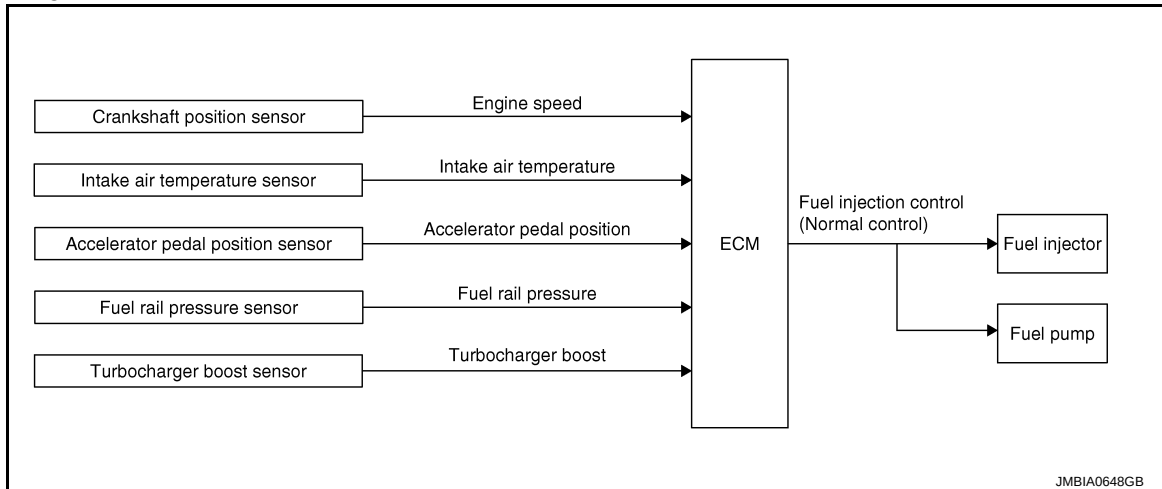
*: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

When the ECM determines that the engine speed is at idle, the fuel injection system is adapted for the idle control. The ECM regulates the amount of fuel injected corresponding to changes in load applied to the engine to keep engine speed constant. The ECM also provides the system with a fast idle control in response to the engine coolant temperature signal.

NORMAL CONTROL

System Diagram



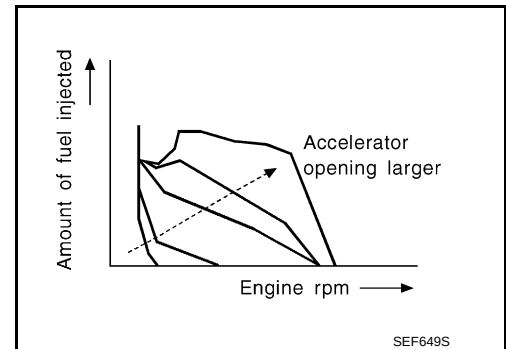
System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Fuel injection control (Normal control)	Fuel injector Fuel pump
Intake air temperature sensor	Intake air temperature		
Accelerator pedal position sensor	Accelerator pedal position		
Fuel rail pressure sensor	Fuel rail pressure		
Turbocharger boost sensor	Turbocharger boost		

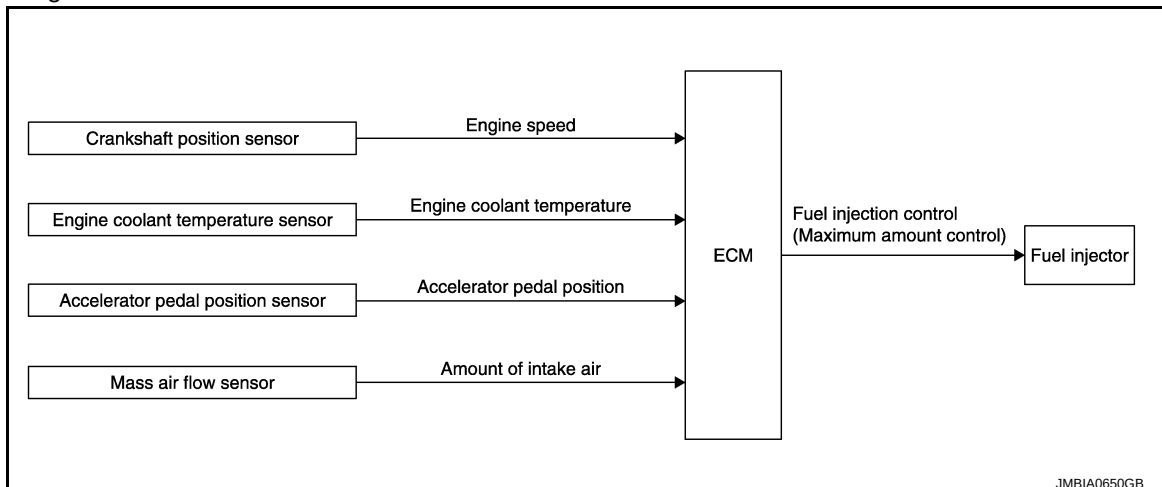
SYSTEM DESCRIPTION

The amount of fuel injected under normal driving conditions is determined according to sensor signals. The crankshaft position sensor detects engine speed, intake air temperature sensor detects intake air temperature, turbocharger boost sensor detects turbocharger boost, the accelerator pedal position sensor detects accelerator pedal position, fuel rail pressure sensor detects fuel rail pressure and other sensors detect each signal. These sensors transmit signals to the ECM. The fuel injection data, predetermined by correlation between various engine speeds, accelerator pedal position and fuel rail pressure are stored in the ECM memory, forming a map. The ECM determines the optimal amount of fuel to be injected using the sensor signals in comparison with the map.



MAXIMUM AMOUNT CONTROL

System Diagram



< FUNCTION DIAGNOSIS >

[ZD]

System Description

INPUT/OUTPUT SIGNAL CHART

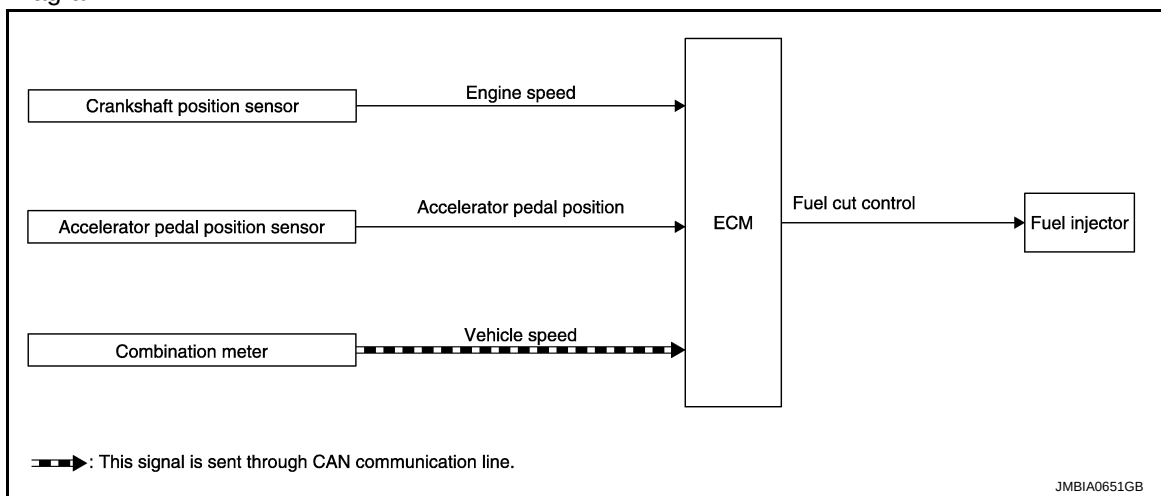
Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Fuel injection control (Maximum control)	Fuel injector
Engine coolant temperature sensor	Engine coolant temperature		
Accelerator pedal position sensor	Accelerator pedal position		
Mass air flow sensor	Amount of intake air		

SYSTEM DESCRIPTION

The maximum injection amount is controlled to an optimum by the engine speed, intake air amount, engine coolant temperature and accelerator opening in accelerator with the driving conditions. This prevents the over-supply of the injection amount caused by decreased air density at a high altitude or during a system failure.

FUEL CUT CONTROL

System Diagram



System Description

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Fuel injection control (Fuel cut control)	Fuel injector
Accelerator pedal position sensor	Accelerator pedal position		
Combination meter	Vehicle speed*		

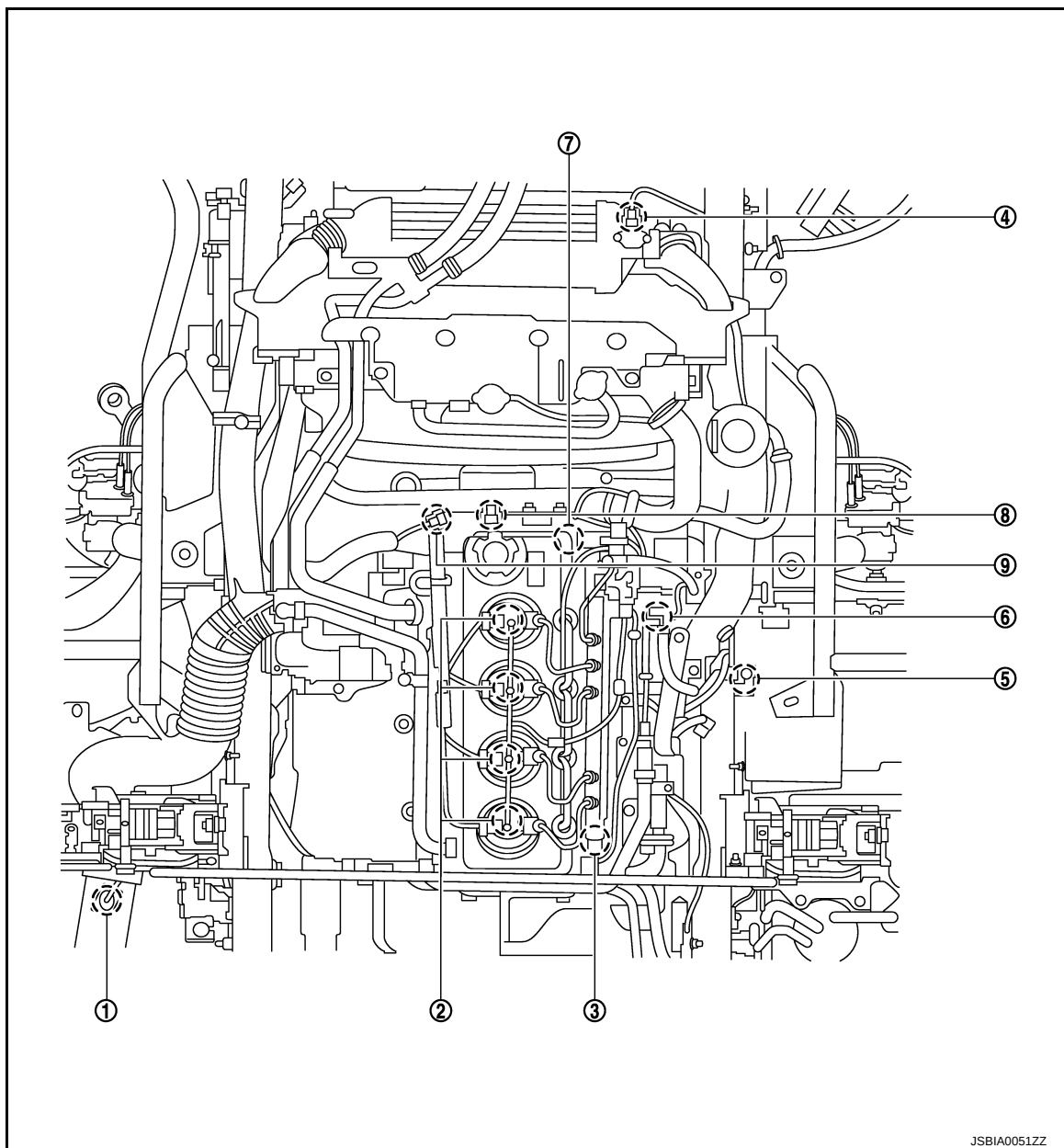
*: This signal is sent to the ECM through ECM CAN communication line.

SYSTEM DESCRIPTION

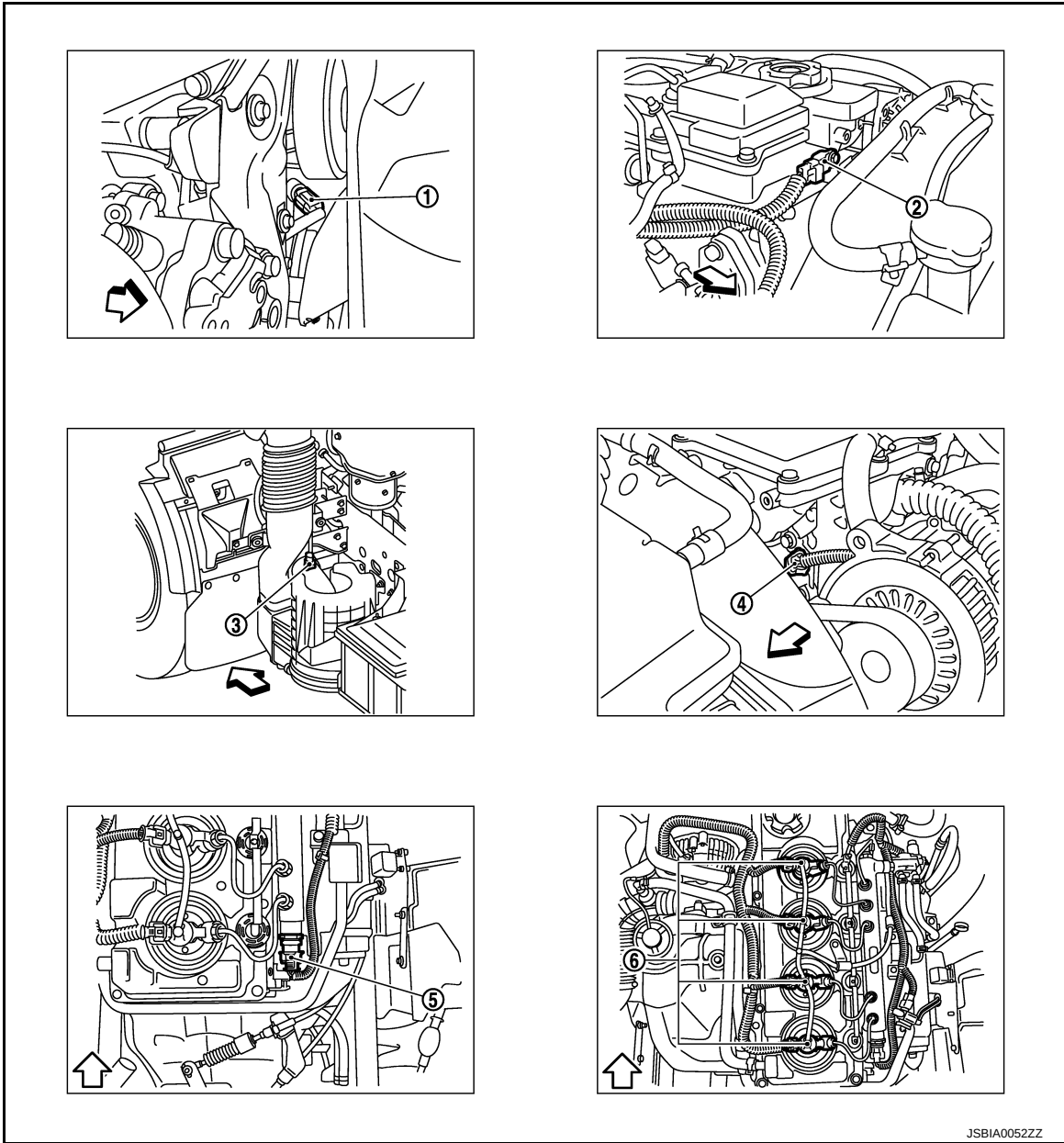
The ECM sends a fuel cut signal to the fuel injectors and fuel pump during deceleration for better fuel efficiency. The ECM determines the time of deceleration according to signals from the accelerator pedal position sensor, crankshaft positions sensor and vehicle speed sensor.

Component Parts Location

INFOID:000000004942101



- | | | |
|---|-----------------------------|--------------------------------------|
| 1. Mass air flow sensor (with built in intake air temperature sensor) | 2. Fuel injector | 3. Fuel rail pressure sensor |
| 4. Turbocharger boost sensor | 5. Glow relay | 6. EGR volume control valve |
| 7. Crankshaft position sensor | 8. Camshaft position sensor | 9. Engine coolant temperature sensor |



1. Crankshaft position sensor

2. Camshaft position sensor

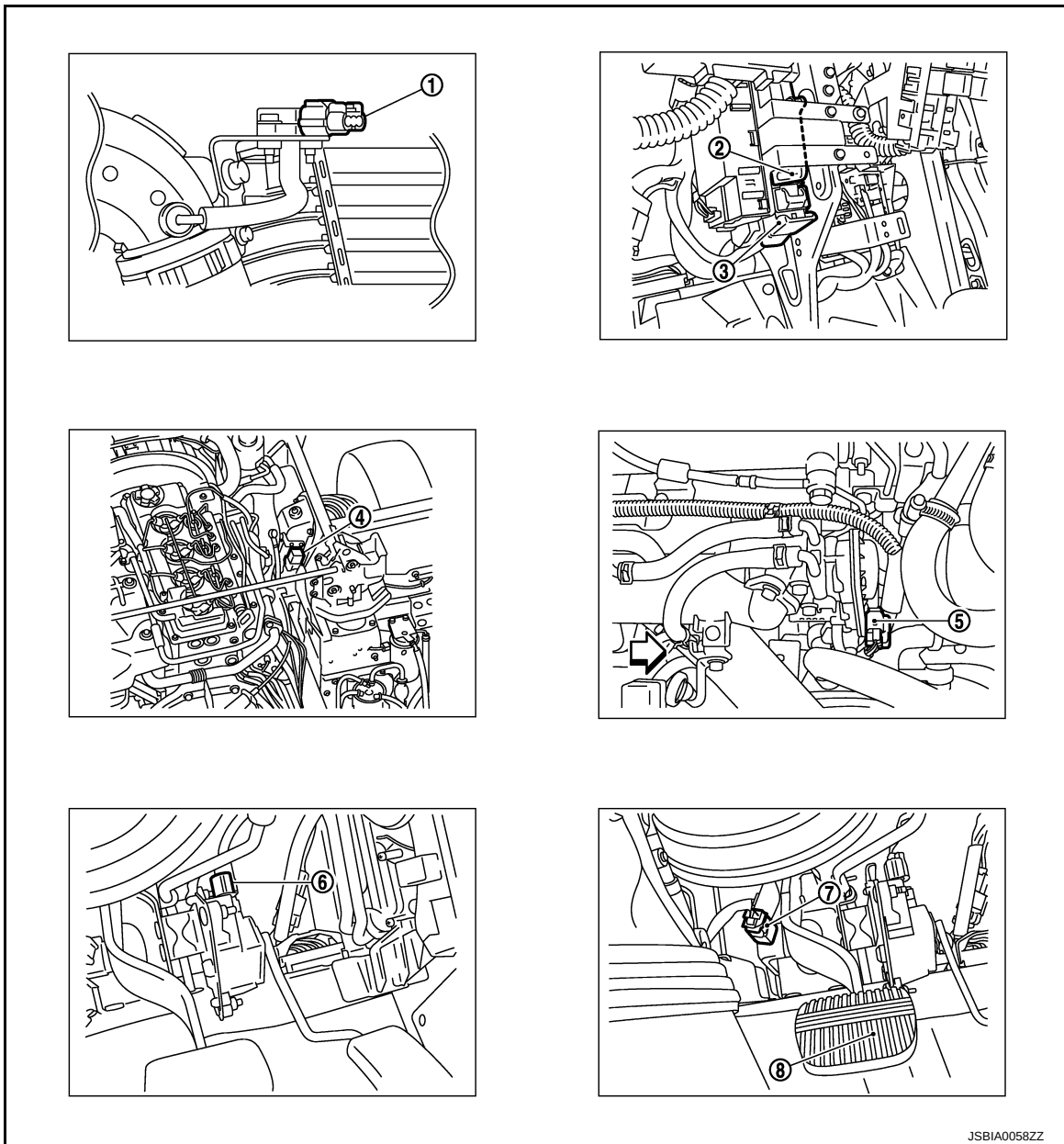
3. Mass air flow sensor (with built in intake air temperature sensor)

4. Engine coolant temperature sensor

5. Fuel rail pressure sensor

6. Fuel injector

↖ : Vehicle front



- | | | |
|------------------------------|---|--------------------------------------|
| 1. Turbocharger boost sensor | 2. ECM | 3. ECM harness connector |
| 4. Glow relay | 5. EGR volume control valve control position sensor | 6. Accelerator pedal position sensor |
| 7. Stop lamp switch | 8. Brake pedal | |

↩ : Vehicle front

Component Description

INFOID:000000004942102

Component	Reference
Accelerator pedal position sensor	EC-97, "Description"
Barometric pressure sensor	EC-199, "Description"
Camshaft position sensor	EC-132, "Description"
Crankshaft position sensor	EC-128, "Description"
Engine coolant temperature sensor	EC-93, "Description"
Fuel injector	EC-106, "Description"

<https://truckmanualshub.com/>
FUEL INJECTION CONTROL

< FUNCTION DIAGNOSIS >

[ZD]

Component	Reference
Fuel pump	EC-72, "Description"
Fuel rail pressure sensor	EC-101, "Description"
Intake air temperature sensor	EC-89, "Description"
Mass air flow sensor	EC-83, "Description"
Turbocharger boost sensor	EC-119, "Description"

A

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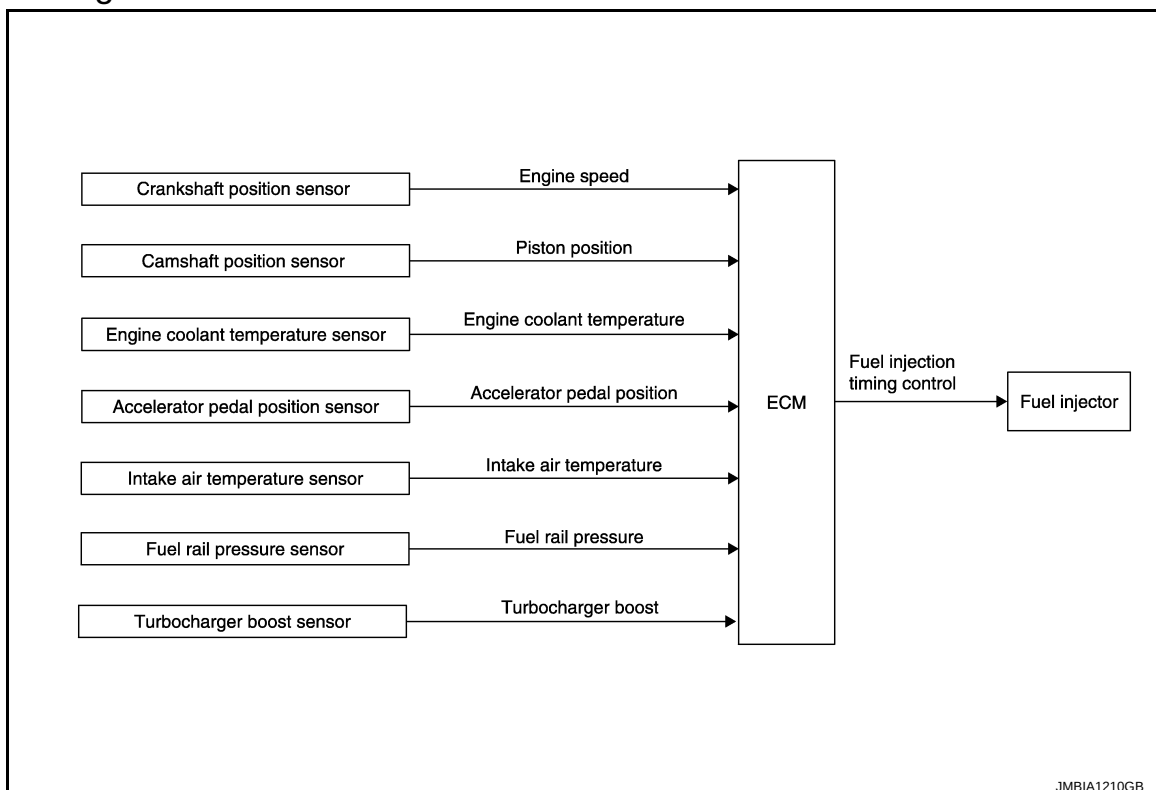
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P

FUEL INJECTION TIMING CONTROL SYSTEM

System Diagram

INFOID:000000004942103



JMBIA1210GB

System Description

INFOID:000000004942104

INPUT/OUTPUT SIGNAL CHART

Input signal to ECM	ECM function	ECM function	Actuator
Crankshaft position sensor	Engine speed	Fuel injection timing control	Fuel injector
Camshaft position sensor	Piston position		
Engine coolant temperature sensor	Engine coolant temperature		
Accelerator pedal position sensor	Accelerator pedal position		
Intake air temperature	Intake air temperature		
Fuel rail pressure	Fuel rail pressure		
Turbocharger boost sensor	Turbocharger boost		

SYSTEM DESCRIPTION

The target fuel injection timing in accordance with the engine speed and the fuel injection amount are recorded as a map in the ECM beforehand. The ECM determines the optimum injection timing using sensor signals accordance with the map.

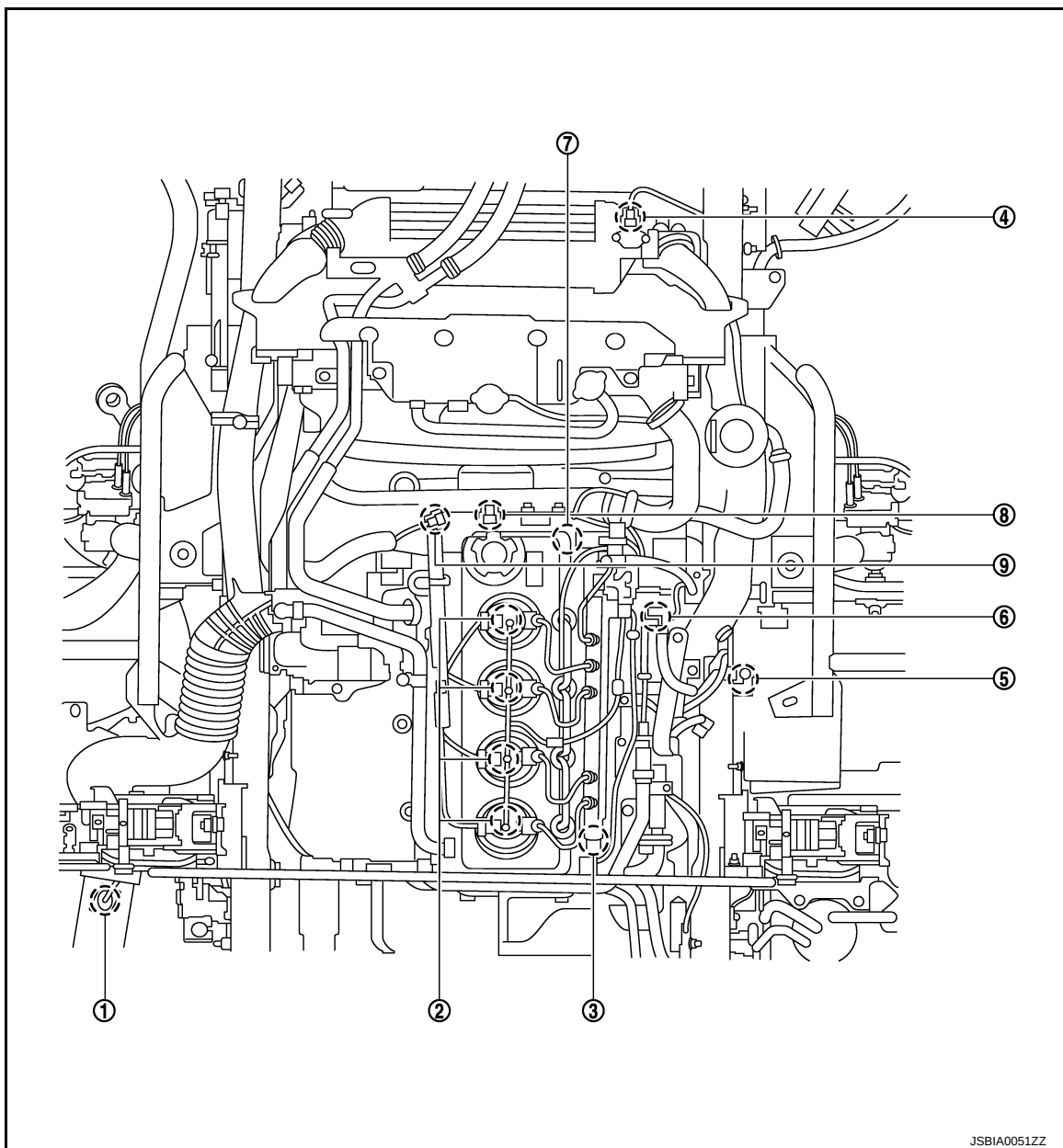
FUEL INJECTION TIMING CONTROL SYSTEM

< FUNCTION DIAGNOSIS >

[ZD]

Component Parts Location

INFOID:000000004942105

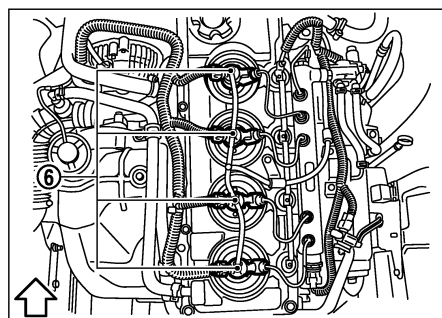
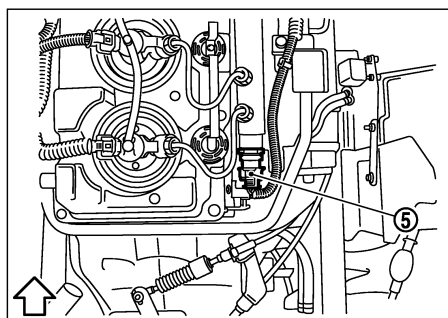
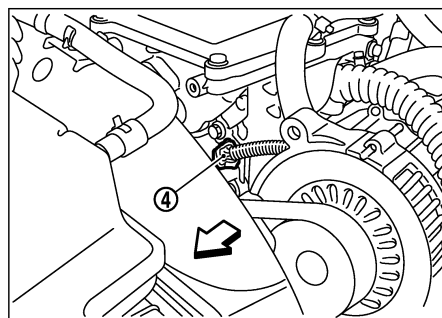
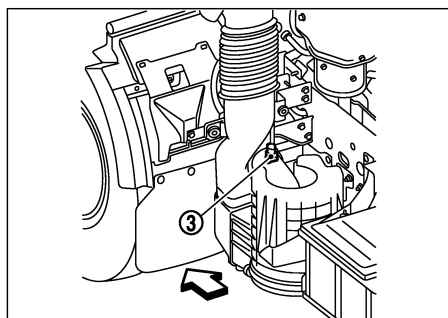
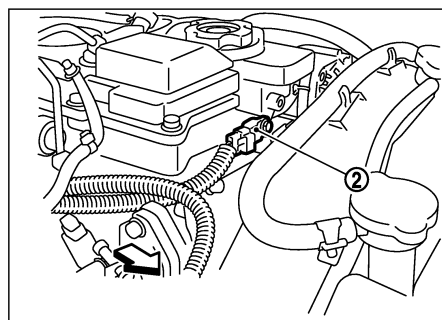
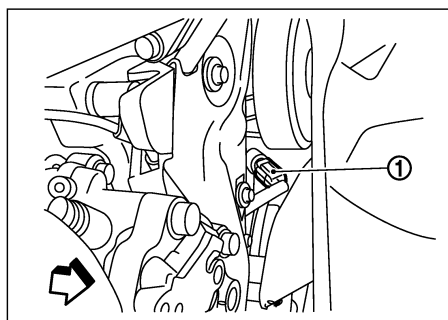


- | | | |
|---|-----------------------------|--------------------------------------|
| 1. Mass air flow sensor (with built in intake air temperature sensor) | 2. Fuel injector | 3. Fuel rail pressure sensor |
| 4. Turbocharger boost sensor | 5. Glow relay | 6. EGR volume control valve |
| 7. Crankshaft position sensor | 8. Camshaft position sensor | 9. Engine coolant temperature sensor |

FUEL INJECTION TIMING CONTROL SYSTEM

< FUNCTION DIAGNOSIS >

[ZD]



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1. Crankshaft position sensor

2. Camshaft position sensor

3. Mass air flow sensor (with built in intake air temperature sensor)

4. Engine coolant temperature sensor

5. Fuel rail pressure sensor

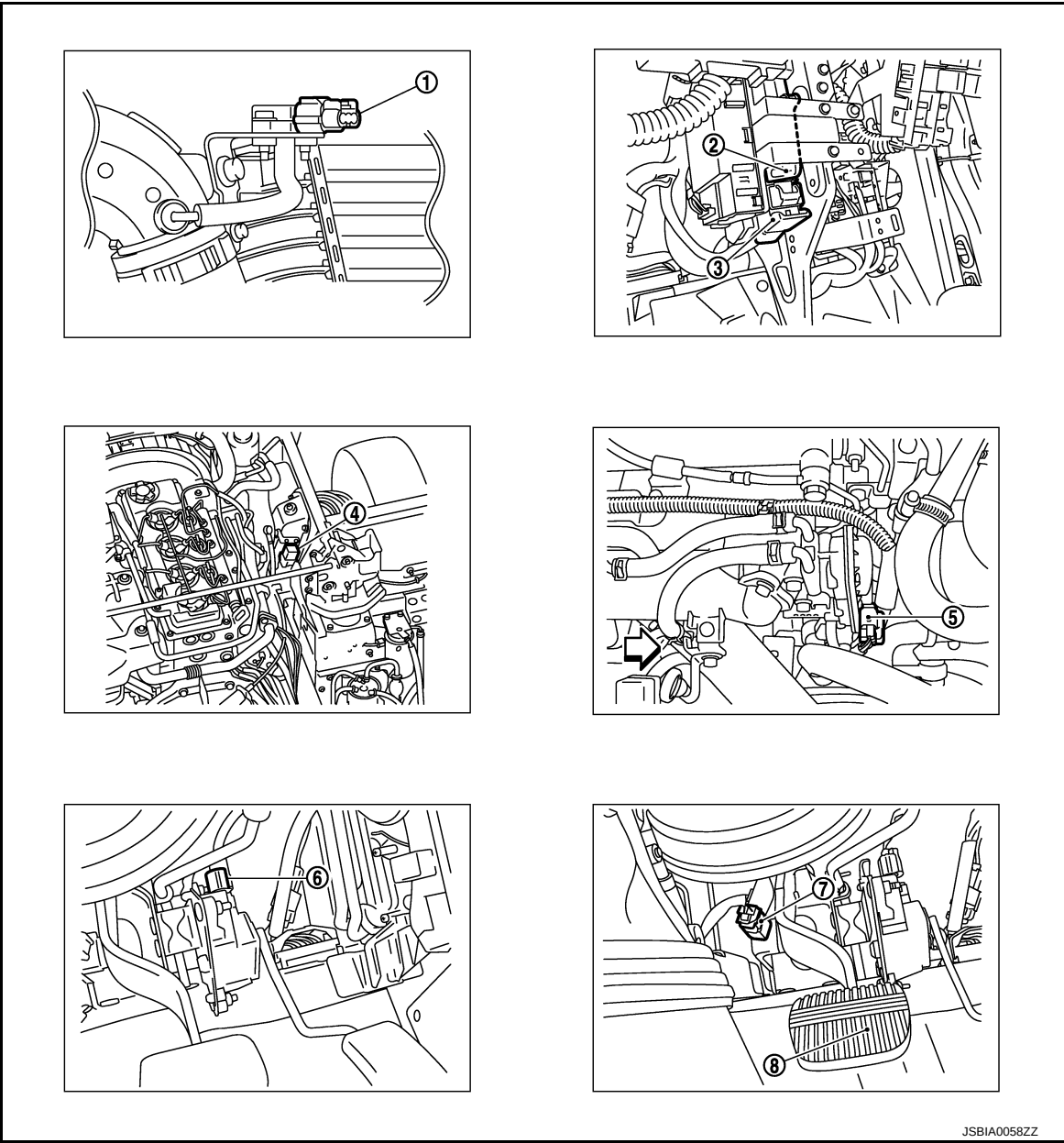
6. Fuel injector

↖ : Vehicle front

FUEL INJECTION TIMING CONTROL SYSTEM

< FUNCTION DIAGNOSIS >

[ZD]



1. Turbocharger boost sensor
2. ECM
3. ECM harness connector
4. Glow relay
5. EGR volume control valve control position sensor
6. Accelerator pedal position sensor
7. Stop lamp switch
8. Brake pedal

↶ : Vehicle front

Component Description

INFOID:000000004942106

Component	Reference
Accelerator pedal position sensor	EC-97, "Description"
Camshaft position sensor	EC-132, "Description"
Crankshaft position sensor	EC-128, "Description"
Engine coolant temperature sensor	EC-93, "Description"
Fuel injector	EC-106, "Description"
Fuel pump	EC-72, "Description"

FUEL INJECTION TIMING CONTROL SYSTEM

< FUNCTION DIAGNOSIS >

[ZD]

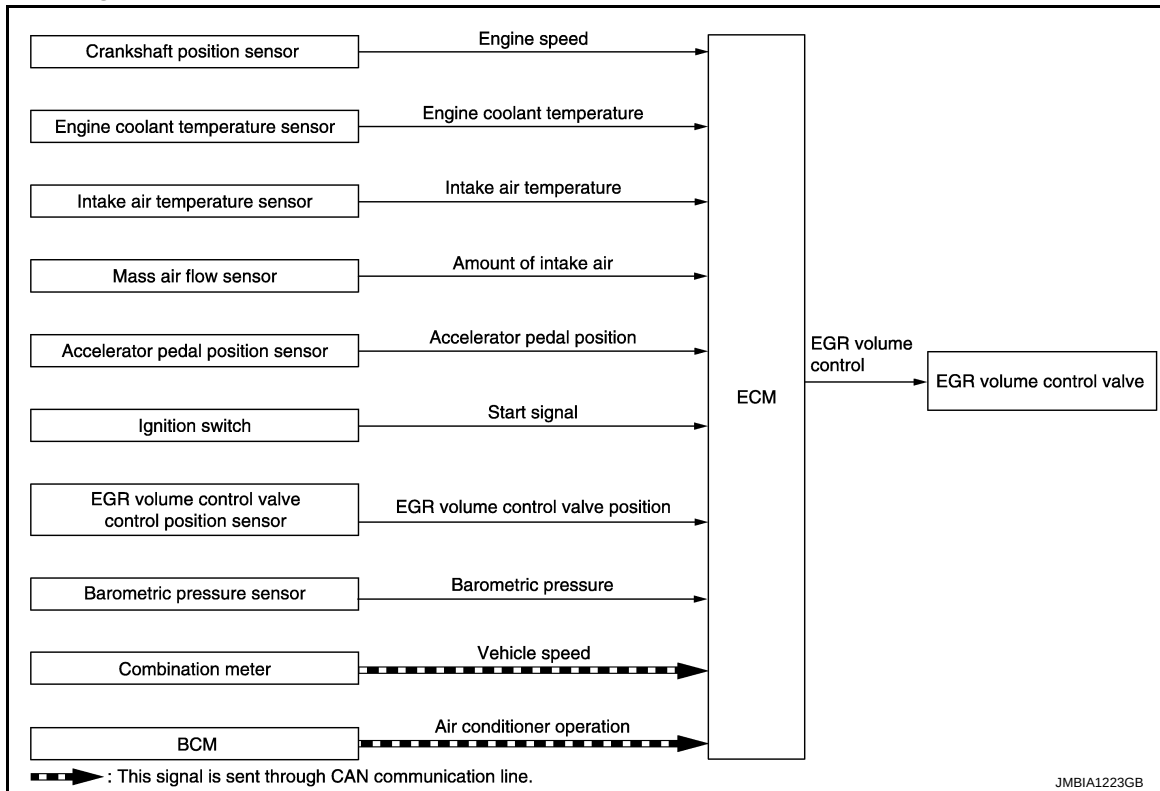
Component	Reference
Fuel rail pressure sensor	EC-101. "Description"
Intake air temperature sensor	EC-89. "Description"
Turbocharger boost sensor	EC-119. "Description"

EGR SYSTEM

< FUNCTION DIAGNOSIS >

[ZD]**EGR SYSTEM****System Diagram**

INFOID:000000004942107

**System Description**

INFOID:000000004942108

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	EGR volume control	EGR volume control valve
Engine coolant temperature sensor	Engine coolant temperature		
Intake air temperature sensor	Intake air temperature		
Mass air flow sensor	Amount of intake air		
Accelerator pedal position sensor	Accelerator pedal position		
Ignition switch	Start signal		
EGR volume control valve control position sensor	EGR volume control valve position		
Barometric pressure sensor	Barometric pressure		
Combination meter	Vehicle speed*		
BCM	Air conditioner operation*		

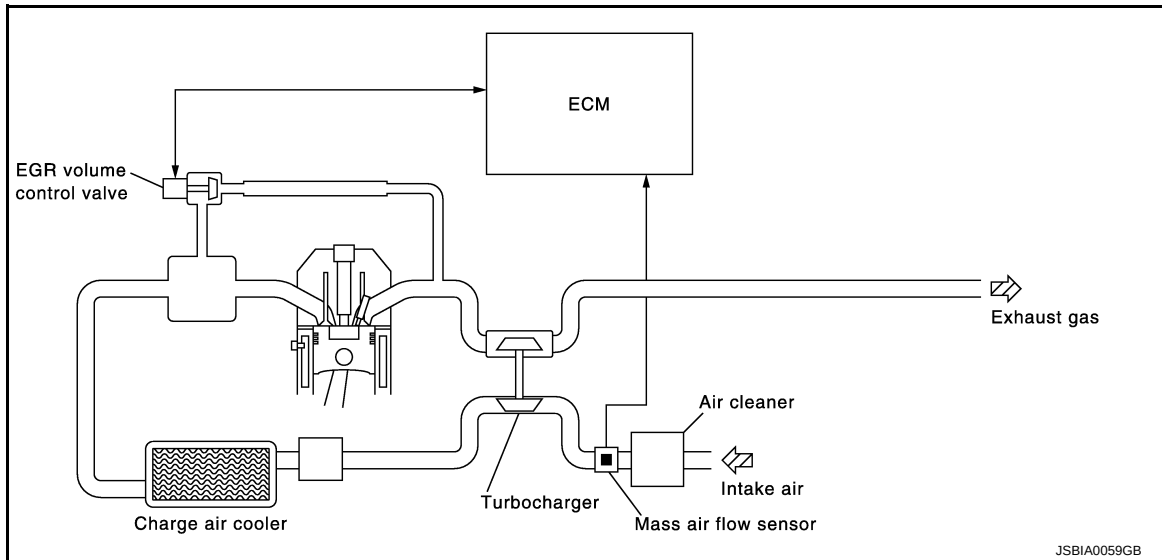
*: This signal is sent to the ECM through CAN communication line.

EGR SYSTEM

< FUNCTION DIAGNOSIS >

[ZD]

SYSTEM DESCRIPTION



This system controls the flow rate of EGR led from exhaust manifold to intake manifold.

The opening of the EGR passage in the EGR volume control valve changes to control the EGR flow rate.

A built-in DC motor moves the valve continuously corresponding to the ECM output signal.

The EGR volume control valve control position sensor detects the valve position and sends the voltage signals to the ECM.

The ECM judges the current opening angle of the valve from this signals and the ECM controls the DC motor to make the valve opening angle normally.

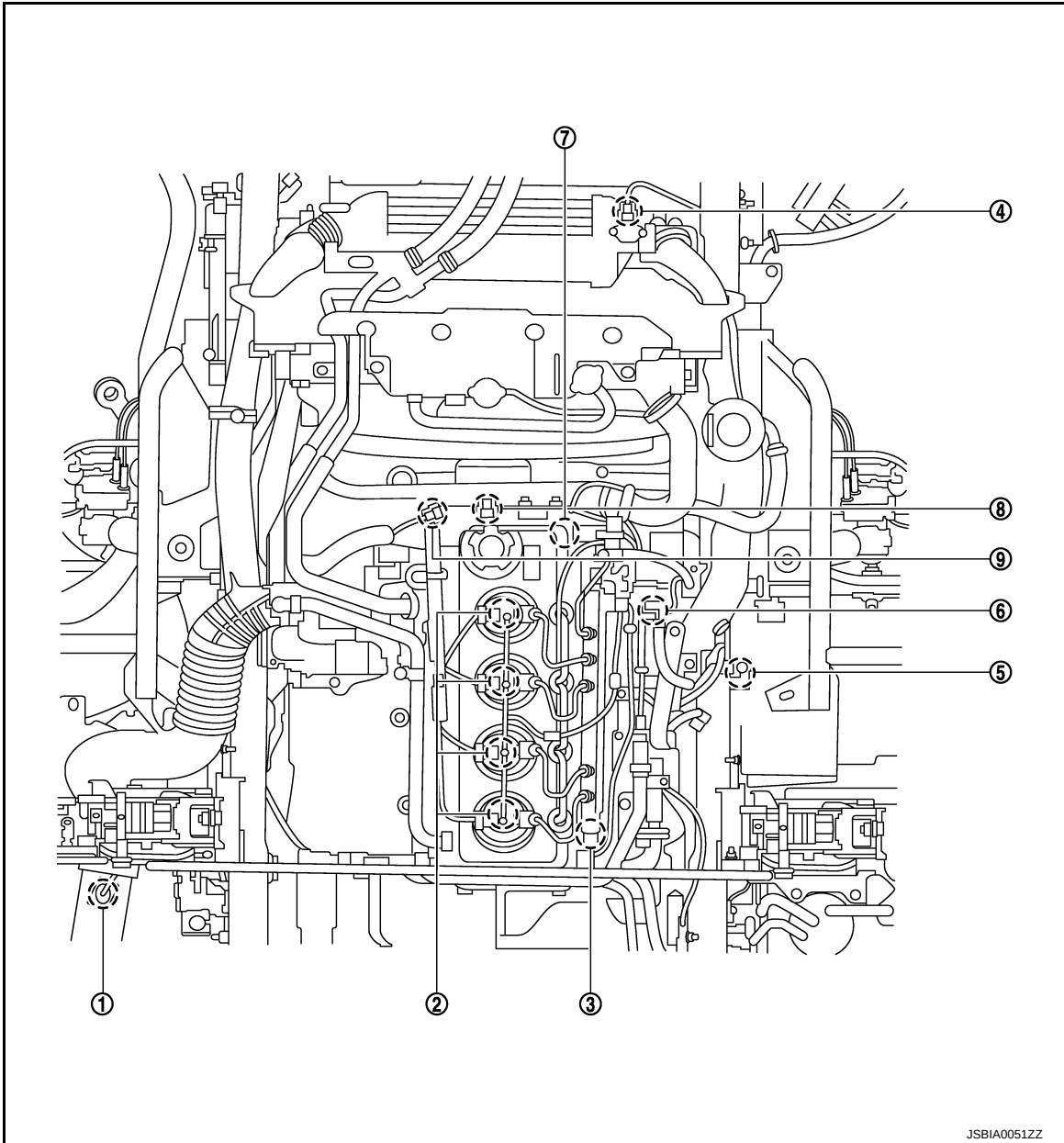
The opening angle of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions.

The EGR volume control valve remains close under the following conditions.

- Engine stopped
- Engine starting
- Low engine coolant temperature
- Excessively high engine coolant temperature
- High engine speed
- Accelerator pedal fully depressed

Component Parts Location

INFOID:000000004942109

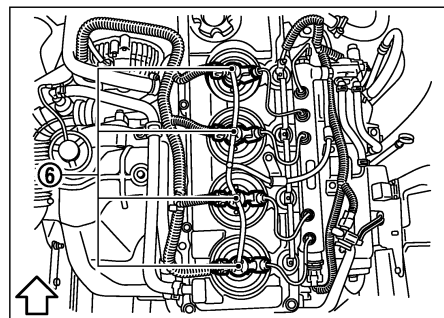
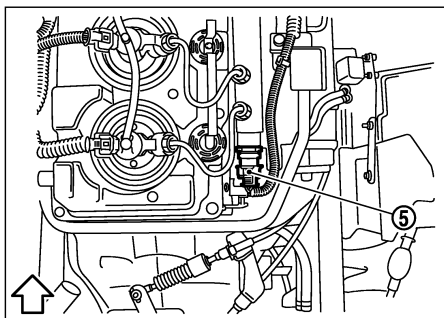
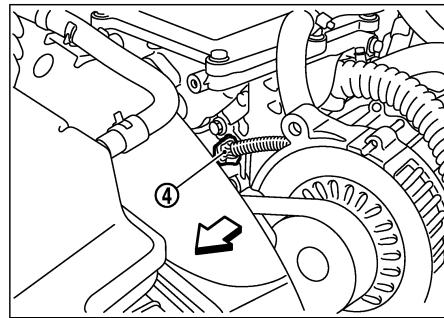
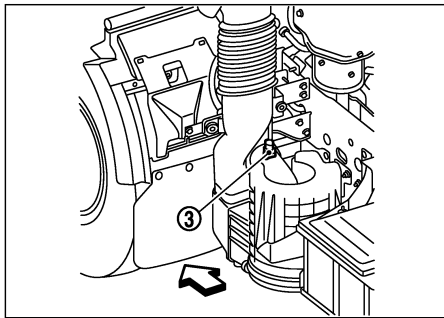
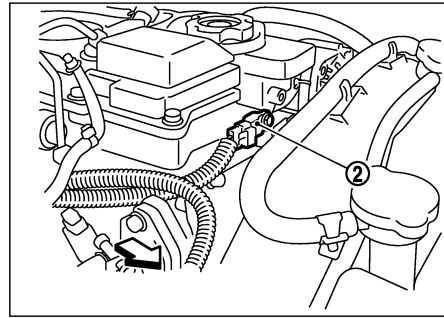
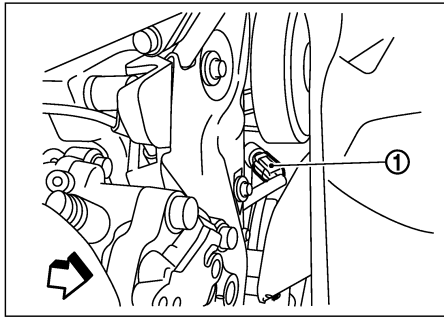


- | | | |
|---|-----------------------------|--------------------------------------|
| 1. Mass air flow sensor (with built in intake air temperature sensor) | 2. Fuel injector | 3. Fuel rail pressure sensor |
| 4. Turbocharger boost sensor | 5. Glow relay | 6. EGR volume control valve |
| 7. Crankshaft position sensor | 8. Camshaft position sensor | 9. Engine coolant temperature sensor |

EGR SYSTEM

< FUNCTION DIAGNOSIS >

[ZD]



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1. Crankshaft position sensor

2. Camshaft position sensor

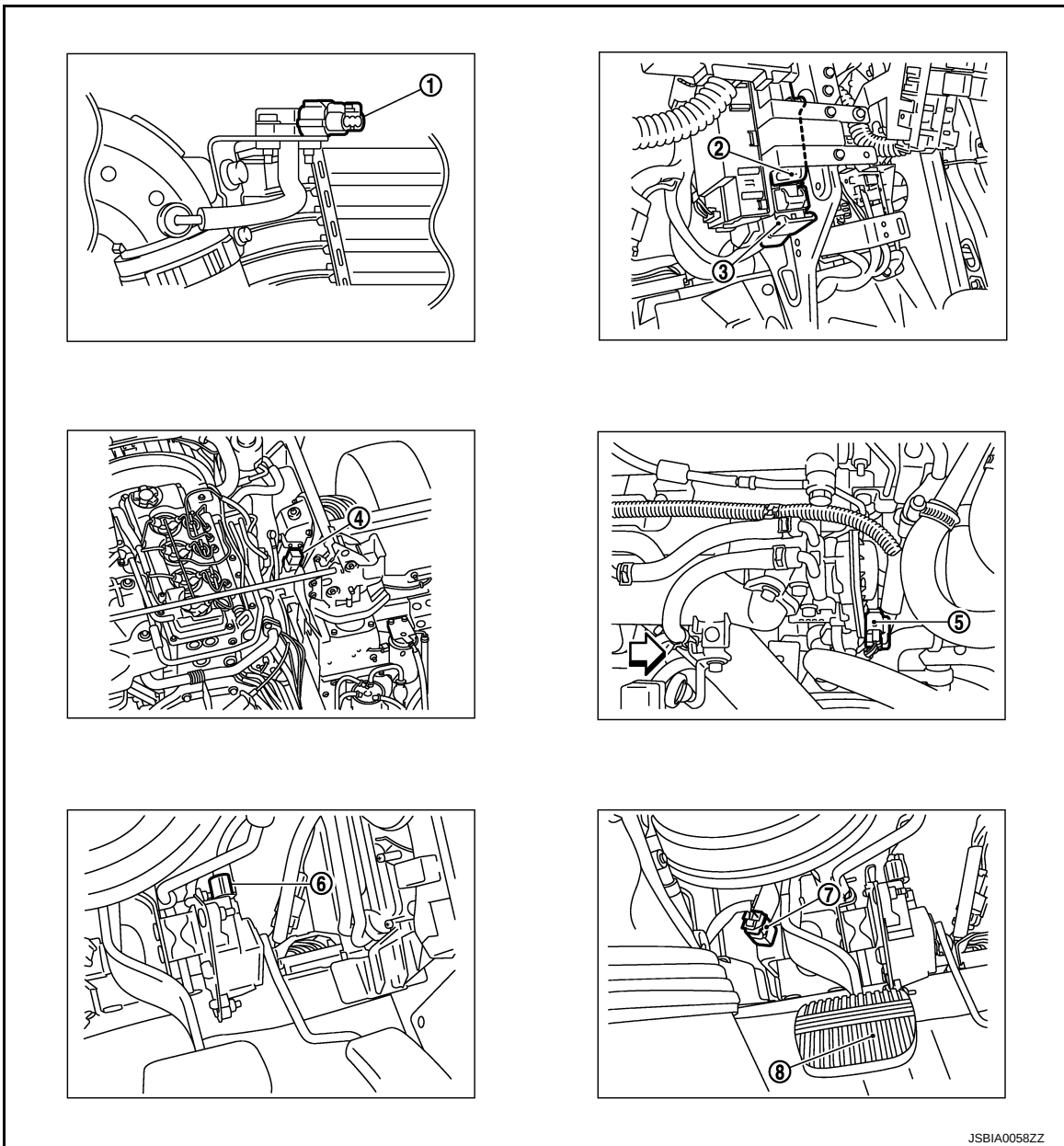
3. Mass air flow sensor (with built in intake air temperature sensor)

4. Engine coolant temperature sensor

5. Fuel rail pressure sensor

6. Fuel injector

↖ : Vehicle front



- | | | |
|------------------------------|---|--------------------------------------|
| 1. Turbocharger boost sensor | 2. ECM | 3. ECM harness connector |
| 4. Glow relay | 5. EGR volume control valve control position sensor | 6. Accelerator pedal position sensor |
| 7. Stop lamp switch | 8. Brake pedal | |

↶ : Vehicle front

Component Description

INFOID:000000004942110

Component	Reference
Accelerator pedal position sensor	EC-97, "Description"
Barometric pressure sensor	EC-199, "Description"
Camshaft position sensor	EC-132, "Description"
Crankshaft position sensor	EC-128, "Description"
EGR volume control valve	EC-154, "Description"
EGR volume control valve control position sensor	EC-158, "Description"

EGR SYSTEM

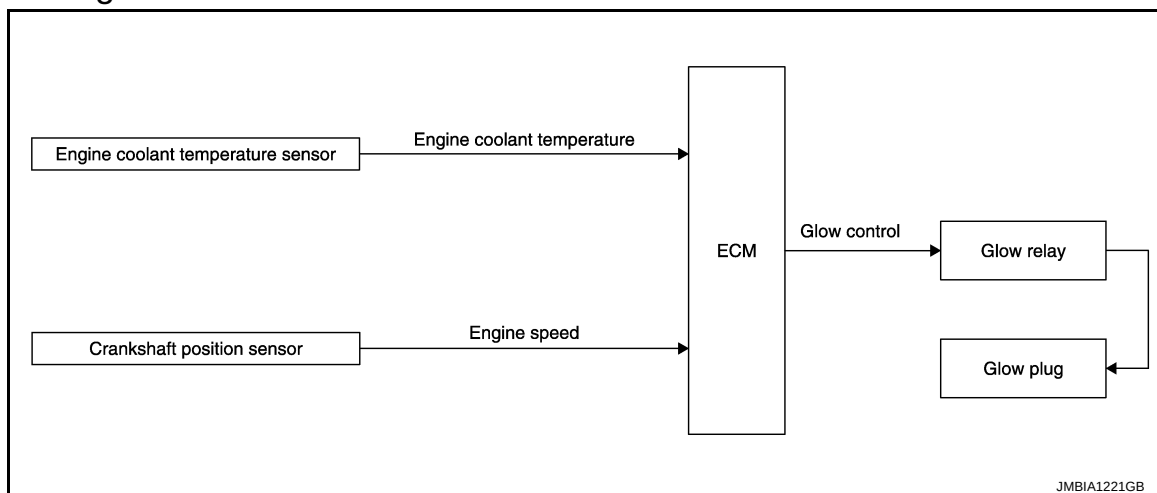
< FUNCTION DIAGNOSIS >

[ZD]

Component	Reference
Engine coolant temperature sensor	EC-93. "Description"
Intake air temperature sensor	EC-89. "Description"
Mass air flow sensor	EC-83. "Description"

GLOW CONTROL SYSTEM

System Diagram



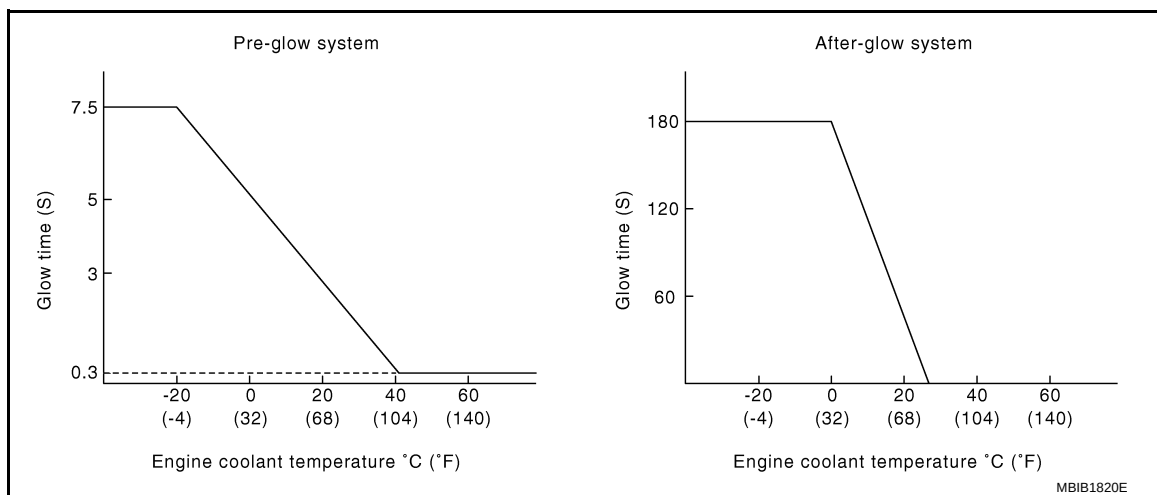
System Description

INFOID:000000004942112

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Engine coolant temperature sensor	Engine coolant temperature	Glow control	Glow relay
Crankshaft position sensor	Engine speed		↓ Glow plug

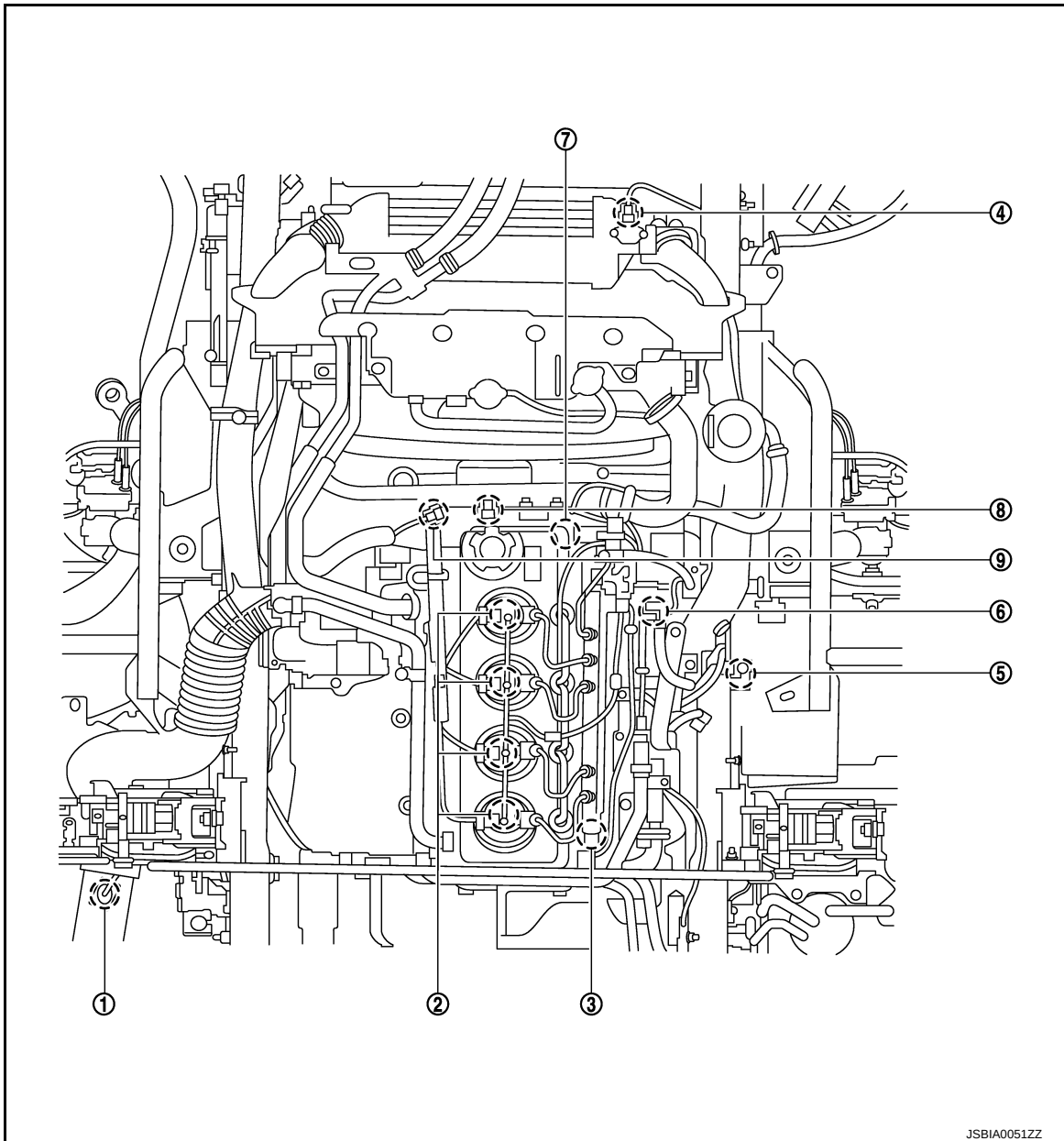
SYSTEM DESCRIPTION



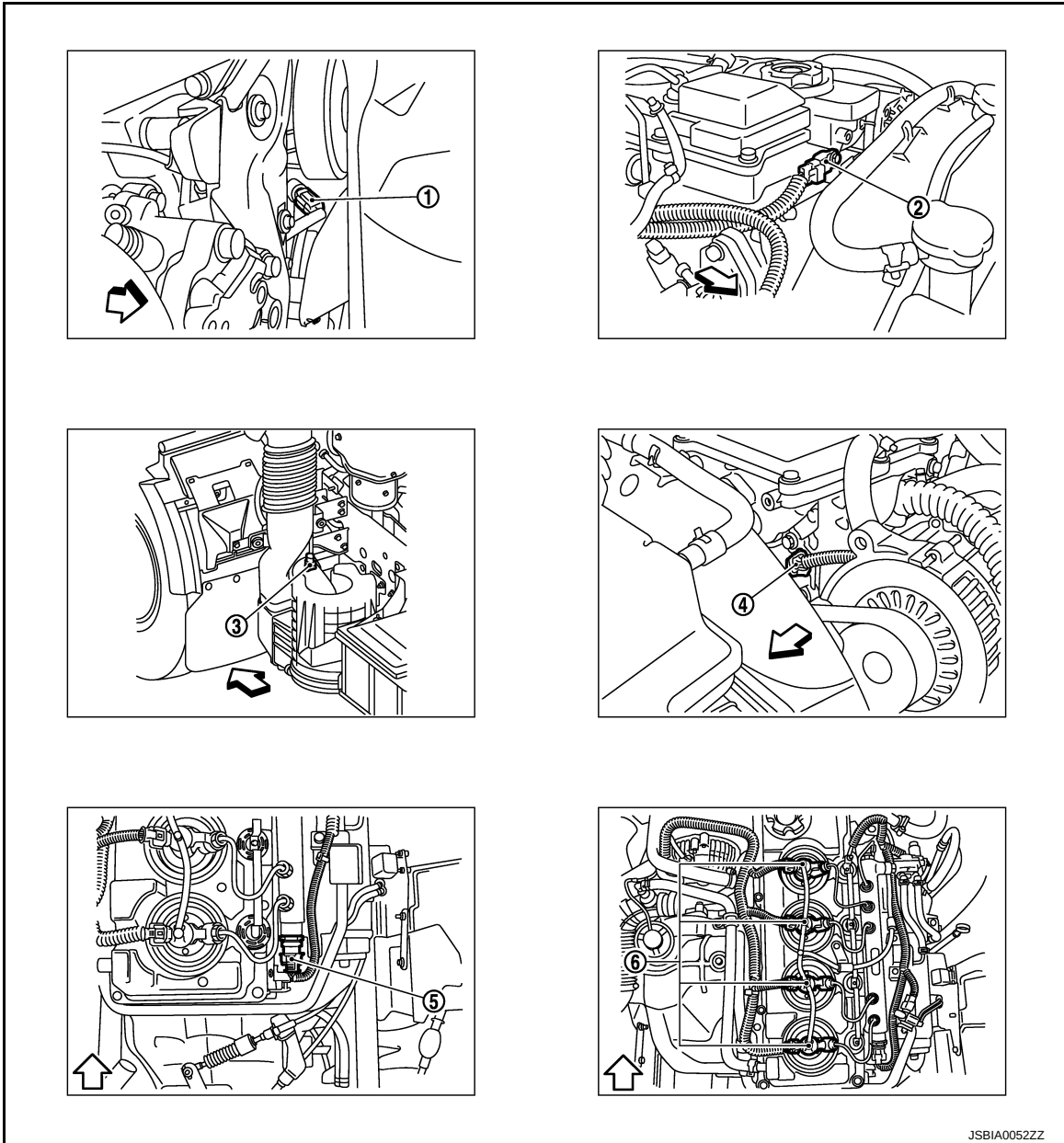
- Ignition switch ON
After ignition switch is turned ON, the glow relay turns ON for a certain period of time in relation to engine coolant temperature, allowing current to flow through glow plug.
- Cranking
The glow relay turns ON, allowing current to flow through glow plug.
- Starting
After engine is started, current continues to flow through glow plug (after-glow mode) for a certain period in relation to engine coolant temperature.
The glow indicator lamp turns ON for a certain period of time in relation to engine coolant temperature at the time glow relay is turned ON.

Component Parts Location

INFOID:000000004942113



- | | | |
|---|-----------------------------|--------------------------------------|
| 1. Mass air flow sensor (with built in intake air temperature sensor) | 2. Fuel injector | 3. Fuel rail pressure sensor |
| 4. Turbocharger boost sensor | 5. Glow relay | 6. EGR volume control valve |
| 7. Crankshaft position sensor | 8. Camshaft position sensor | 9. Engine coolant temperature sensor |



1. Crankshaft position sensor

2. Camshaft position sensor

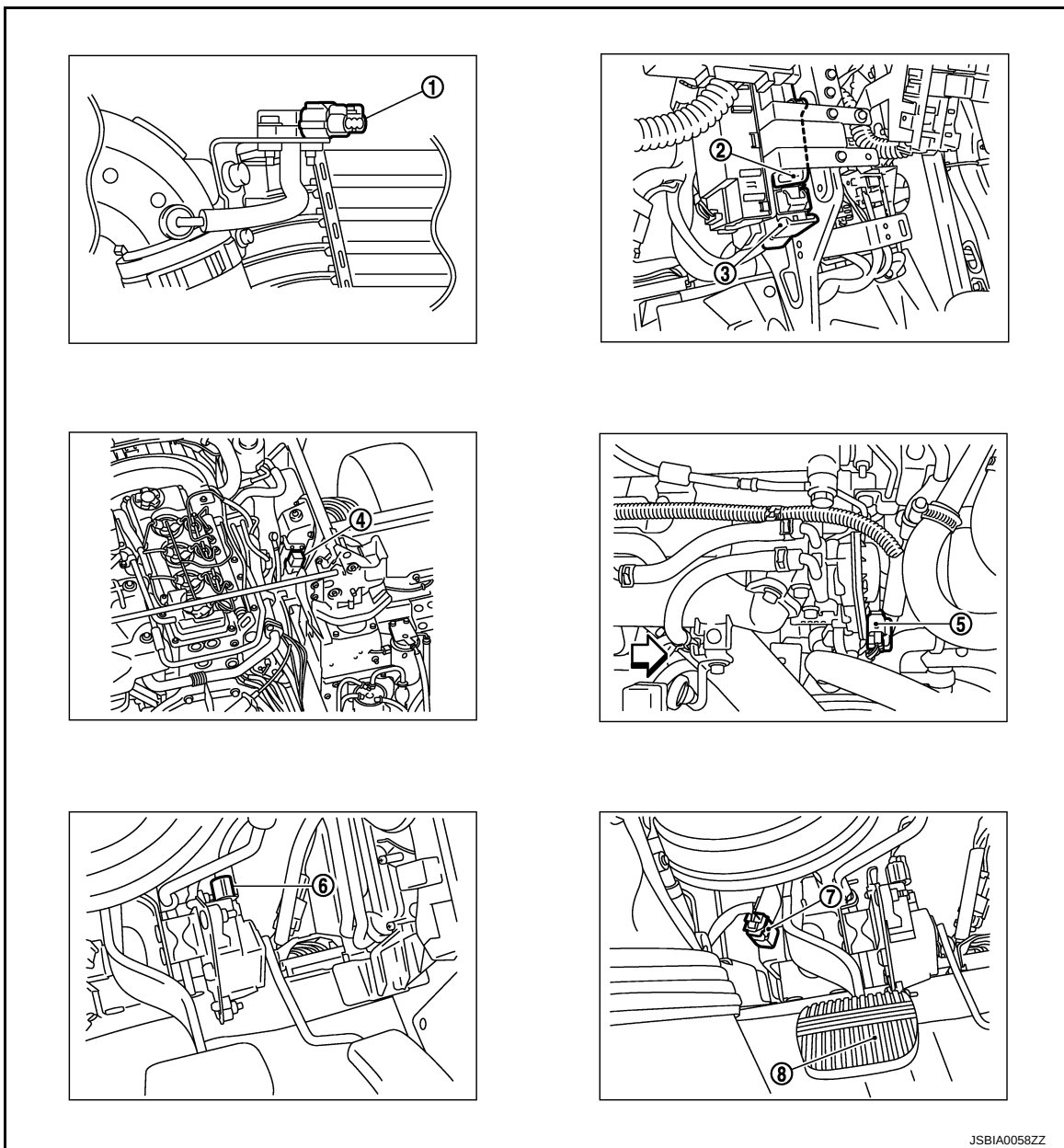
3. Mass air flow sensor (with built in intake air temperature sensor)

4. Engine coolant temperature sensor

5. Fuel rail pressure sensor

6. Fuel injector

↙ : Vehicle front



- | | | |
|------------------------------|---|--------------------------------------|
| 1. Turbocharger boost sensor | 2. ECM | 3. ECM harness connector |
| 4. Glow relay | 5. EGR volume control valve control position sensor | 6. Accelerator pedal position sensor |
| 7. Stop lamp switch | 8. Brake pedal | |

↩ : Vehicle front

Component Description

INFOID:000000004942114

Component	Reference
Crankshaft position sensor	EC-128, "Description"
Engine coolant temperature sensor	EC-93, "Description"
Glow plug	EC-207, "Description"

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:000000005200005

INTRODUCTION

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

Emission-related diagnostic information	ISO Standard
Diagnostic Trouble Code (DTC)	Service \$03 of ISO 15031-5
Freeze Frame data	Service \$02 of ISO 15031-5
1st/2nd Trip Diagnostic Trouble Code (1st/2nd Trip DTC)	Service \$07 of ISO 15031-5
Calibration ID	Service \$09 of ISO 15031-5

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

x: Applicable —: Not applicable

	DTC	1st trip DTC	2nd trip DTC	Freeze Frame data
CONSULT-III	x	x	x	x
GST	x	x	x	x

The malfunction indicator (MI) on the instrument panel illuminates when the same malfunction is detected in three consecutive trips (Three trip detection logic).

THREE TRIP DETECTION LOGIC AND ONE TRIP DETECTION LOGIC

On board diagnosis (OBD) system of this vehicle has “Three Trip Detection Logic” and “One Trip Detection Logic”. For which logic each self-diagnosis corresponds with, refer to [EC-236, "DTC Index"](#).

“Trip” of “Three Trip Detection Logic” means a driving mode in which the self-diagnosis is performed while driving.

Three Trip Detection Logic

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

When the same malfunction is detected again during the next driving, 2nd trip DTC is stored in the ECM memory and 1st trip DTC is cleared from the ECM memory. MI does not illuminate at this stage. <2nd trip>

When the same malfunction is detected again at the third driving, DTC is stored in the ECM memory and 2nd trip DTC is cleared from the ECM memory. MI illuminates at the same time when DTC is stored. <3rd trip>

In other words, DTC is stored and MI illuminates when the same malfunction occurs in 3 consecutive trips. This is called “Three Trip Detection Logic”.

One Trip Detection Logic

When a malfunction is detected for the first time, DTC and Freeze Frame Data are stored in the ECM memory and MI illuminates. This is called “One Trip Detection Logic”.

Some self-diagnoses is not illuminate MI when DTC is stored. (Refer to [EC-236, "DTC Index"](#).)

1st/2nd trip DTC is not stored for one trip detection logic.

DTC AND FREEZE FRAME DATA

DTC and 1st/2nd Trip DTC

The number of 1st/2nd trip DTC is the same as the number of DTC.

When a malfunction is detected during 1st trip, 1st trip DTC is stored in the ECM memory. MI does not illuminate at this time. When the same malfunction is detected in the next trip (2nd trip), 2nd trip DTC is stored in the ECM memory and 1st trip DTC is cleared from the ECM memory. MI does not illuminate at this time. In addition, DTC is stored in the ECM memory and MI illuminates when the same malfunction is detected during the following consecutive trip (3rd trip).

The procedure for erasing DTC, 1st trip DTC, and 2nd trip DTC from the ECM memory is described in “How to Erase DTC and 1st/2nd Trip DTC”.

For malfunctions in which 1st/2nd trip DTC are displayed, Refer to [EC-236, "DTC Index"](#).

1st/2nd trip DTC is specified in Service \$07 of ISO15031-5. 1st/2nd trip DTC detection occurs without illuminating MI and therefore does not warn the driver of a malfunction.

When 1st/2nd trip DTC is detected, repair a malfunction according to Work Flow.

< FUNCTION DIAGNOSIS >

Freeze Frame Data

ECM records driving conditions such as calculated load value, engine coolant temperature, engine speed, etc., at the moment a malfunction is detected.

The data stored together with DTC is called Freeze Frame Data, and is displayed on CONSULT-III or GST.

When the DTC is erased from ECM memory, Freeze Frame Data is erased with DTC. The procedure for erasing DTC is described in "How to Erase DTC and 1st/2nd Trip DTC".

How to Read DTC and 1st/2nd Trip DTC

DTC and 1st/2nd trip DTC can be read by the following procedures.

WITH CONSULT-III

WITH GST

CONSULT-III or GST (Generic Scan Tool): Examples: P0016, P0335, P1409, etc.

These numbers are prescribed by ISO 15031-6.

(CONSULT-III also displays the malfunctioning parts and systems.)

- **1st/2nd trip DTC No. is the same as DTC No.**
- **Output of a DTC indicates a malfunction. However, GST do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-III can identify malfunction status. Therefore, using CONSULT-III (if available) is recommended.**

DTC and 1st/2nd trip DTC are displayed in the "SELF-DIAG RESULTS" mode of CONSULT-III.

When DTC is currently being detected, "TIME" displays "CRNT". When 1st/2nd trip DTC is stored in ECM, "TIME" displays "1t". When "TIME" displays "PAST", DTC indicates a past malfunction (a malfunction that ECM judges repair complete). "IGN COUNTER" indicates the number of times that the vehicle is driven after ECM judges that a malfunction is repaired.

How to Erase DTC and 1st/2nd Trip DTC

WITH CONSULT-III

NOTE:

- DTC cannot be erased while it is being detected. DTC can only be erased when ECM judges that a malfunction causing the applicable DTC is repaired ("TIME" displays "PAST").
- If the ignition switch stays ON after repair work, check that ignition switch is turned OFF once. Wait at least 30 seconds and then turn it ON (engine stopped) again.

1. Select "ENGINE" with CONSULT-III.
2. Select "SELF-DIAG RESULTS".
3. Touch "ERASE". (DTC in ECM is erased.)

WITH GST

NOTE:

- DTC cannot be erased while it is being detected. DTC can only be erased when ECM judges that a malfunction causing the applicable DTC is repaired.
- If the ignition switch stays ON after repair work, check that ignition switch is turned OFF once. Wait at least 30 seconds and then turn it ON (engine stopped) again.

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

The following data are cleared when the ECM memory is erased.

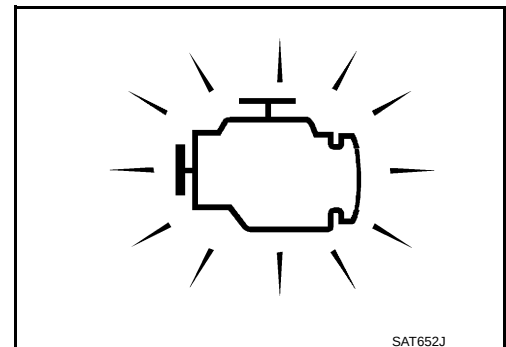
- Diagnostic trouble codes
- 1st/2nd trip diagnostic trouble codes
- Freeze frame data

MALFUNCTION INDICATOR (MI)

Description

The MI is located on the combination meter.

1. The MI illuminate when the ignition switch is turned ON without the engine running. This is a bulb check.
If the MI does not illuminate, refer to [EC-212, "Component Function Check"](#).
2. When the engine is started, the MI should turn off.
If the MI remains on, the on board diagnostic system has detected an engine system malfunction.



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ON BOARD DIAGNOSTIC (OBD) SYSTEM

< FUNCTION DIAGNOSIS >

[ZD]

On Board Diagnostic System Function

The on board diagnostic system has the following two functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position  Engine stopped 	BULB CHECK	This function checks the MI bulb for damage (blown, open circuit, etc.). If the MI does not come on, check MI circuit.
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When a DTC is detected, the MI illuminates to inform the driver that a malfunction is detected.

Diagnostic Test Mode I — Bulb Check

In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to [EC-212, "Component Function Check"](#).

Diagnostic Test Mode I — Malfunction Warning

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

OBD SYSTEM OPERATION CHART

Relationship Between MI, 1st/2nd Trip DTC, DTC, and Detectable Items

- When the malfunction is detected for the first time, 1st trip DTC and Freeze Frame Data are stored in the ECM memory.
- When the same malfunction is detected during 2nd consecutive trip, 2nd trip DTC is stored and 1st trip DTC and is cleared.
- When the same malfunction is detected during 3rd consecutive trip, DTC is stored and MI illuminates. 2nd trip DTC is cleared from the ECM memory.
- MI turns off after the vehicle is driven 5 times (Driving pattern A) with no malfunction.
- 1st/2nd trip DTC, DTC and Freeze Frame Data is stored until the vehicle is driven 40 times (Driving pattern B) without the same malfunction recurring after MI turns off.

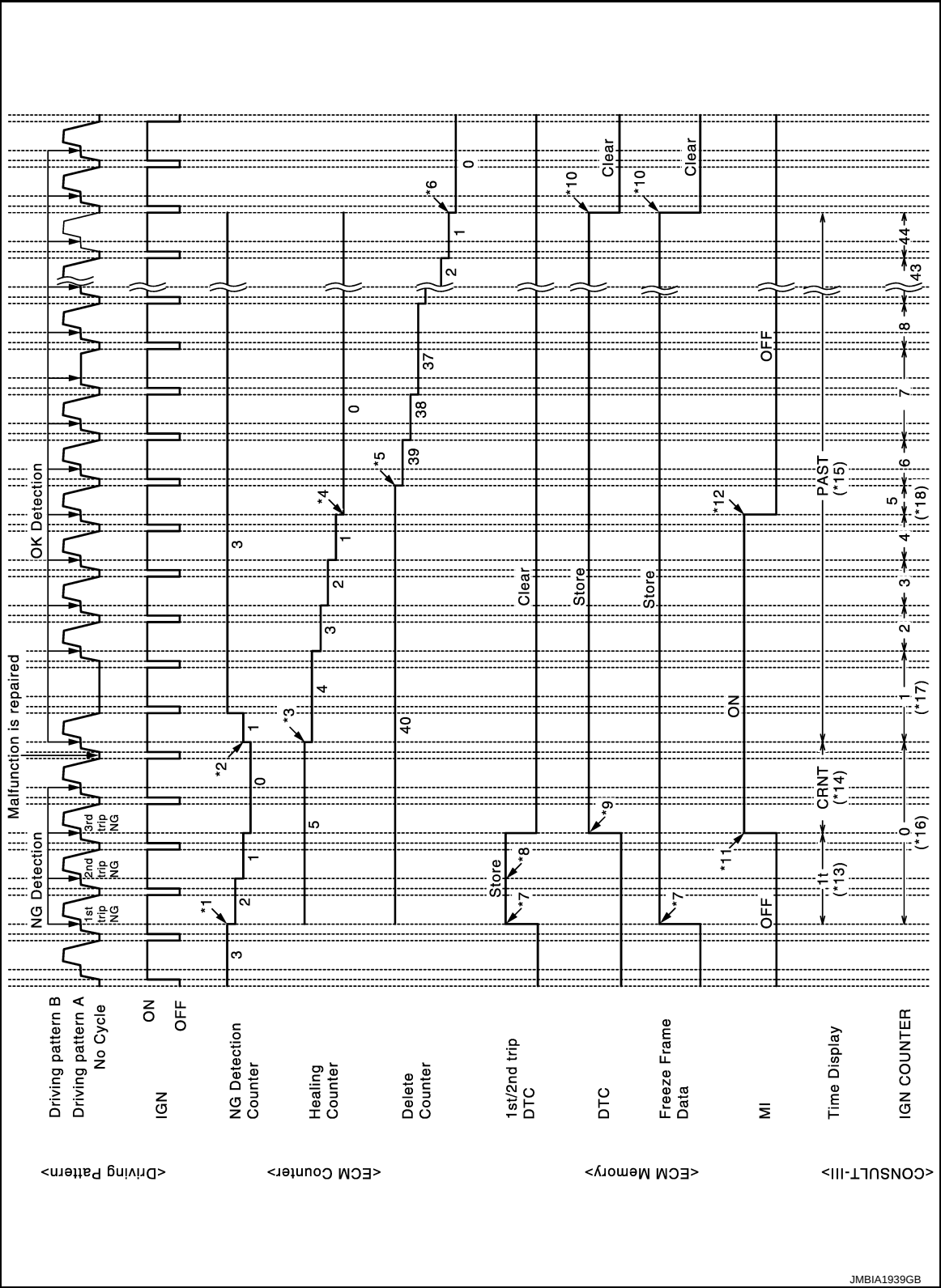
The number of times the vehicle is driven without the same malfunction recurring is indicated by "IGN COUNTER" that is displayed with Freeze Frame Data on CONSULT-III screen.

Summary Chart

Items	Trip	Driving Pattern
MI (turns off)	5	A
1st/2nd Trip DTC, DTC, Freeze Frame Data (clear)	40	B

Refer to "<Driving Pattern A>" for details of pattern A and B.

Relationship Between MI, DTC, 1st/2nd Trip DTC and Driving Patterns



JMBIA1939GB

- | | | |
|--|---|---|
| *1: When the ECM satisfies driving pattern A and detects the NG detection, the NG detection counter is decrement. | *2: When the ECM satisfies driving pattern A and detects OK detection, the NG detection counter is increment. | *3: When the ECM satisfies driving pattern A and detects OK detection, the healing counter is decrement. |
| *4: When the ECM detects OK detection and elapses 4 driving cycles, the healing counter reaches 0. | *5: The delete counter is decrement when the ignition switch turns OFF after MI turns OFF, the ECM satisfies driving pattern B, and detects OK detection. | *6: When the ECM detects OK detection and elapses 40 driving pattern B, the delete counter reaches 0. |
| *7: When the malfunction is detected for the first time, 1st trip DTC and Freeze Frame Data are stored in the ECM memory. | *8: When the same malfunction is detected during 2nd consecutive trip, 2nd trip DTC is stored and 1st trip DTC is cleared. | *9: When the same malfunction is detected during 3rd consecutive trip, DTC is stored and 2nd trip DTC is cleared. |
| *10: When the delete counter is reached to 0, DTC and Freeze Frame Data are cleared. | *11: When the same malfunction is detected in 3 consecutive trips, MI illuminates. | *12: MI turns OFF after vehicle is driven 5 times (driving pattern A) without any malfunctions. |
| *13: When the ECM detects 1st/2nd trip NG detection, the time "1t" is displayed in the CONSULT-III Self diagnostic screen. | *14: When the ECM detects 3rd trip NG detection, the time "CRNT" is displayed in the CONSULT-III Self diagnostic screen. | *15: When the ECM satisfies driving pattern A and detects OK detection, the time "PAST" is displayed in the CONSULT-III Self diagnostic screen. |
| *16: When the malfunction is detected, the IGN COUNTER "0" is displayed in the CONSULT-III Freeze Frame Data screen. | *17: When the healing counter is 4, the IGN COUNTER "1" is displayed in the CONSULT-III Freeze Frame Data screen. | *18: When the healing counter is 0 and the delete counter is 40, the IGN COUNTER "5" is displayed in the CONSULT-III Freeze Frame Data screen. |

<DRIVING PATTERN A>

Driving pattern A means the vehicle operation as per the following items:

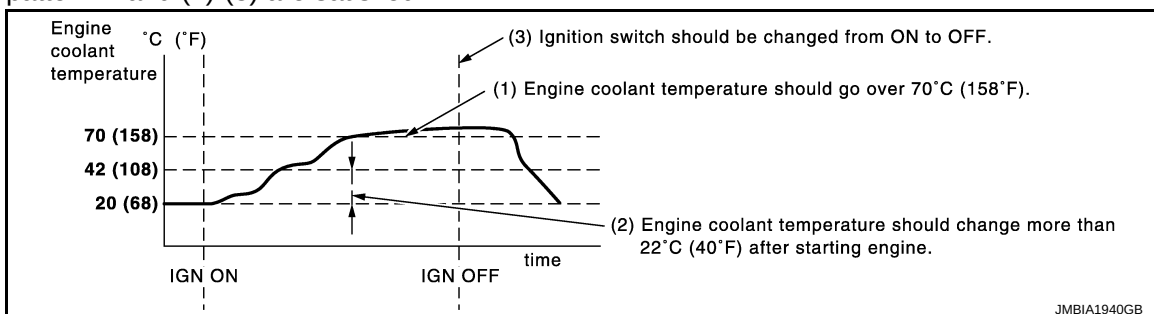
Engine speed should go over 500 rpm at least 5 seconds and the DTC Confirmation Procedure is performed.

- The healing counter is set when the malfunction is detected.
- The healing counter is decrement when the same malfunction is not detected.
- The MI turns off when the healing counter reaches 0.

<DRIVING PATTERN B>

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

Driving pattern A and (1)-(3) are satisfied.



- The delete counter is set when the malfunction is detected.
- The delete counter is decrement when the same malfunction is not detected.
- The DTC is not displayed after the delete counter reaches 0.

CONSULT-III Function

INFOID:000000005200006

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-III unit.
Self Diagnostic Result	Self-diagnostic results such as DTC and freeze frame data can be read and erased quickly.*
Data Monitor	Input/Output data in the ECM can be read.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

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< FUNCTION DIAGNOSIS >

[ZD]

Diagnostic test mode	Function
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. DTC cannot be erased while it is being detected. DTC can only be erased when ECM judges that a malfunction causing the applicable DTC is repaired ("TIME" displays "PAST").

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- 2nd trip diagnostic trouble codes
- Freeze frame data

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

Item			DIAGNOSTIC TEST MODE				
			WORK SUPPORT	SELF DIAG RESULT		DATA MONITOR	ACTIVE TEST
				DTC	FREEZE FRAME DATA		
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor		×	×	×	
		Camshaft position sensor		×		×	
		Engine coolant temperature sensor		×	×	×	
		Vehicle speed signal		×	×	×	
		Accelerator pedal position sensor 1		×	×	×	
		Accelerator pedal position sensor 2		×		×	
		Fuel rail pressure sensor		×	×	×	
		Mass air flow sensor		×	×	×	
		Intake air temperature sensor		×	×	×	
		Turbocharger boost sensor		×	×	×	
		Battery voltage				×	
		Park/neutral position (PNP) switch				×	
		Stop lamp switch				×	
		EGR volume control valve control position sensor		×	×	×	
		Air conditioner switch				×	
		Clutch pedal position switch				×	
		Barometric pressure sensor (built-into ECM)		×		×	
		PTO switch				×	
	OUTPUT	Fuel pump		×			
		Fuel injector	×	×	×		
		Glow relay		×		×	×
		Turbocharger boost control solenoid valve		×	×		×
		Swirl control valve control solenoid valve		×		×	×
		EGR volume control valve	×	×		×	×

X: Applicable

WORK SUPPORT MODE

Work Item

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< FUNCTION DIAGNOSIS >

[ZD]

WORK ITEM	DESCRIPTION	USAGE
ENTER INJECTR CALIB DATA	Injector adjustment value is written onto ECM memory.	When performing INJECTOR ADJUSTMENT VALUE REGISTRATION.
EGR/V LEARN CLR	EGR volume control valve closed position learning value stored in ECM is cleared.	EGR volume control valve closed position learning value should be cleared under the following cases. - EGR volume control valve is removed. - EGR volume control valve is replaced.
PTO REGISTRATION	PTO registration is written onto ECM memory.	When performing PTO REGISTRATION.

SELF-DIAGNOSTIC MODE

Self Diagnostic Item

Regarding items detected in "SELF-DIAG RESULTS" mode, refer to [EC-236, "DTC Index"](#).

Freeze Frame Data

Freeze frame data item	Description
DTC	The engine control component part/control system has a trouble code, it is displayed. (Refer to EC-236, "DTC Index".)
CAL/LD VALUE [%]	The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	The engine coolant temperature at the moment a malfunction is detected is displayed.
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.
INT MANI PRES [kPa]	The intake manifold pressure at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed.
FUEL/R PRESS [kPa]	The fuel rail pressure at the moment a malfunction is detected is displayed.
MASS AIRFLOW [g/s]	The mass air flow at the moment a malfunction is detected is displayed.
ACCEL POS SEN [mV]	The accelerator pedal position at the moment a malfunction is detected is displayed.
TRG INJ QTY [mg/st]	The target injection quantity at the moment a malfunction is detected is displayed.
EGR/V ANGLE [%]	The EGR volume control valve opening angle at the moment a malfunction is detected is displayed.
TC V/N CONT/V [%]	The turbocharger boost control valve position at the moment a malfunction is detected is displayed.
INFO CODE	The ECM information code is displayed.
ID FLAG	The DTC identification flag is displayed. (For detail, see next table)

ID FLAG

When other number than 1, 2, 4, or 8 is displayed, it means that multiple malfunctions are detected.

Relation of displayed ID FLAG and detected DTC identification flag is as shown in the following list.

×: Applicable, —: Not applicable

CONSULT-III display	Detected DTC identification flag			
	1	2	4	8
1	×	—	—	—
2	—	×	—	—
3	×	×	—	—
4	—	—	×	—
5	×	—	×	—
6	—	×	×	—
7	×	×	×	—

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[ZD]

CONSULT-III display	Detected DTC identification flag			
	1	2	4	8
8	—	—	—	×
9	×	—	—	×
A	—	×	—	×
B	×	×	—	×
C	—	—	×	×
D	×	—	×	×
E	—	×	×	×
F	×	×	×	×

DATA MONITOR MODE

Monitored Item

MONITOR ITEM	Unit	CONDITION	SPECIFICATION
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 circuit is open or short, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal is displayed.	
ACCEL POS SEN	V	The accelerator pedal position sensor 1 signal voltage is displayed.	
BATTERY VOLT	V	The power supply voltage of ECM is displayed.	
BARO SEN	kPa	The barometric pressure (determined by the signal voltage from the absolute pressure sensor built into the ECM) is displayed.	
TURBO BST SEN	kPa	The turbocharger boost (determined by the signal voltage of the turbocharger boost sensor) is displayed.	
TC V/N CONT/V	%	The turbocharger boost control solenoid valve position is displayed.	
PTO STATUS	OFF/SET-/SET+/RES	Indicates [OFF/SET-/SET+/RES] condition from PTO status.	
I/C INT/A T/S	°C or °F	The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is displayed.	
ACCEL SEN 2	V	The accelerator pedal position sensor 2 signal voltage is displayed.	
EGR/V ANGLE	%	- Indicates the EGR volume control valve computed by the ECM according to the input signals. - The opening becomes larger as the value increases	
ACT CR PRESS	MPa	The Fuel rail pressure (determined by the signal voltage of the fuel rail pressure sensor) is displayed.	
EGR V/POS SEN	mV	The EGR volume control valve control position sensor signal voltage is displayed.	
INT/A VOLUME	mg/st	The intake air volume computed from the mass air flow sensor signal is displayed.	
TRG INJ QTY	mg/st	The target injection quantity is displayed.	
CKPS-RPM (TDC)	rpm	The engine speed computed from the crankshaft position sensor signal is displayed.	

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< FUNCTION DIAGNOSIS >

[ZD]

MONITOR ITEM	Unit	CONDITION	SPECIFICATION
CMPS-RPM	rpm	• The engine speed computed from the camshaft position sensor signal is displayed.	
IGN SW	ON/OFF	• Indicates [ON/OFF] condition from ignition switch signal.	
START SIGNAL	ON/OFF	• Indicates [ON/OFF] condition from the starter signal.	
P/N POSI SW	ON/OFF	• Indicates [ON/OFF] condition from the park/neutral position switch signal.	
AIR COND SIG	ON/OFF	• Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
BRAKE SW	ON/OFF	• Indicates [ON/OFF] condition from the stop lamp switch signal.	
CLUTCH SW	ON/OFF	• Indicates [ON/OFF] condition from clutch switch signal.	
PTO EMGCY SW	ON/OFF	• Indicates [ON/OFF] condition from PTO emergency stop switch signal.	
VHCL LMT SW	ON/OFF	• Indicates [ON/OFF] condition from PTO vehicle speed limit switch signal.	
AIR COND RLY	ON/OFF	• Indicates the control condition of the air conditioner relay (determined by ECM according to the input signals).	
SWRL CON S/V1	ON/OFF	• The control condition of the swirl control valve control solenoid valve (determined by ECM according to the input signals) is indicated. ON: Swirl control valve is closed OFF: Swirl control valve is opened	
GLOW RLY	ON/OFF	• The glow relay control condition (determined by ECM according to the input signal) is displayed.	

NOTE:

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

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
TC BOOST CONT/V	- Ignition switch: ON - Turn turbocharger boost control solenoid valve ON and OFF with the CONSULT-III and listen to operation sound.	Turbocharger boost control solenoid valve makes an operating sound.	- Harness and connector - Turbocharger boost control valve
EGR/V ANGLE	- Ignition switch: ON - Change EGR volume control valve opening angle using CONSULT-III	The opening angle of EGR volume control valve is changed normally.	- Harness and connector - EGR volume control valve
SWIRL CONT S/V 1	- Ignition switch: ON - Turn swirl control valve control solenoid valve ON and OFF with the CONSULT-III and listen to operation sound.	Swirl control valve control solenoid valve makes an operating sound.	- Harness and connector - Swirl control valve control solenoid valve
GLOW RLY	- Ignition switch: ON (Engine stopped) - Turn the glow relay ON and OFF using CONSULT-III and listen to operating sound.	Glow relay makes the operating sound.	- Harness and connector - Glow relay

ON BOARD DIAGNOSTIC (OBD) SYSTEM

< FUNCTION DIAGNOSIS >

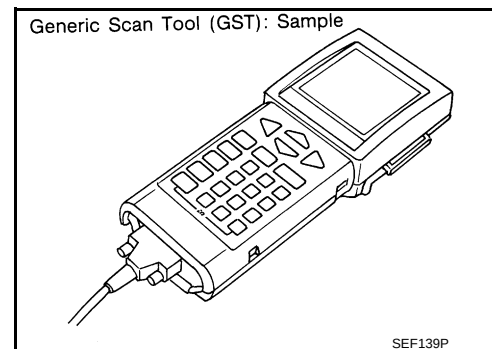
[ZD]

Diagnosis Tool Function

INFOID:000000005200007

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with ISO 15031-4 has several functions explained below.
ISO15765-4 is used as the protocol.
The name "GST" or "Generic Scan Tool" is used in this service manual.

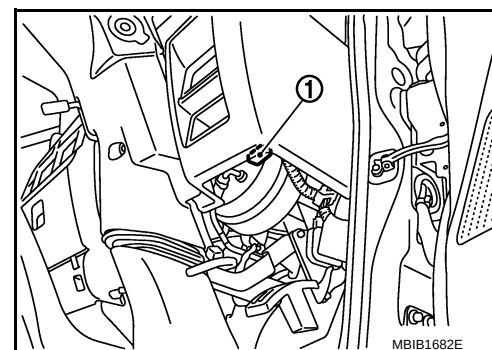


FUNCTION

Diagnostic Service		Function
Service \$02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored in ECM during the freeze frame.
Service \$03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored in ECM.
Service \$04	CLEAR DIAG INFO	This diagnostic service can clear all emission-related diagnostic information. This includes: • Clear number of diagnostic trouble codes (Service \$01) • Clear diagnostic trouble codes (Service \$03) • Clear trouble code for freeze frame data (Service \$01) • Clear freeze frame data (Service \$02) • Reset status of system monitoring test (Service \$01) • Clear on board monitoring test results (Service \$07)
Service \$07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
Service \$09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

INSPECTION PROCEDURE

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

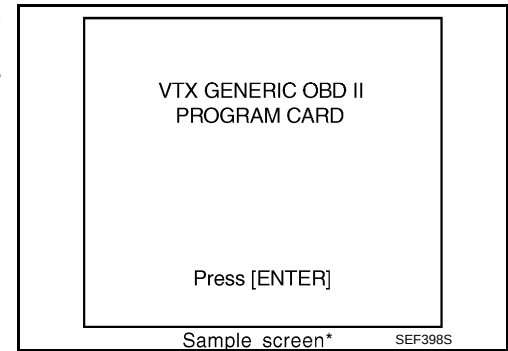


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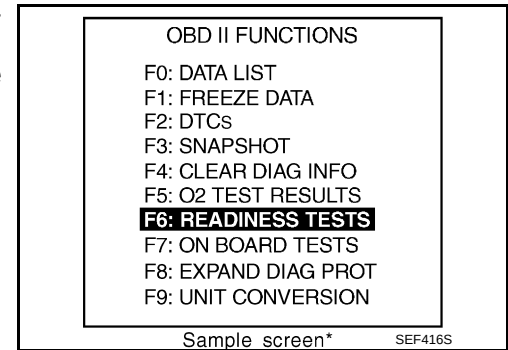
< FUNCTION DIAGNOSIS >

[ZD]

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



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



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COMPONENT DIAGNOSIS

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

Description

INFOID:000000004942126

Intermittent incidents may occur. In many cases, the incident resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st/2nd trip) DTC visits. Realize also that the most frequent cause of intermittent incidents occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

Diagnosis Procedure

INFOID:000000004942127

1.CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.

Refer to [EC-58, "Ground Inspection"](#).

OK or NG

OK >> GO TO 2.

NG >> Repair or replace.

2.SEARCH FOR ELECTRICAL INCIDENT

Perform [GI-22, "How to Perform Efficient Diagnosis for an Electrical Incident"](#), "INCIDENT SIMULATION TESTS".

OK or NG

OK >> **INSPECTION END**

NG >> Repair or replace.

POWER SUPPLY AND GROUND CIRCUIT

< COMPONENT DIAGNOSIS >

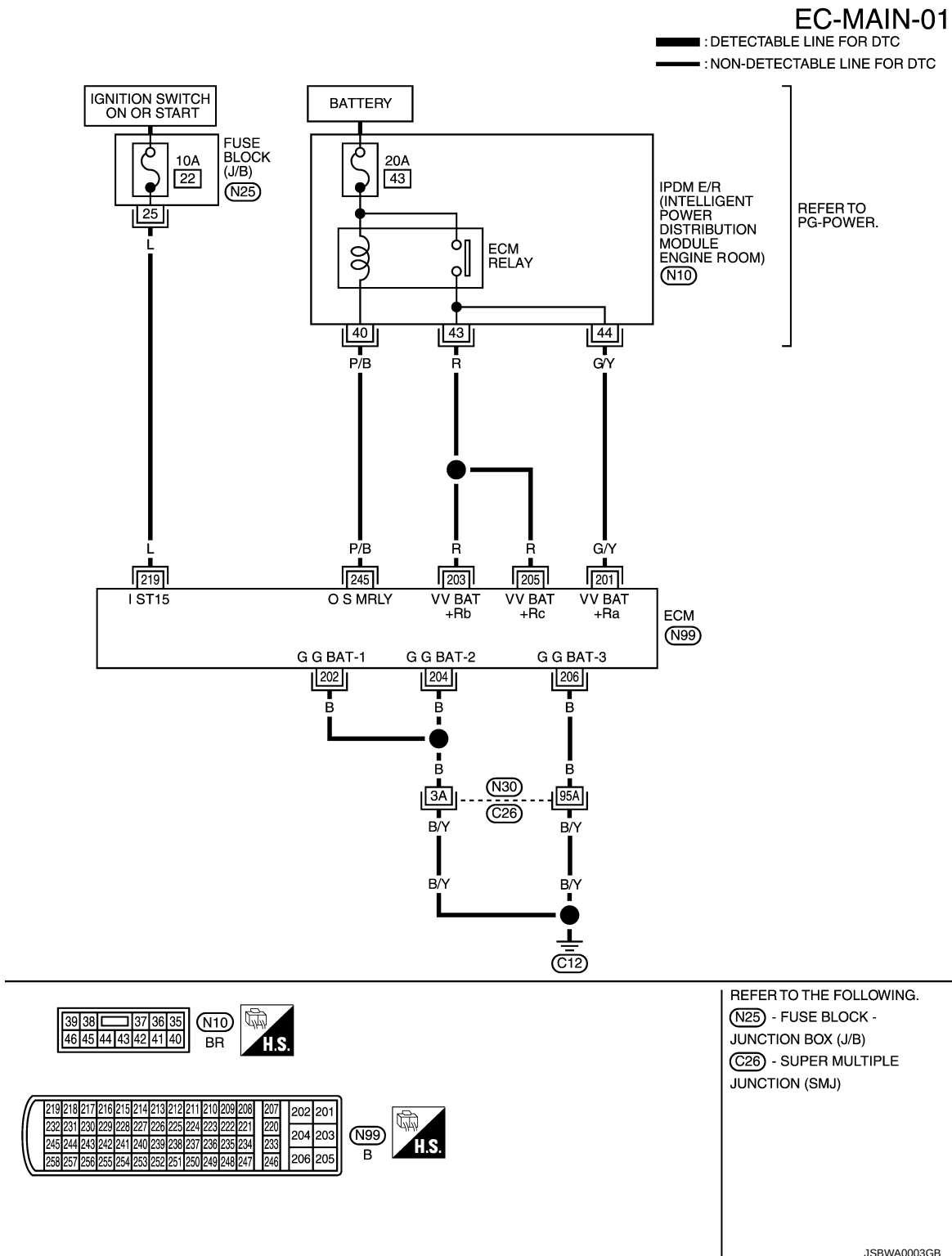
[ZD]

POWER SUPPLY AND GROUND CIRCUIT

Wiring Diagram

INFOID:000000004942128

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Diagnosis Procedure

INFOID:000000004942129

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

POWER SUPPLY AND GROUND CIRCUIT

[ZD]

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2. Check ground connection C12. Refer to [EC-58. "Ground Inspection"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

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

ECM		Ground	Continuity
Connector	terminal		
N99	202	Ground	Existed
	204		
	206		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors N30, C26
- Harness for open and short between ECM harness connector and ground

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

4.CHECK ECM POWER SUPPLY CIRCUIT-I

1. Reconnect ECM harness connector.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector terminals as per the following items.

ECM			Voltage
Connector	+	-	
	Terminal	Terminal	
N99	219	202	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse (No. 22)
- Harness for open and short between ECM harness connector and fuse

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

6.CHECK ECM POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Turn ignition switch ON and then OFF.
Check the voltage between ECM harness connector terminals as per the following items.

POWER SUPPLY AND GROUND CIRCUIT

< COMPONENT DIAGNOSIS >

[ZD]

ECM			Voltage
Connector	+	-	
	Terminal	Terminal	
N99	201	202	After turning ignition switch OFF, battery voltage exists for a certain seconds, then drop approximately 0V.
	203		
	205		

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 8.

7.CHECK INTERMITTENT INCIDENTRefer to [EC-54. "Description"](#).

>> INSPECTION END

8.CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF, and wait at least 30 seconds.
2. Check the voltage between ECM harness connector terminals as per the following items.

ECM			Voltage
Connector	+	-	
	Terminal	Terminal	
N99	245	202	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 9.

9.CHECK ECM POWER SUPPLY CIRCUIT-IV

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

ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
N99	245	N11	7	Existed

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

Is the inspection result normal?

YES >> GO TO 10.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

10.CHECK 20A FUSE

1. Disconnect 20A fuse (No. 52) from IPDM E/R.
2. Check 20A fuse.

Is the inspection result normal?

YES >> GO TO 12.

NO >> Replace 20A fuse.

11.CHECK ECM POWER SUPPLY CIRCUIT-V

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

POWER SUPPLY AND GROUND CIRCUIT

< COMPONENT DIAGNOSIS >

[ZD]

ECM		IPDM E/R		continuity
Connector	Terminal	Connector	Terminal	
N99	201	N11	3	Existed
	203		4	
	205			

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

Is the inspection result normal?

YES >> GO TO 12.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

12. CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair open circuit or short to power in harness or connectors.

Ground Inspection

INFOID:000000004942130

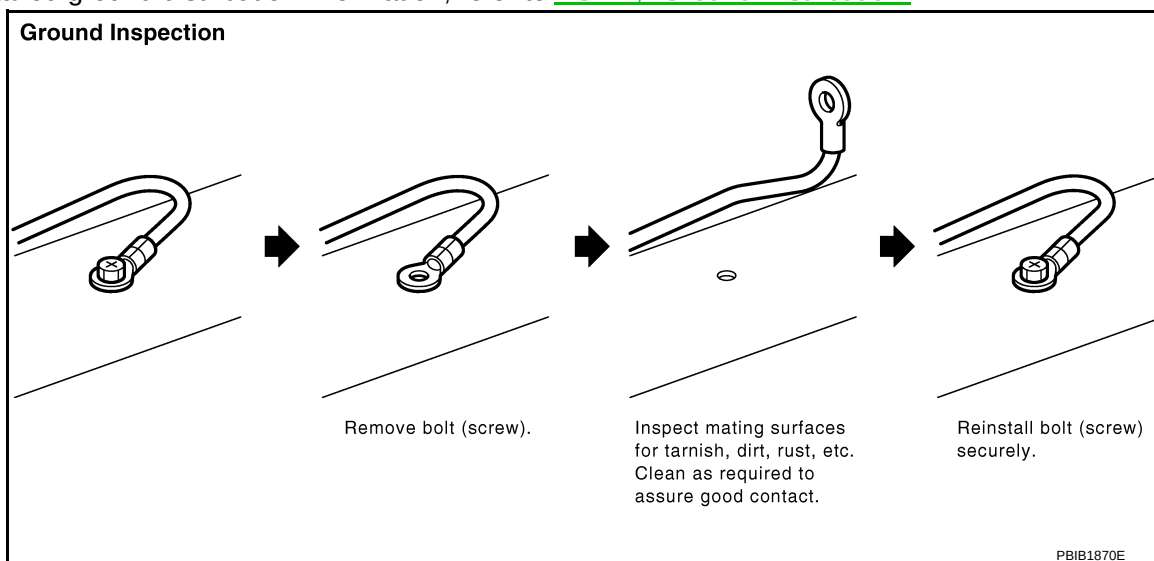
Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.

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

For detailed ground distribution information, refer to [PG-22, "Ground Distribution"](#).



U1001 CAN COMM CIRCUIT

Description

INFOID:000000004942131

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

DTC Logic

INFOID:000000004942132

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
U1001	4	U1001	CAN communica- tion line	When ECM is not transmitting or receiv- ing CAN communication signal other than OBD (emission-related diagnosis) for 2 seconds or more.	Harness or connectors (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 3 seconds.
- Erase DTC.

Is DTC erased?

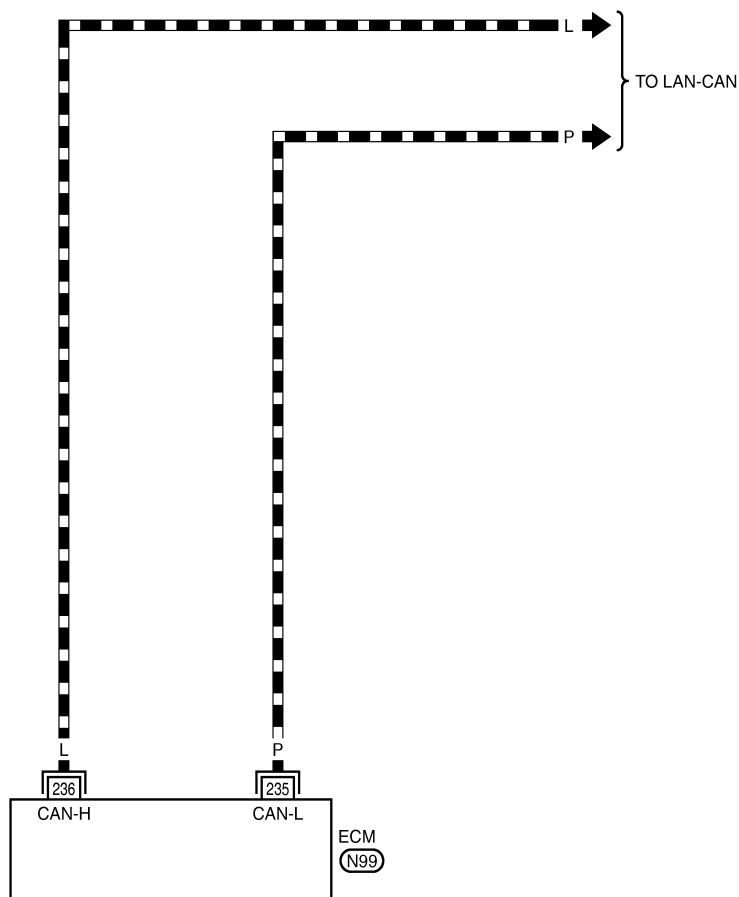
- YES >> INSPECTION END
NO >> Go to [EC-60, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000004942133

EC-CAN-01

- ▬ : DATA LINE
- ▬ : DETECTABLE LINE FOR DTC
- ▬ : NON-DETECTABLE LINE FOR DTC



219	218	217	216	215	214	213	212	211	210	209	208	207	202	201
232	231	230	229	228	227	226	225	224	223	222	221	220	204	203
245	244	243	242	241	240	239	238	237	236	235	234	233	206	205
258	257	256	255	254	253	252	251	250	249	248	247	246		

(N99) B H.S.

MBWA1721E

Diagnosis Procedure

INFOID:000000004942134

Go to [LAN-14, "Trouble Diagnosis Flow Chart"](#).

U1010 CONTROL UNIT (CAN)

Description

INFOID:000000004942135

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

DTC Logic

INFOID:000000004942136

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
U1010	4	U1010	CAN communica- tion bus	When detecting error during the initial diag- nosis for CAN controller of each control unit.	• ECM

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.

Is DTC erased?

YES >> INSPECTION END
NO >> Go to [EC-61, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000004942137

1. INSPECTION START

1. Perform DTC confirmation procedure. Refer to [EC-61, "DTC Logic"](#).
2. Erase DTC.

Is DTC erased?

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

2. REPLACE ECM

1. Replace ECM.
2. Perform [EC-10, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"](#).

>> INSPECTION END

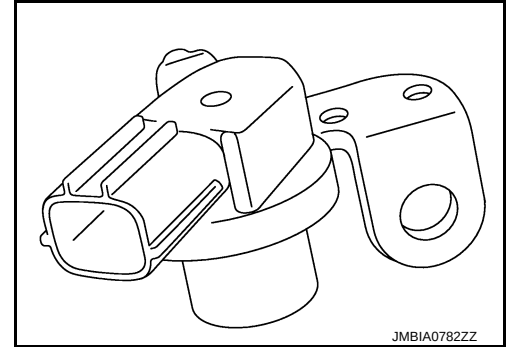
P0008 CKP SENSOR

Description

INFOID:000000004942138

The crankshaft position (CKP) sensor is located on the cylinder block front facing the gear teeth of the signal plate installed to the crankshaft pulley.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.



JMBIA0782ZZ

DTC Logic

INFOID:000000004942139

DTC DETECTION LOGIC

NOTE:

If DTC P0008 is displayed with DTC P0335 (GST: P0335, P0336), first perform the trouble diagnosis for DTC P0335 (GST: P0335, P0336). Refer to [EC-128, "DTC Logic"](#).

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III	ID FLAG	GST			
P0008	1	P0008	Engine position system performance	ECM cannot detect crankshaft position sensor signal, therefore, ECM controls the engine by camshaft position sensor signal only.	• Harness or connectors (Crankshaft position sensor circuit is open or shorted.) • Crankshaft position sensor • Signal plate

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. Erase DTC.

Is DTC erased?

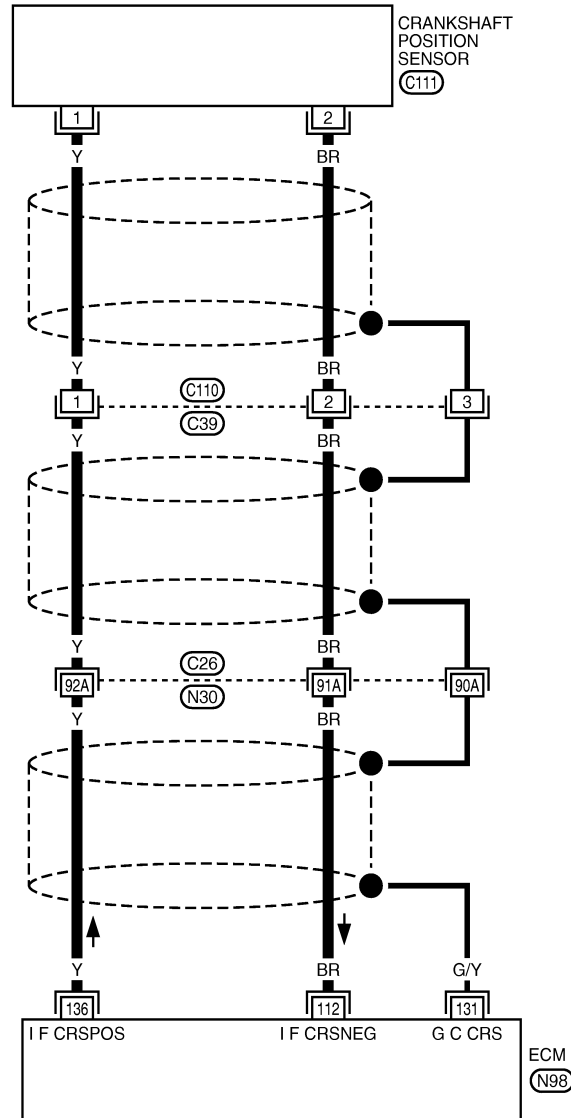
YES >> INSPECTION END
 NO >> Go to [EC-63, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000004942140

EC-CKPS-01

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



124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101
148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125
172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156	155	154	153	152	151	150	149
196	195	194	193	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176	175	174	173

(N98)
B



1 2 3
C39
GR

1 2
C111

REFER TO THE FOLLOWING.

(C26) - SUPER MULTIPLE
JUNCTION (SMJ)

JMBWA0090GB

Diagnosis Procedure

INFOID:000000004942141

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection C12. Refer to [EC-58, "Ground Inspection"](#).

Is the inspection result normal?

< COMPONENT DIAGNOSIS >

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

2.CHECK CKP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C111	1	N98	136	Existed
	2		112	

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

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector C26, N30
- Harness connector C39, C110
- Harness for open and short between ECM and CKP sensor

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

4.CHECK CKP SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connector C39, C110.
2. Check the continuity between harness connector C39 and ECM harness connector.

Harness connector		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C39	3	N98	131	Existed

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

Is the inspection result normal?

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

5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector C39
- Harness connector C26, N30
- Harness for open and short between harness connector C39 and ECM

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

6.CHECK CKP SENSOR

Refer to [EC-65. "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> Replace CKP sensor.

7.CHECK SIGNAL PLATE

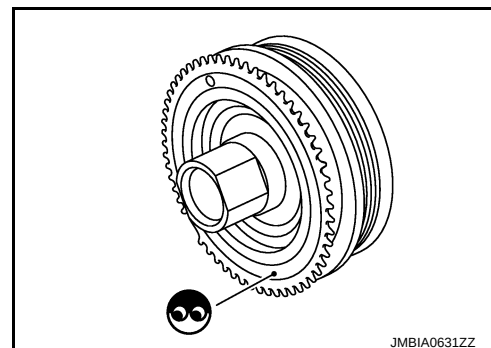
< COMPONENT DIAGNOSIS >

[ZD]

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

- YES >> GO TO 8.
NO >> Replace the signal plate.



8.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

Component Inspection

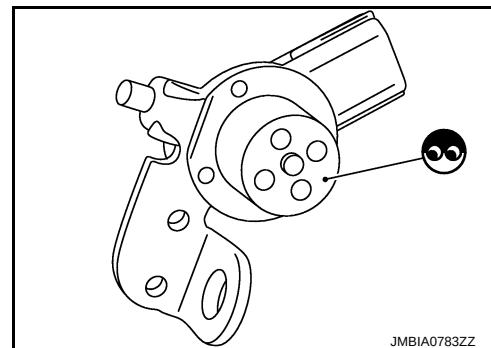
INFOID:000000004942142

1.CHECK CKP SENSOR-I

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

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Replace crankshaft position sensor.



2.CHECK CKP SENSOR-II

Check resistance between crankshaft position sensor terminal.

Terminal	Resistance
1 and 2	500 – 600Ω [at 25°C(77°F)]

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Replace crankshaft position sensor.

P0016 CKP - CMP CORRELATION

DTC Logic

INFOID:000000004942143

DTC DETECTION LOGIC

NOTE:

- If DTC P0016 is displayed with DTC P0335 (GST: P0335, P0336), first perform trouble diagnosis for DTC P0335 (GST: P0335, P0336). Refer to [EC-128, "DTC Logic"](#).
- If DTC P0016 is displayed with DTC P0340 (GST: P0340, P0341), first perform trouble diagnosis for DTC P0340 (GST: P0340, P0341). Refer to [EC-132, "DTC Logic"](#).

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0016	1	P0016	Crankshaft position - camshaft position correlation	• The correlation between crankshaft position sensor signal and camshaft position sensor signal is out of the normal range.	• Camshaft position sensor • Crankshaft position sensor • Timing chain • Signal plate • Harness or connectors

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
If the engine does not start, keep ignition switch at START position for at least 5 seconds.
2. Erase DTC.

Is DTC erased?

- YES >> INSPECTION END
NO >> Go to [EC-66, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000004942144

1. CHECK CAMSHAFT POSITION SENSOR

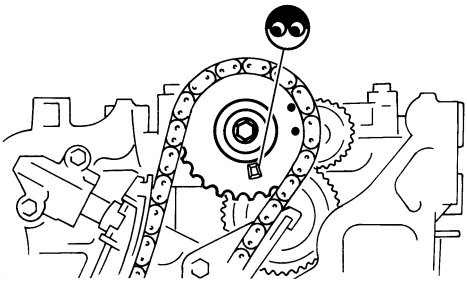
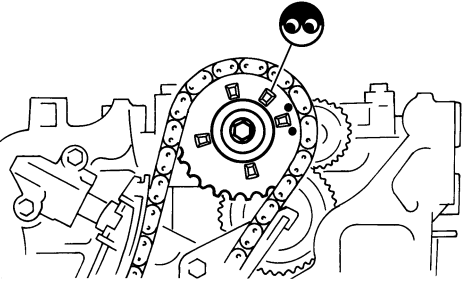
Refer to [EC-135, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Replace camshaft position sensor.

2. CHECK SPROCKET

Visually check for chipping signal plate of camshaft sprocket.

Except for Russia/Ukraine	For Russia/Ukraine
 JMBIA1954ZZ	 JMBIA0786ZZ

Is the inspection result normal?

YES >> GO TO 3.

NO >> Remove debris and clean the signal plate or replace sprocket.

3.CHECK CRANKSHAFT POSITION SENSOR

Refer to [EC-131. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 4.

NO >> Replace crankshaft position sensor.

4.CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace signal plate.

5.CHECK TIMING CHAIN

Refer to [EM-63. "Removal and Installation"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace timing chain.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-54. "Description"](#).

>> INSPECTION END

P0087 FUEL SYSTEM

DTC Logic

INFOID:000000004942150

DTC DETECTION LOGIC

NOTE:

If DTC P0087 is displayed with DTC P0651 (GST: P0652, P0653), first perform the trouble diagnosis for DTC P0651 (GST: P0652, P0653). Refer to [EC-171, "DTC Logic"](#).

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0087	1	P0087	Fuel rail pressure too low	Fuel pressure is too much lower than the specified value.	• Fuel pump • Fuel injector • Fuel rail pressure sensor • Air mixed with fuel • Lack of fuel • Fuel rail pressure relief valve • Fuel line • Harness or connectors

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine.
- Keep engine speed more than 700 rpm for at least 5 seconds.
- Erase DTC.

Is DTC erased?

YES >> INSPECTION END
NO >> Go to [EC-68, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000004942151

1. CHECK FUEL LINE FOR LEAK

- Start engine.
- Visually check the following for fuel leakage.
 - Fuel tube from fuel pump to fuel rail
 - Fuel tube from fuel rail to fuel injector
 - Fuel rail
- Also check for improper connection or pinches.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair malfunctioning part.

2. CHECK FUEL RAIL PRESSURE SENSOR

Refer to [EC-104, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace fuel rail.

3. CHECK FUEL INJECTOR

< COMPONENT DIAGNOSIS >

[ZD]

Refer to [EC-109, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4. REPLACE FUEL INJECTOR

1. Replace malfunctioning fuel injector.
2. Perform INJECTOR ADJUSTMENT VALUE REGISTRATION. Refer to [EC-11, "INJECTOR ADJUSTMENT VALUE REGISTRATION : Special Repair Requirement"](#).

>> INSPECTION END

5. CHECK FUEL PUMP

Refer to [EC-74, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace fuel pump.

6. CHECK FUEL RAIL PRESSURE RELIEF VALVE

Refer to [EC-69, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace fuel rail.

7. CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:000000004942152

1. FUEL RAIL PRESSURE RELIEF VALVE

WARNING:

- Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
- Prepare pans or saucers under the disconnected fuel line because the fuel may spill out.

1. Turn ignition switch OFF.
2. Remove fuel hose from fuel rail pressure relief valve.
3. Attach a blind cap or plug to removed hose.
4. Start engine and keep engine speed 2,000 rpm for at least 5 seconds.

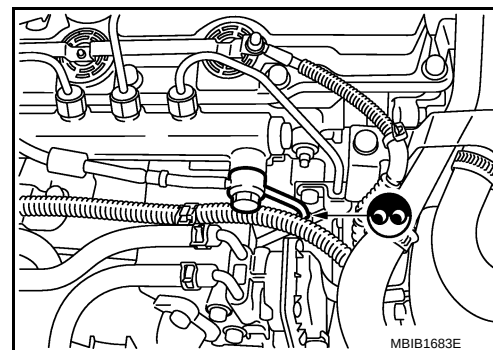
WARNING:

- If the fuel comes out, stop the engine immediately.
- Be careful not to allow leaked fuel to contaminate engine compartment. Especially, ensure to keep engine mount insulator clear of fuel.

Does fuel come out from the fuel rail pressure relief valve?

YES >> Replace fuel rail.

NO >> INSPECTION END



P0088 FUEL SYSTEM

DTC Logic

INFOID:000000004942153

DTC DETECTION LOGIC

NOTE:

If DTC P0088 is displayed with DTC P0651 (GST: P0652, P0653), first perform the trouble diagnosis for DTC P0651 (GST: P0652, P0653). Refer to [EC-171, "DTC Logic"](#).

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0088	1	P0088	Fuel rail pressure too high	Fuel pressure is too much higher than the specified value.	• Fuel pump • Fuel injector • Fuel rail pressure sensor • Fuel line

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and let it idle for at least 5 seconds.
- Erase DTC.

Is DTC erased?

YES >> INSPECTION END

NO >> Go to [EC-70, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000004942154

1. CHECK FUEL LINE FOR LEAK

- Start engine.
- Visually check the following for fuel leakage.
 - Fuel tube from fuel pump to fuel rail
 - Fuel tube from fuel rail to fuel injector
 - Fuel rail
- Also check for improper connection or pinches.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair malfunctioning part.

2. CHECK FUEL RAIL PRESSURE SENSOR

Refer to [EC-104, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace fuel rail.

3. CHECK FUEL INJECTOR

Refer to [EC-109, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

< COMPONENT DIAGNOSIS >

[ZD]

4.REPLACE FUEL INJECTOR

1. Replace malfunctioning fuel injector.
2. Perform INJECTOR ADJUSTMENT VALUE REGISTRATION. Refer to [EC-11, "INJECTOR ADJUSTMENT VALUE REGISTRATION : Special Repair Requirement"](#).

>> INSPECTION END

5.CHECK FUEL PUMP

Refer to [EC-74, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace fuel pump.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

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P0090 FUEL PUMP

< COMPONENT DIAGNOSIS >

[ZD]**P0090 FUEL PUMP****Description**

INFOID:000000004942155

The fuel pump is installed in the engine. Utilizing the revolutions of the engine via gears, the fuel pump discharges high-pressure fuel to the fuel rail. The fuel pressure is controlled by the ECM.

DTC Logic

INFOID:000000004942156

DTC DETECTION LOGIC

DTC No.		GST	Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III					
	ID FLAG				
P0090	4	P0090	Fuel pump control circuit	The fuel pump signal is not detected by the ECM.	• Harness or connectors (The fuel pump circuit is open.) • Fuel pump
	8			An improper voltage is sent to ECM through fuel pump.	

DTC CONFIRMATION PROCEDURE**1. PRECONDITIONING**

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

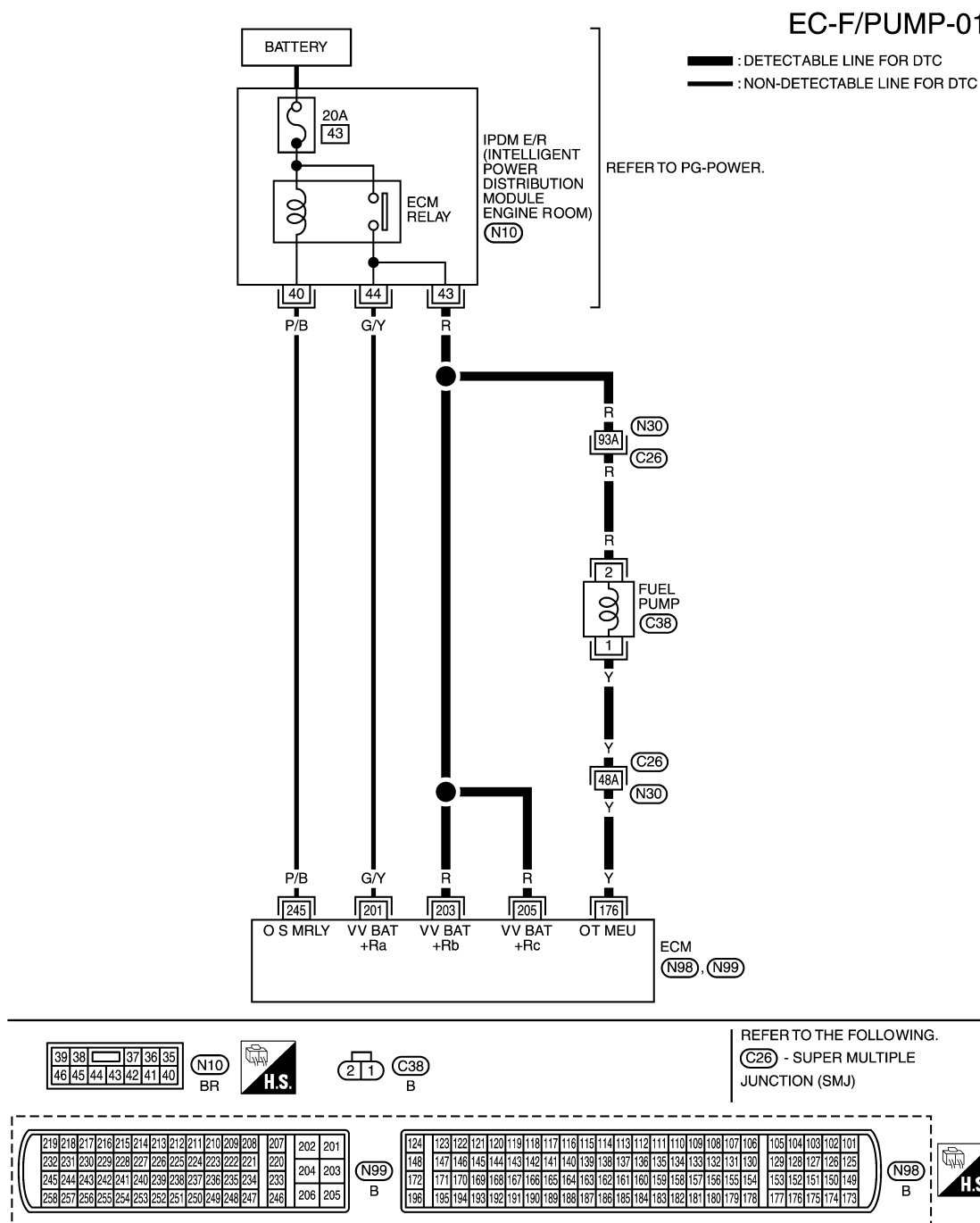
Is DTC erased?

YES >> INSPECTION END

NO >> Go to [EC-73. "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000004942157



Diagnosis Procedure

INFOID:000000004942158

1. CHECK FUEL PUMP POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel pump harness connector.
3. Turn ignition switch ON.

P0090 FUEL PUMP**[ZD]**

< COMPONENT DIAGNOSIS >

4. Check the voltage between fuel pump harness connector and ground.

Fuel pump		Ground	Voltage
Connector	Terminal		
C38	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors N30, C26
- Harness for open between fuel pump and IPDM E/R
- Harness for open between fuel pump and ECM

>> Repair open circuit in harness or connectors.

3.CHECK FUEL PUMP OUTPUT SIGNAL CIRCUIT FOR OPEN

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

Fuel pump		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C38	1	N98	176	Existed

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors N30, C26
- Harness for open between fuel pump and ECM

>> Repair open circuit in harness or connectors.

5.CHECK FUEL PUMPRefer to [EC-74, "Component Inspection"](#).Is inspection result normal?

YES >> GO TO 6.

NO >> Replace fuel pump.

6.CHECK INTERMITTENT INCIDENTRefer to [EC-54, "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:000000004942159

1.CHECK FUEL PUMP

1. Turn ignition switch OFF
2. Disconnect fuel pump harness connector.
3. Check the resistance between fuel pump terminals as per the following items.

P0090 FUEL PUMP

< COMPONENT DIAGNOSIS >

[ZD]

Terminals	Resistance
1 and 2	2.6 – 3.5Ω [at 20 – 40°C (68 – 104°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel pump.

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P0091, P0092 FUEL PUMP

Description

INFOID:000000004942160

The fuel pump is installed in the engine. Utilizing the revolutions of the engine via gears, the fuel pump discharges high-pressure fuel to the fuel rail. The fuel pressure is controlled by the ECM.

DTC Logic

INFOID:000000004942161

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0091	2	P0091	Fuel pump circuit low input	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The fuel pump circuit is shorted.) • Fuel pump
P0092	1	P0092	Fuel pump circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC erased?

- YES >> INSPECTION END
 NO >> Go to [EC-77, "Diagnosis Procedure"](#).

INFOID:0000000004942162



INFOID:0000000004942163

1. Turn ignition switch OFF.
2. Disconnect fuel pump harness connector.
3. Turn ignition switch ON.

< COMPONENT DIAGNOSIS >

4. Check the voltage between fuel pump harness connector and ground.

Fuel pump		Ground	voltage
Connector	terminal		
C38	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector N30, C26
- Harness for short between fuel pump and IPDM E/R
- Harness for short between fuel pump and ECM

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

3.CHECK FUEL PUMP OUTPUT SIGNAL CIRCUIT FOR AND SHORT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check harness for short to ground and short to power between fuel pump harness connector and ECM harness connector.

Fuel pump		ECM	
Connector	Terminal	Connector	Terminal
C38	1	N98	176

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors N30, C26
- Harness for short between fuel pump and ECM

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

5.CHECK FUEL PUMP

Refer to [EC-78, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace fuel pump.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:000000004942164

1.CHECK FUEL PUMP

1. Turn ignition switch OFF
2. Disconnect fuel pump harness connector.
3. Check the resistance between fuel pump terminals as per the following items.

<https://truckmanualshub.com/>
P0091, P0092 FUEL PUMP

< COMPONENT DIAGNOSIS >

[ZD]

Terminals	Resistance
1 and 2	2.6 – 3.5Ω [at 20 – 40°C (68 – 104°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel pump.

A

EC

C

D

E

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G

H

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N

O

P

P0093 FUEL SYSTEM

DTC Logic

INFOID:000000004942165

DTC DETECTION LOGIC

NOTE:

If DTC P0093 is displayed with DTC P1089 (GST: P0089), first perform the trouble diagnosis for DTC P1089 (GST: P0089). Refer to [EC-178, "DTC Logic"](#).

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0093	1	P0093	Fuel system leakage	ECM detects a fuel system leakage. (The relation between the output voltage to the fuel pump and input voltage from the fuel rail pressure sensor is out of the normal range.)	• Fuel pump • Fuel rail • Fuel line • Fuel rail pressure relief valve • Air mixed with fuel • Lack of fuel • Fuel injector

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

WARNING:

- Check that there is no fire hazard near the vehicle.
- Before performing the following procedure, cool down engine.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

Turn ignition switch OFF and check that there are no signs of fuel leakage.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Go to [EC-81, "Diagnosis Procedure"](#).

3. PERFORM DTC CONFIRMATION PROCEDURE-II

Start engine and check fuel leakage in the engine room.

Is the inspection result normal?

YES-1 >> WITH CONSULT-III: GO TO 4.

YES-2 >> WITH GST: GO TO 5.

NO >> Go to [EC-81, "Diagnosis Procedure"](#).

4. PERFORM DTC CONFIRMATION PROCEDURE-III

Ⓟ With CONSULT-III

1. Select "ACT CR PRESS" in "DATA MONITOR" mode with CONSULT-III
2. Check the display of the idle speed.

Monitor item	Condition	Indication
ACT CR PRESS	Idle	30 – 40 MPa

Is the inspection result normal?

YES >> GO TO 6.

NO >> Go to [EC-81, "Diagnosis Procedure"](#).

5. PERFORM DTC CONFIRMATION PROCEDURE-IV

< COMPONENT DIAGNOSIS >

[ZD]



With GST

Check voltage between ECM harness connector at the idle speed.

ECM			Voltage
connector	+	-	
	terminal	terminal	
N98	161	108	1.0 – 1.6 V

Is the inspection result normal?

YES >> GO TO 6.

NO >> Go to [EC-81, "Diagnosis Procedure"](#).

6.PERFORM DTC CONFIRMATION PROCEDURE-V

1. Run engine at more than 2,000 rpm and check fuel leakage in the engine room.

2. Erase DTC.

Is DTC erased?

YES >> INSPECTION END

NO >> Go to [EC-81, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000004942166

1.CHECK FUEL LEVEL

1. Turn ignition switch ON.

2. Check low fuel warning lamp and confirm it is not illuminated.

Is low fuel warning lamp illuminated?

YES >> Fill with the fuel. Then GO TO 2.

NO >> GO TO 2.

2.CHECK FUEL LINE FOR LEAK

1. Start engine.

2. Visually check the following for fuel leakage.

- Fuel tube from fuel pump to fuel rail
- Fuel tube from fuel rail to fuel injector
- Fuel rail

3. Also check for improper connection or pinches.

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair malfunctioning part.

3.CHECK FUEL INJECTOR

Refer to [EC-109, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.REPLACE FUEL INJECTOR

1. Replace malfunctioning fuel injector

2. Perform INJECTOR ADJUSTMENT VALUE REGISTRATION. Refer to [EC-11, "INJECTOR ADJUSTMENT VALUE REGISTRATION : Special Repair Requirement"](#).

>> INSPECTION END

5.CHECK FUEL PUMP

Refer to [EC-74, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 6.

< COMPONENT DIAGNOSIS >

NO >> Replace fuel pump.

6.CHECK FUEL RAIL PRESSURE RELIEF VALVE

Refer to [EC-69, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace fuel rail.

7.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

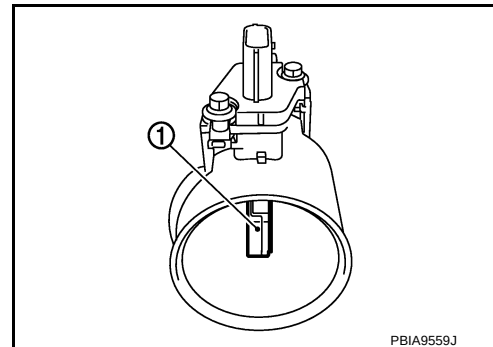
P0100 MAF SENSOR

Description

INFOID:000000004942167

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

Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



DTC Logic

INFOID:000000004942168

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III	ID FLAG	GST			
P0100	1	P0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Mass air flow sensor • Intake air leaks
	2	P0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

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

Is DTC erased?

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

3. PERFORM DTC CONFIRMATION PROCEDURE-II

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

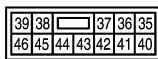
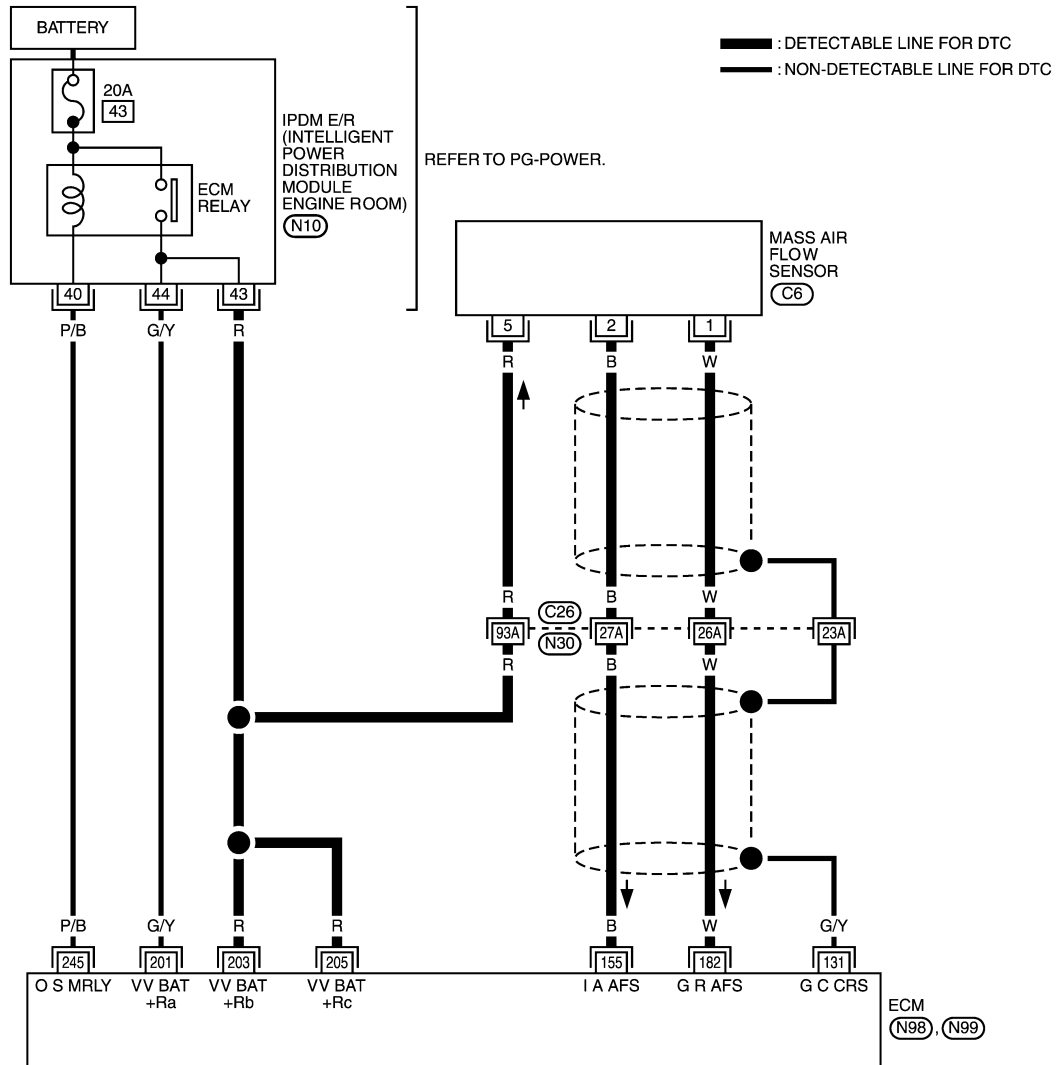
Is DTC erased?

YES >> INSPECTION END
 NO >> Go to [EC-84, "Diagnosis Procedure"](#).

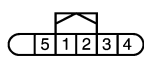
Wiring Diagram

INFOID:000000004942169

EC-MAFS-01



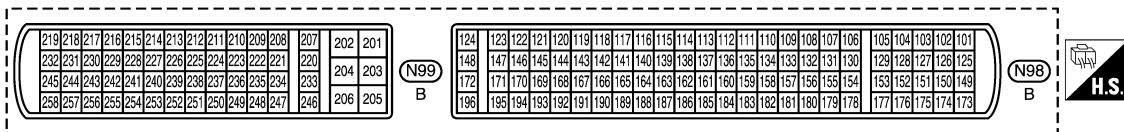
N10
BR



C6
B

REFER TO THE FOLLOWING.

C26 - SUPER MULTIPLE JUNCTION (SMJ)



JSBWA0005GB

Diagnosis Procedure

INFOID:000000004942170

1. CHECK INTAKE SYSTEM

Check the following for connection.

- Air duct
- Vacuum hoses

< COMPONENT DIAGNOSIS >

- Intake air passage between air duct and intake manifold

Is the inspection result normal?

YES >> GO TO 2.

NO >> Reconnect the parts.

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection C12. Refer to [EC-58, "Ground Inspection"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3.CHECK MAF SENSOR POWER SUPPLY CIRCUIT

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

MAF sensor		Ground	Voltage
Connector	Terminal		
C6	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C26, N30
- Harness for open and short between IPDM E/R and MAF sensor
- Harness for open and short between ECM and MAF sensor

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

5.CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C6	1	N98	182	Existed

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

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector C26, N30
- Harness for open and short between ECM and MAF sensor

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

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

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

< COMPONENT DIAGNOSIS >

[ZD]

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C6	2	N98	155	Existed

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

Is the inspection result normal?

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

8.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector C26, N30
- Harness for open and short between ECM and MAF sensor

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

9.CHECK MAF SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connectors C26, N30.
2. Check the continuity between ECM harness connector and harness connector N30.

Harness connector		ECM		Continuity
Connector	Terminal	Connector	terminal	
N30	23A	N98	131	Existed

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

Is the inspection result normal?

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

10.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector N30
- Harness for open and short between ECM and harness connector N30

>> Repair open circuit or short to ground or short to power in harness or connector

11.CHECK MASS AIR FLOW SENSOR

Refer to [EC-86, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 12.
 NO >> Replace mass air flow sensor.

12.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:000000004942171

1.CHECK MASS AIR FLOW SENSOR

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

< COMPONENT DIAGNOSIS >

[ZD]

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
N98	155 (MAF sensor signal)	182	Ignition switch ON (Engine stopped.)	Approx. 0.4V
			Idle (Engine is warmed-up to normal operating temperature.)	1.3 – 2.3V
			Idle to about 4,000 rpm	1.3 – 2.3V to Approx. 4.0V*

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

Is the inspection result normal?

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

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

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

Is the inspection result normal?

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

3.CHECK MASS AIR FLOW SENSOR-II

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

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
N98	155 (MAF sensor signal)	182	Ignition switch ON (Engine stopped.)	Approx. 0.4V
			Idle (Engine is warmed-up to normal operating temperature.)	1.3 – 2.3V
			Idle to about 4,000 rpm	1.3 – 2.3V to Approx. 4.0V*

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

Is the inspection result normal?

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

4.CHECK MASS AIR FLOW SENSOR-III

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

< COMPONENT DIAGNOSIS >

[ZD]

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
N98	155 (MAF sensor signal)	182	Ignition switch ON (Engine stopped.)	Approx. 0.4V
			Idle (Engine is warmed-up to normal operating temperature.)	1.3 – 2.3V
			Idle to about 4,000 rpm	1.3 – 2.3V to Approx. 4.0V*

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace mass air flow sensor.

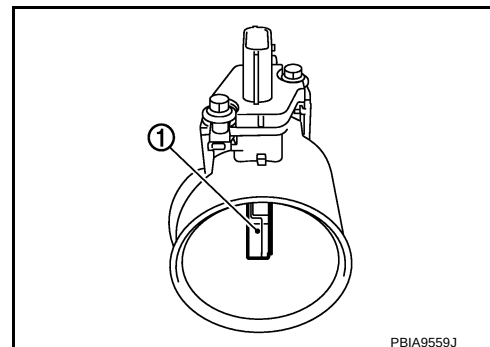
P0110 IAT SENSOR

Description

INFOID:000000004942172

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.

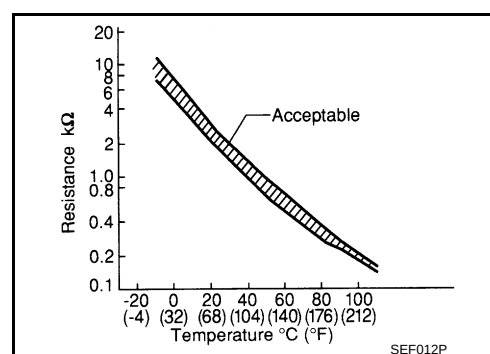
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	2.4	1.800 - 2.200
80 (176)	0.8	0.283 - 0.359

*: This data is reference values and is measured between ECM terminal 160 (Intake air temperature sensor) and ECM terminal 147.



DTC Logic

INFOID:000000004942173

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III	ID FLAG	GST			
P0110	1	P0113	Intake air temperature 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.) - Intake air temperature sensor
	2	P0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 5 seconds.
- Erase DTC.

Is DTC erased?

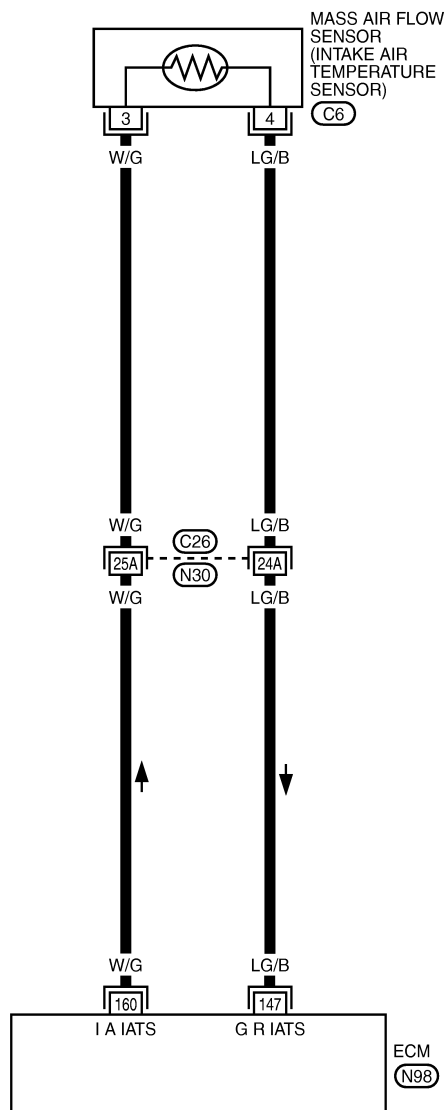
- YES >> INSPECTION END
NO >> Go to [EC-90, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000004942174

EC-IATS-01

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



124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101
148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125
172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156	155	154	153	152	151	150	149
196	195	194	193	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176	175	174	173

N98 B

C6 B
5 1 2 3 4

REFER TO THE FOLLOWING.

C26 - SUPER MULTIPLE JUNCTION (SMJ)

MBWA1723E

Diagnosis Procedure

INFOID:000000004942175

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection C12. Refer to [EC-58, "Ground Inspection"](#).

Is the inspection result normal?

< COMPONENT DIAGNOSIS >

[ZD]

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

2.CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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

MAF sensor		Ground	Voltage
Connector	Terminal		
C6	3	Ground	Approx. 5V

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector C26, N30
- Harness for open and short between mass air flow sensor and ECM

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

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

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

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C6	4	N98	147	Existed

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

Is the inspection result normal?

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

5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C26, N30
- Harness for open and short between mass air flow sensor and ECM

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

6.CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to [EC-92. "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> Replace mass air flow sensor (with intake air temperature sensor).

7.CHECK INTERMITTENT INCIDENT

Refer to [EC-54. "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:000000004942176

1. CHECK INTAKE AIR TEMPERATURE SENSOR

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

Terminals	Condition		Resistance
3 and 4	Temperature	25°C (77°F)	1.800 - 2.200 kΩ

Is the inspection result normal?

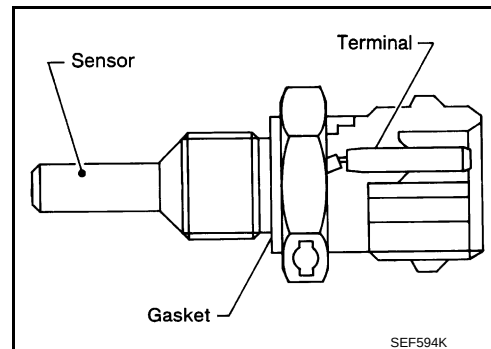
- YES >> INSPECTION END
NO >> Replace mass air flow sensor (with intake air temperature sensor).

P0115 ECT SENSOR

Description

INFOID:000000004942177

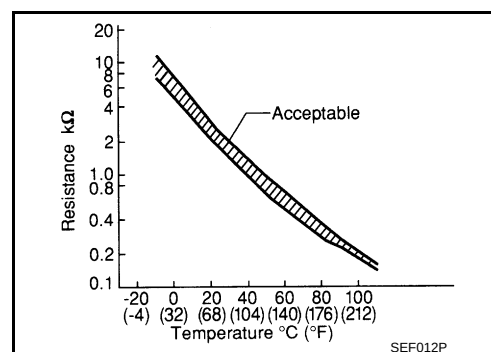
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The 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)	2.3	0.68 - 1.00
90 (194)	1.0	0.236 - 0.260

*: This data is reference values and is measured between ECM terminal 185 (Engine coolant temperature sensor) and ECM terminal 159.



DTC Logic

INFOID:000000004942178

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0115	1	P0118	Engine coolant temperature 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.) • Engine coolant temperature sensor
	2	P0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 5 seconds.
- Erase DTC.

Is DTC erased?

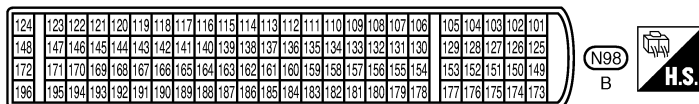
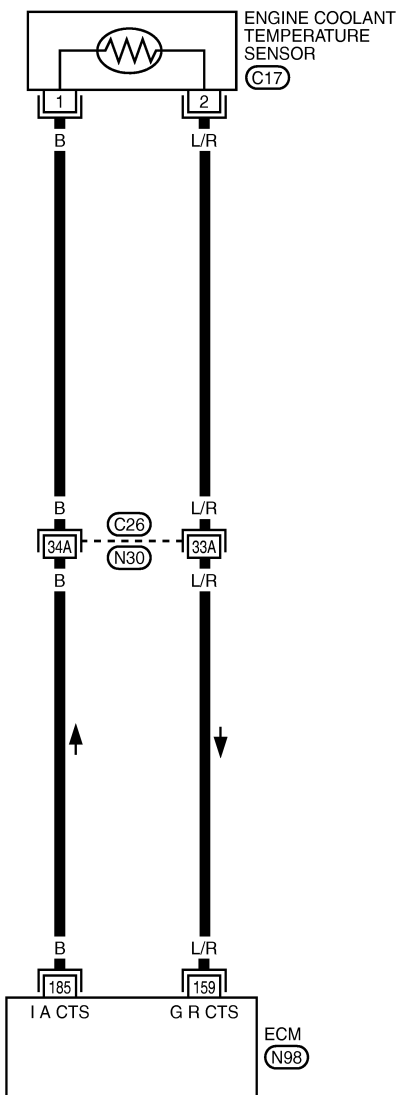
- YES >> INSPECTION END
 NO >> Go to [EC-94, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000004942179

EC-ECTS-01

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



REFER TO THE FOLLOWING.

(C26) - SUPER MULTIPLE JUNCTION (SMJ)

MBWA1724E

Diagnosis Procedure

INFOID:000000004942180

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection C12. Refer to [EC-58, "Ground Inspection"](#).

Is the inspection result normal?

< COMPONENT DIAGNOSIS >

[ZD]

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

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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

Engine coolant temperature sensor		Ground	voltage
Connector	Terminal		
C17	1	Ground	Approx. 5V

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C26, N30
- Harness for open and short between engine coolant temperature sensor and ECM

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

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Engine coolant temperature sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C17	2	N98	159	Existed

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

Is the inspection result normal?

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

5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector C26, N30
- Harness for open and short between engine coolant temperature sensor and ECM

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

6.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to [EC-96, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> Replace engine coolant temperature sensor.

7.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:000000004942181

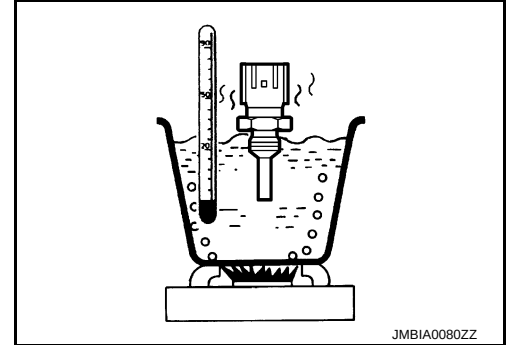
1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

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

Terminals	Condition	Resistance (kΩ)
1 and 2	20 (68)	2.1 - 2.9
	50 (122)	0.68 - 1.00
	90 (194)	0.236 - 0.260

Is the inspection result normal?

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

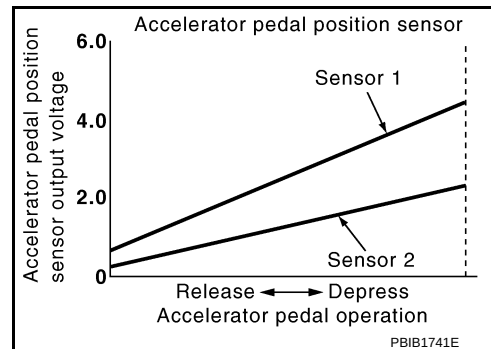


P0120 APP SENSOR

Description

INFOID:000000004942182

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.



DTC Logic

INFOID:000000004942183

DTC DETECTION LOGIC

NOTE:

If DTC P0120 is displayed with DTC P0641 (GST: P0642, P0643), first perform the trouble diagnosis for DTC P0641 (GST: P0642, P0643). Refer to [EC-168, "DTC Logic"](#).

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III	ID FLAG	GST			
P0120	1	P0123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	- Harness or connectors (APP sensor 1 circuit is open or shorted.) - Accelerator pedal position sensor (APP sensor 1)
	2	P0122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 5 seconds.
- Erase DTC.

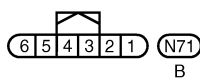
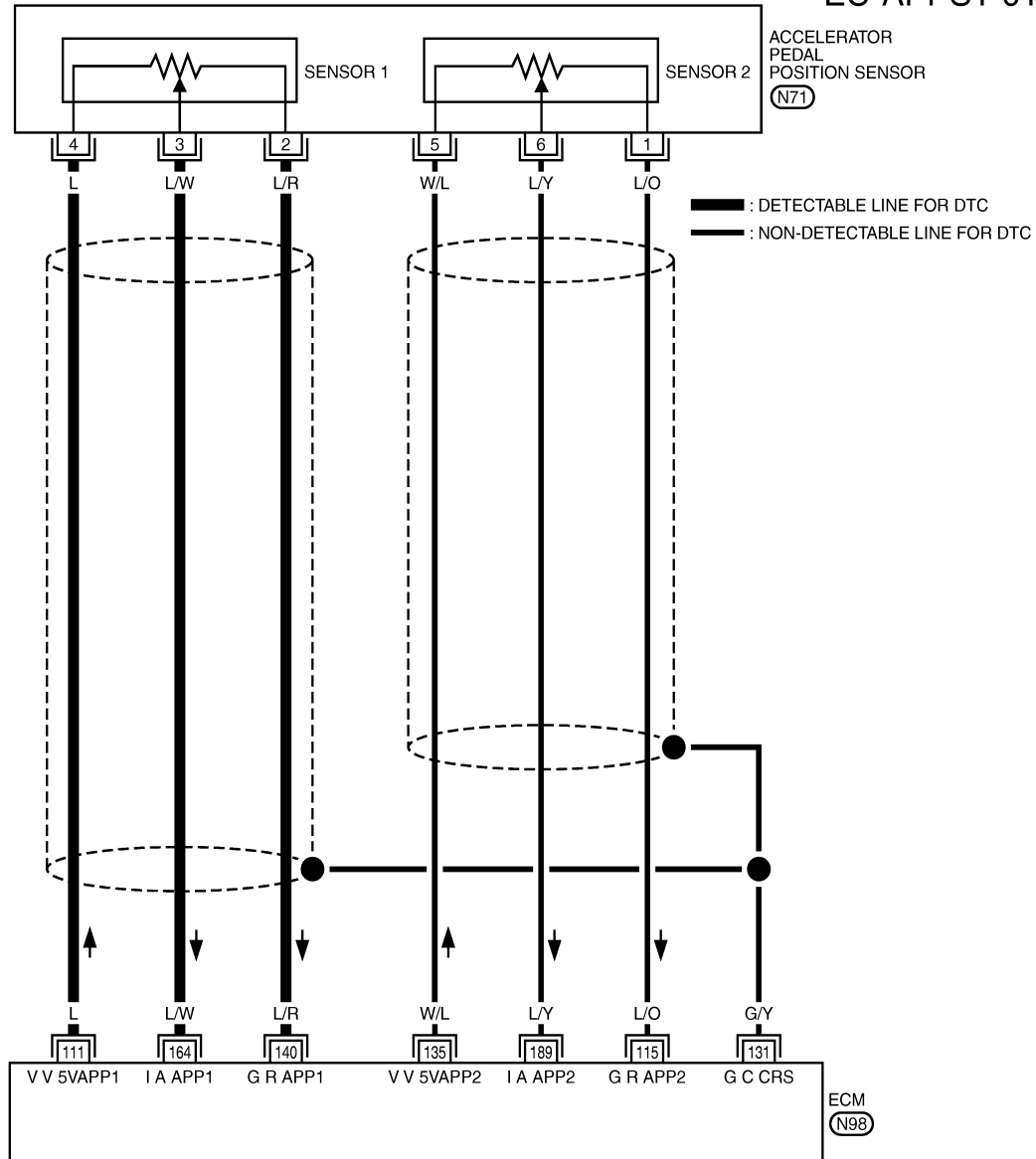
Is DTC erased?

- YES >> INSPECTION END
- NO >> Go to [EC-98, "Diagnosis Procedure"](#).

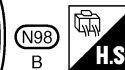
Wiring Diagram

INFOID:000000004942184

EC-APPS1-01



124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101
148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125
172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156	155	154	153	152	151	150	149
196	195	194	193	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176	175	174	173



MBWA1728E

INFOID:000000004942185

Diagnosis Procedure

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection C12. Refer to [EC-58, "Ground Inspection"](#).

Is the inspection result normal?

< COMPONENT DIAGNOSIS >

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

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
N71	4	Ground	Approx. 5V

Is the inspection result normal?

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

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

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
N71	2	N98	140	Existed

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

Is the inspection result normal?

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

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

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
N71	3	N98	164	Existed

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

Is the inspection result normal?

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

5.CHECK APP SENSOR

Refer to [EC-99, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 6.
 NO >> Replace accelerator pedal assembly.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:000000004942186

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.

< COMPONENT DIAGNOSIS >

[ZD]

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

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
N98	164 (APP sensor 1 signal)	140	Fully released	0.6 – 0.9 V
			Fully depressed	3.9 – 4.7 V
	189 (APP sensor 2 signal)	115	Fully released	0.3 – 0.6 V
			Fully depressed	1.95 – 2.40 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly.

P0190 FRP SENSOR

Description

INFOID:000000004942187

The fuel rail pressure (FRP) sensor is placed to the fuel rail. It measures the fuel pressure in the fuel rail. The sensor sends voltage signal to the ECM. As the pressure increases, the voltage rises. The ECM controls the fuel pressure in the fuel rail. The ECM uses the signal from fuel rail pressure sensor as a feedback signal.

DTC Logic

INFOID:000000004942188

DTC DETECTION LOGIC

NOTE:

If DTC P0190 is displayed with DTC P0651 (GST: P0652, P0653), first perform the trouble diagnosis for DTC P0651 (GST: P0652, P0653). Refer to [EC-171, "DTC Logic"](#).

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0190	1	P0193	Fuel rail pressure 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.) • Fuel rail pressure sensor
	2	P0192	Fuel rail pressure sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE-I

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

Is DTC erased?

YES >> INSPECTION END

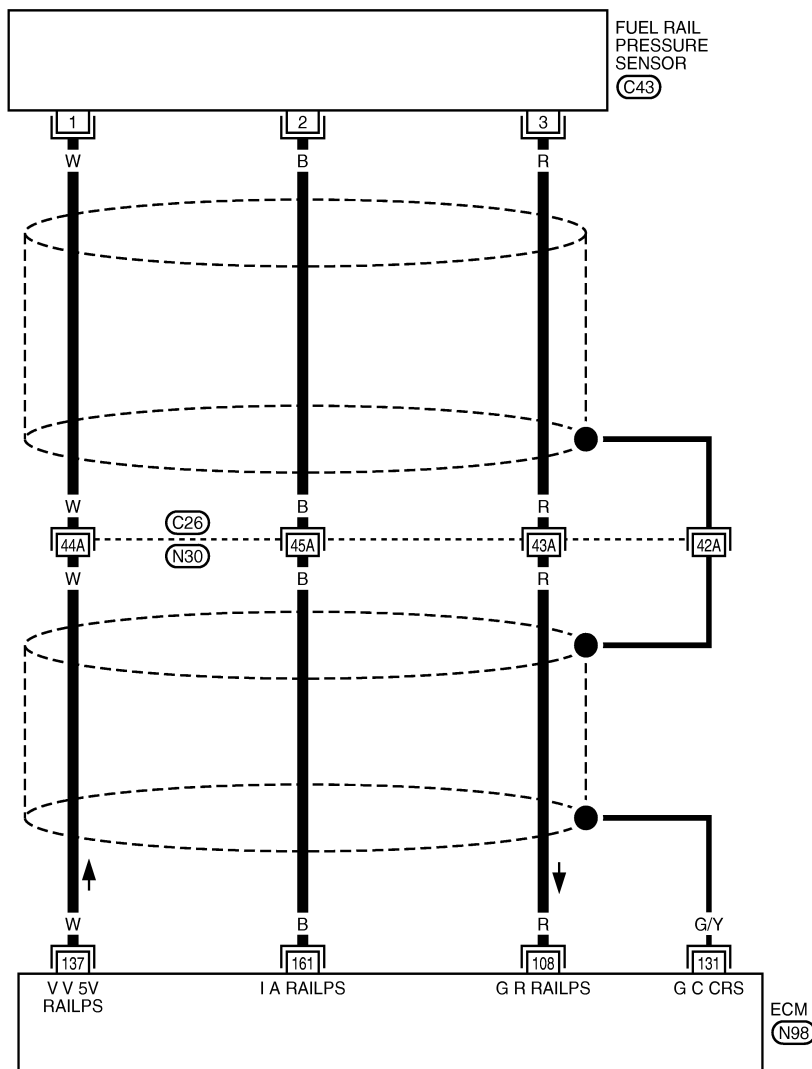
NO >> Go to [EC-102, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000004942189

EC-FRPS-01

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



124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101
148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125
172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156	155	154	153	152	151	150	149
196	195	194	193	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176	175	174	173

N98
B



3 2 1 C43
B

REFER TO THE FOLLOWING.

C26 - SUPER MULTIPLE JUNCTION (SMJ)

JMBWA0089GB

Diagnosis Procedure

INFOID:000000004942190

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection C12. Refer to [EC-58, "Ground Inspection"](#).

Is the inspection result normal?

< COMPONENT DIAGNOSIS >

[ZD]

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

2.CHECK FUEL RAIL PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect fuel rail pressure sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between fuel rail pressure sensor connector and ground.

Fuel rail pressure sensor		Ground	Voltage
Connector	Terminal		
C43	1	Ground	Approx. 5V

Is the inspection result normal?

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

3.DETECT Malfucntioning Part

Check the following.

- Harness connectors C26, N30
- Harness for open and short between fuel rail pressure sensor and ECM

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

4.CHECK FUEL RAIL PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Fuel rail pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C43	3	N98	108	Existed

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

Is the inspection result normal?

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

5.DETECT Malfucntioning Part

Check the following.

- Harness connectors C26, N30
- Harness for open and short between fuel rail pressure sensor and ECM

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

6.CHECK FUEL RAIL PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between fuel rail pressure sensor harness connector and ECM harness connector.

Fuel rail pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C43	2	N98	161	Existed

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

Is the inspection result normal?

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

7.DETECT Malfucntioning Part

< COMPONENT DIAGNOSIS >

Check the following.

- Harness connectors C26, N30
- Harness for open and short between fuel rail pressure sensor and ECM

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

8.CHECK FUEL RAIL PRESSURE SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connectors C26, N30.
2. Check the continuity between harness connector N30 and ECM harness connector.

Harness connector		ECM		Continuity
Connector	Terminal	Connector	Terminal	
N30	42A	N98	131	Existed

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

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 9.

9.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector N30
- Harness for open and short between harness connector N30 and ECM

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

10.CHECK FUEL RAIL PRESSURE SENSOR

Refer to [EC-104, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 11.

NO >> Replace fuel rail.

11.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:000000004942191

1.CHECK FUEL RAIL PRESSURE SENSOR-I

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

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
N98	161	108	Idle	1.0 - 1.6 V
	(Fuel rail pressure sensor signal)		2,000 rpm	2.0 - 2.9 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK FUEL RAIL PRESSURE SENSOR-II

< COMPONENT DIAGNOSIS >

[ZD]

1. Disconnect fuel rail pressure sensor harness connector and reconnect it again.
2. Check the voltage between ECM harness connector terminals as per the following items.

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
N98	161 (Fuel rail pressure sensor signal)	108	Idle	1.0 - 1.6 V
			2,000 rpm	2.0 - 2.9 V

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Replace fuel rail.

A

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https://truckmanualshub.com/
P0201, P0202, P0203, P0204 FUEL INJECTOR

< COMPONENT DIAGNOSIS >

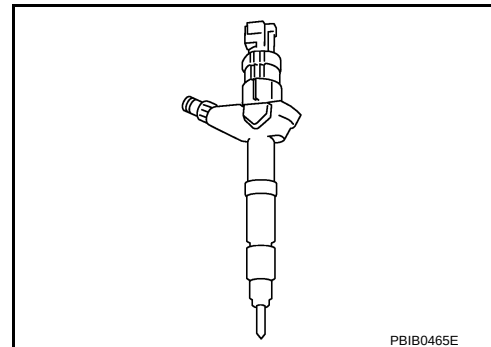
[ZD]

P0201, P0202, P0203, P0204 FUEL INJECTOR

Description

INFOID:000000004942192

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. 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.



DTC Logic

INFOID:000000004942193

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0201	4	P0201	No.1 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 1 cylinder fuel injector.	• Harness or connectors (The fuel injector circuit is open.) • Fuel injector
P0202	4	P0202	No.2 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 2 cylinder fuel injector.	
P0203	4	P0203	No.3 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 3 cylinder fuel injector.	
P0204	4	P0204	No.4 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 4 cylinder fuel injector.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

TESTING CONDITION

Before performing the following procedure, confirm the ambient temperature is more than -20°C (-4°F).

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
2. Erase DTC.

Is DTC erased?

YES >> INSPECTION END

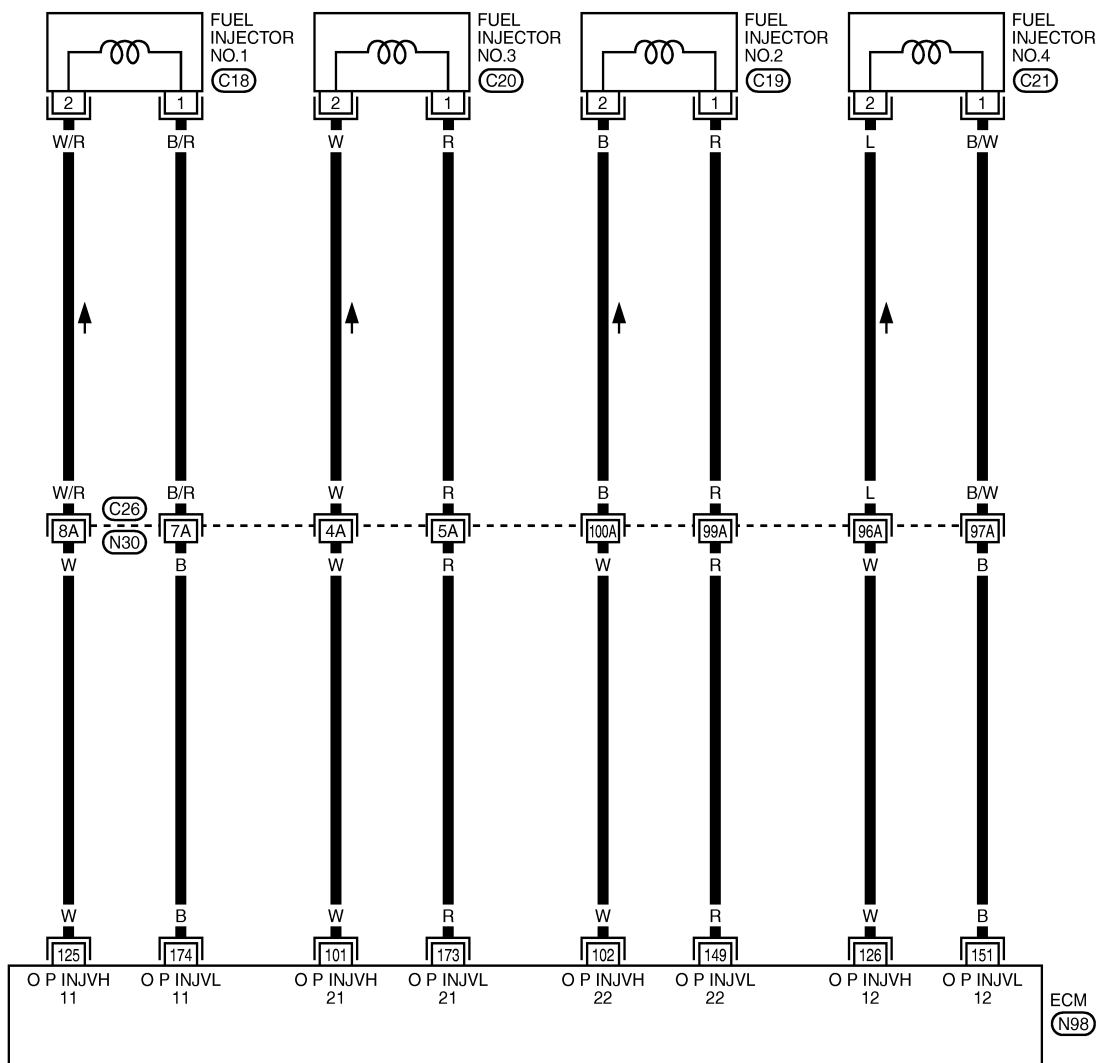
NO >> Go to [EC-107, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000004942194

EC-INJEC1-01

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



124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101
148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125
172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156	155	154	153	152	151	150	149
196	195	194	193	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176	175	174	173

(N98)
B



(2) 1 (C18), (C19), (C20), (C21)
B B B B

REFER TO THE FOLLOWING.

(C26) - SUPER MULTIPLE JUNCTION (SMJ)

MBWA1733E

Diagnosis Procedure

INFOID:000000004942195

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT FOR OPEN

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.

<https://truckmanualshub.com/>
P0201, P0202, P0203, P0204 FUEL INJECTOR

[ZD]

< COMPONENT DIAGNOSIS >

4. Check the continuity between fuel injector harness connector and ECM harness connector.

DTC	Fuel injector			ECM		Continuity
	Cylinder	Connector	Terminal	Connector	Terminal	
P0201	No.1	C18	2	N98	125	Existed
P0202	No.2	C19	2		102	
P0203	No.3	C20	2		101	
P0204	No.4	C21	2		126	

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.DETECT MALFUNCTIONING

Check the following.

- Harness connector C26, N30
- Harness for open between fuel injector and ECM

>> Repair open circuit in harness or connectors.

3.CHECK FUEL INJECTOR GROUND CIRCUIT FOR OPEN

Check the continuity between fuel injector harness connector and ECM harness connector.

DTC	Fuel injector			ECM		Continuity
	Cylinder	Connector	Terminal	Connector	Terminal	
P0201	No.1	C18	1	N98	174	Existed
P0202	No.2	C19	1		149	
P0203	No.3	C20	1		173	
P0204	No.4	C21	1		151	

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C26, N30
- Harness for open between fuel injector and ECM

>> Repair open circuit in harness or connectors.

5.CHECK FUEL INJECTOR

Refer to [EC-109. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.REPLACE FUEL INJECTOR

1. Replace malfunctioning fuel injector.
2. Perform INJECTOR ADJUSTMENT VALUE REGISTRATION. Refer to [EC-11. "INJECTOR ADJUSTMENT VALUE REGISTRATION : Special Repair Requirement"](#).

>> INSPECTION END

7.CHECK INTERMITTENT INCIDENT

https://truckmanualshub.com/
P0201, P0202, P0203, P0204 FUEL INJECTOR

< COMPONENT DIAGNOSIS >

[ZD]

Refer to [EC-54. "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:000000004942196

EC

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as per the following items.

Terminal	Resistance
1 and 2	0.2 - 0.3 Ω [at 20 - 70°C (68 - 158 °F)]

Is the inspection result normal?

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

2.REPLACE FUEL INJECTOR

1. Replace malfunctioning fuel injector.
2. Perform INJECTOR ADJUSTMENT VALUE REGISTRATION. Refer to [EC-11. "INJECTOR ADJUSTMENT VALUE REGISTRATION : Special Repair Requirement"](#).

>> INSPECTION END

P0217 ENGINE OVER TEMPERATURE

< COMPONENT DIAGNOSIS >

[ZD]**P0217 ENGINE OVER TEMPERATURE****DTC Logic**

INFOID:000000004942197

DTC DETECTION LOGIC

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature rises. When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0217	1	P0217	Engine over temperature (Overheat)	• Cooling fan does not operate normally (Overheat). • Cooling fan system does not operate normally (Overheat). • Engine coolant is not added to the system using the proper filling method. • Engine coolant is not within the specified range.	• Cooling fan • Radiator hose • Radiator • Reservoir tank cap • Water pump • Thermostat

CAUTION:

When a malfunction is indicated, always replace the coolant. Refer to [MA-12, "Changing Engine Coolant"](#). Also, replace the engine oil. Refer to [MA-18, "Changing Engine Oil"](#).

1. Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Always use coolant with the proper mixture ratio. Refer to [MA-11, "Engine Coolant Mixture Ratio"](#).
2. After refilling coolant, run engine to ensure that no water-flow noise is emitted.

DTC CONFIRMATION PROCEDURE**1. PERFORM DTC CONFIRMATION PROCEDURE-I****WARNING:**

Never remove a reservoir tank cap and/or radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the reservoir tank and/or radiator.

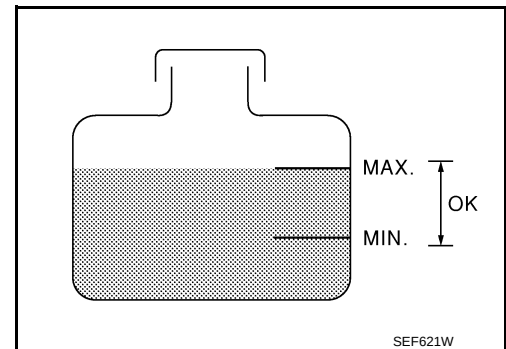
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

Check the coolant level in the reservoir tank and radiator.

Allow engine to cool before checking coolant level.

Is the coolant level in the reservoir tank and/or radiator below the proper range?

- YES >> Go to [EC-111, "Diagnosis Procedure"](#).
 NO >> GO TO 2.

**2. PERFORM DTC CONFIRMATION PROCEDURE-II**

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

- YES >> Go to [EC-111, "Diagnosis Procedure"](#).
 NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-III

Start engine and check cooling fan operation.

Is the inspection result normal?

P0217 ENGINE OVER TEMPERATURE**[ZD]**

< COMPONENT DIAGNOSIS >

- YES >> GO TO 4.
 NO >> Go to [EC-111, "Diagnosis Procedure"](#).

4.PERFORM DTC CONFIRMATION PROCEDURE-IV

Erase DTC.

Is DTC erased?

- YES >> INSPECTION END
 NO >> Go to [EC-111, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000004942198

1.CHECK COOLING FAN OPERATION

Start engine and check cooling fan operation.

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Go to [CO-13, "Removal and Installation"](#).

2.CHECK COOLING SYSTEM FOR LEAK-ICheck cooling system for leakage. Refer to [CO-7, "Inspection"](#).Is leakage detected?

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

3.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leakage.

- Hose
- Radiator
- Reservoir tank cap
- Water pump
- Reservoir tank

>> Repair or replace malfunctioning part.

4.CHECK RESERVOIR TANK CAPCheck reservoir tank cap. Refer to [CO-10, "Removal and Installation"](#).Is the inspection result normal?

- YES >> GO TO 5.
 NO >> Replace reservoir tank cap.

5.CHECK THERMOSTATCheck thermostat. Refer to [CO-16, "Removal and Installation"](#).Is the inspection result normal?

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

6.CHECK ENGINE COOLANT TEMPERATURE SENSORRefer to [EC-96, "Component Inspection"](#).Is the inspection result normal?

- YES >> GO TO 7.
 NO >> Replace engine coolant temperature sensor.

7.CHECK MAIN 12 CAUSES

If the cause cannot be isolated, check the following.

P0217 ENGINE OVER TEMPERATURE

< COMPONENT DIAGNOSIS >

[ZD]

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	- Blocked radiator - Blocked condenser - Blocked radiator grille - Blocked bumper	• Visual	No blocking	—
	2	• Coolant mixture	• Coolant tester	See MA-11, "Engine Coolant Mixture Ratio" .	
	3	• Coolant level	• Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See CO-7, "Inspection" .
	4	• Reservoir tank cap	• Pressure tester	See CO-10, "Removal and Installation" .	
ON*1	5	• Coolant leaks	• Visual	No leaks	See CO-7, "Inspection" .
ON*1	6	• Thermostat	• Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-16, "Removal and Installation" .
ON*1	7	• Cooling fan	• Visual	Operating	See CO-13, "Removal and Installation" .
OFF	8	• Combustion gas leakage	• Color checker chemical tester 4 Gas analyzer	Negative	—
ON*2	9	• Coolant temperature gauge	• Visual	Gauge less than 3/4 when driving	—
		• Coolant overflow to reservoir tank	• Visual	No overflow during driving and idling	See CO-7, "Inspection" .
OFF*3	10	• Coolant return from reservoir tank to radiator	• Visual	Should be initial level in reservoir tank	See CO-7, "Inspection" .
OFF	11	• Cylinder head	• Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-74, "Removal and Installation" .
	12	• Cylinder block and pistons	• Visual	No scuffing on cylinder walls or piston	See EM-90, "Disassembly and Assembly" .

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

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

*3: After 60 minutes of cool down time.

For more information, refer to [CO-4, "Troubleshooting Chart"](#).

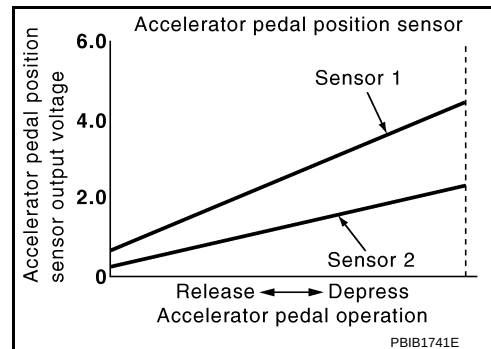
>> INSPECTION END

P0220 APP SENSOR

Description

INFOID:000000004942199

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.



DTC Logic

INFOID:000000004942200

DTC DETECTION LOGIC

NOTE:

If DTC P0220 is displayed with DTC P0697 (GST: P0698, P0699), first perform the trouble diagnosis for DTC P0697 (GST: P0698, P0699). Refer to [EC-175, "DTC Logic"](#).

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III	ID FLAG	GST			
P0220	1	P0223	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	- Harness or connectors (APP sensor 2 circuit is open or shorted.) - Accelerator pedal position sensor (APP sensor 2)
	2	P0222	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 5 seconds.
- Erase DTC.

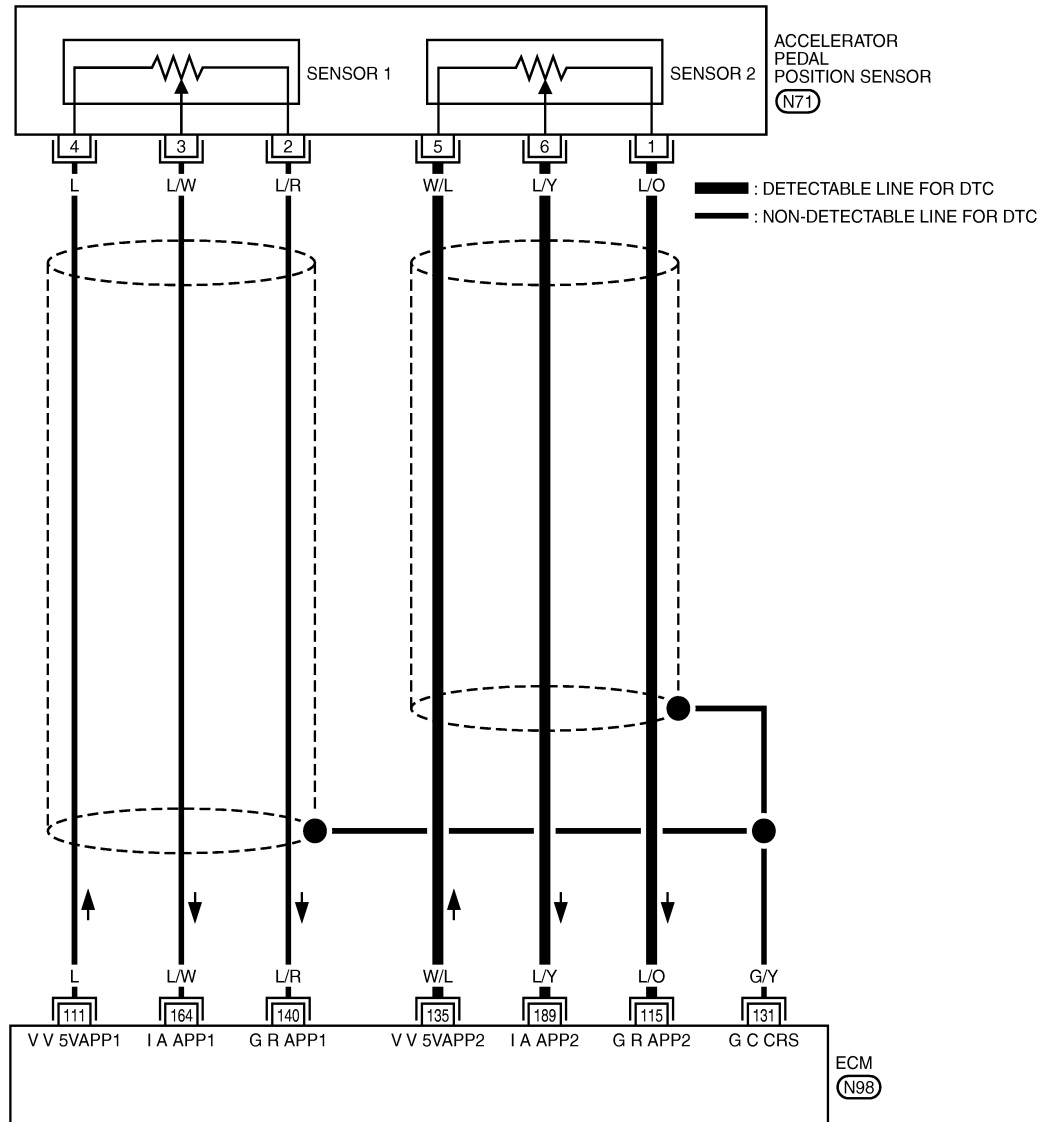
Is DTC erased?

- YES >> INSPECTION END
 NO >> Go to [EC-114, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000004942201

EC-APPS2-01



MBWA1729E

INFOID:000000004942202

Diagnosis Procedure

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection C12. Refer to [EC-58, "Ground Inspection"](#).

Is the inspection result normal?

< COMPONENT DIAGNOSIS >

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

2.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
N71	5	Ground	Approx. 5V

Is the inspection result normal?

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

3.CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
N71	1	N98	115	Existed

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

Is the inspection result normal?

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

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

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
N71	6	N98	189	Existed

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

Is the inspection result normal?

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

5.CHECK APP SENSOR

Refer to [EC-115, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 6.
 NO >> Replace accelerator pedal assembly.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:000000004942203

1.CHECK ACCELERATOR PEDAL POSITION SENSOR

1. Turn ignition switch OFF.

< COMPONENT DIAGNOSIS >

[ZD]

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

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
N98	164 (APP sensor 1 signal)	140	Fully released	0.6 – 0.9 V
			Fully depressed	3.9 – 4.7 V
	189 (APP sensor 2 signal)	115	Fully released	0.3 – 0.6 V
			Fully depressed	1.95 – 2.40 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly.

P0234 TC SYSTEM

DTC Logic

INFOID:000000004942208

DTC DETECTION LOGIC

NOTE:

If DTC P0234 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0234	2	P0234	Turbocharger overboost condition	Turbocharger boost pressure is higher than the target value.	• Turbocharger • Turbocharger boost sensor

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 3.

2. PERFORM DTC CONFIRMATION PROCEDURE

 With CONSULT-III

- Start engine and select "DATA MONITOR" mode with CONSULT-III.
- Maintain the following conditions for at least 30 consecutive seconds.

CKPS-PRM (TDC)	More than 2,000 rpm
TRG INJ QTY	More than 20 mg/st
Shift lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

NOTE:

Keep the accelerator pedal as steady as possible during the cruising.

CAUTION:

Always drive at a safe speed.

- Erase DTC.

Is DTC erased?

YES >> INSPECTION END

NO >> Go to [EC-118, "Diagnosis Procedure"](#).

3. PERFORM DTC CONFIRMATION PROCEDURE

 With GST

- Maintain the following conditions for at least 30 consecutive seconds.

Engine speed	More than 2,000 rpm
Calculated load value	More than 25%
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

NOTE:

Keep the accelerator pedal as steady as possible during the cruising.

CAUTION:

Always drive at a safe speed.

< COMPONENT DIAGNOSIS >

2. Erase DTC.

Is DTC erased?

YES >> INSPECTION END

NO >> Go to [EC-118, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000004942209

1.CHECK TURBOCHARGER BOOST SENSOR

Refer to [EC-122, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace turbocharger boost sensor.

2.CHECK TURBOCHARGER

Refer to [EM-27, "Removal and Installation"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace turbocharger

3.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

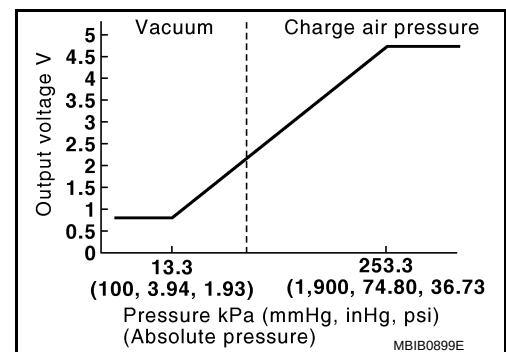
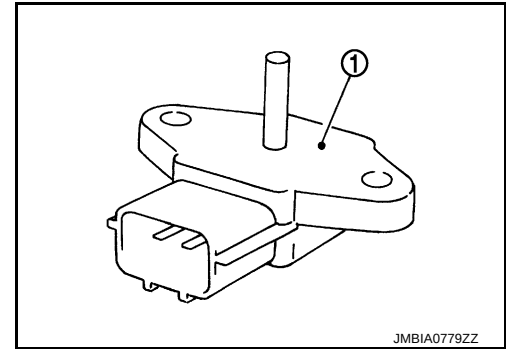
>> INSPECTION END

P0235 TC BOOST SENSOR

Description

INFOID:000000004942210

The turbocharger boost sensor (1) detects pressure in the exit side of the charge air cooler. The sensor output voltage to the ECM increases as pressure increases.



DTC Logic

INFOID:000000004942211

DTC DETECTION LOGIC

NOTE:

If DTC P0235 is display with DTC P0651 (GST: P0652, P0653), first perform trouble diagnosis for DTC P0651 (GST: P0652, P0653). Refer to [EC-171, "DTC Logic"](#).

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III	ID FLAG	GST			
P0235	1	P0238	Turbocharger boost 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.) - Turbocharger boost sensor
	2	P0237	Turbocharger boost sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Turn ignition switch ON and wait at least 5 seconds.
- Erase DTC.

Is DTC erased?

YES >> INSPECTION END

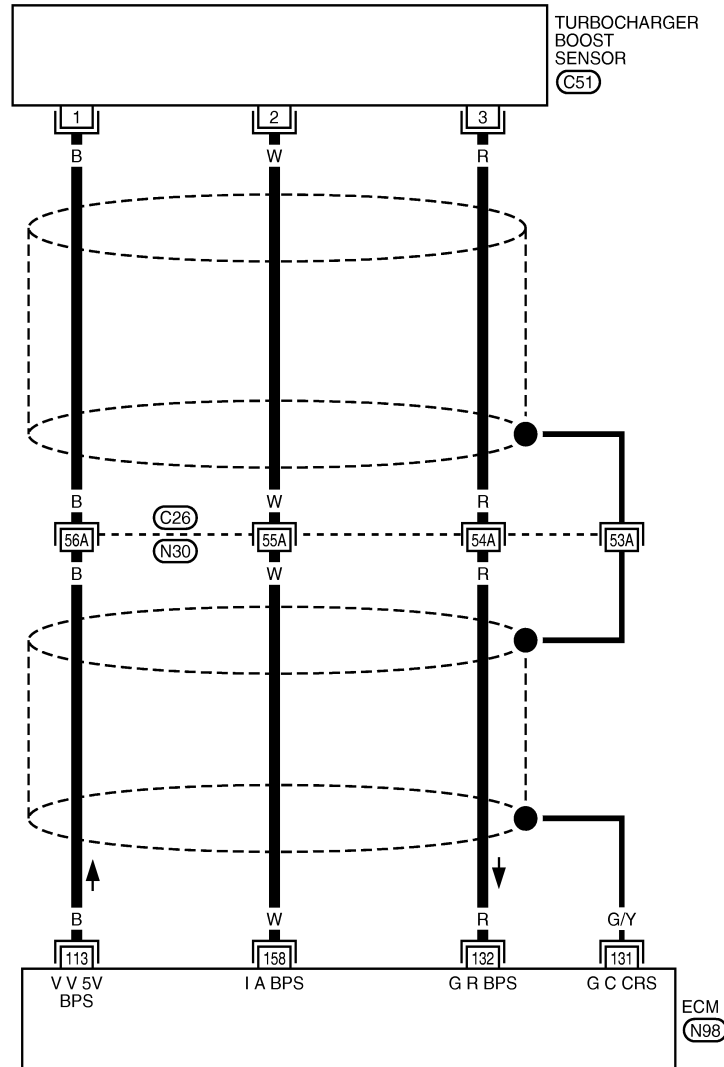
NO >> Go to [EC-120. "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000004942212

EC-BOOST-01

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



124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101
148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125
172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156	155	154	153	152	151	150	149
196	195	194	193	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176	175	174	173

(N98)
B



3 2 1 C51
GR

REFER TO THE FOLLOWING.

(C26) - SUPER MULTIPLE
JUNCTION (SMJ)

MBWA1727E

Diagnosis Procedure

INFOID:000000004942213

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.

< COMPONENT DIAGNOSIS >

[ZD]

2. Check ground connection C12. Refer to [EC-58. "Ground Inspection"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace ground connection.

2.CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY CIRCUIT

1. Disconnect turbocharger boost sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger boost sensor harness connector and ground.

Turbocharger boost sensor		Ground	Voltage
Connector	Terminal		
C51	1	Ground	Approx. 5V

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C26, N30
- Harness for open and short between turbocharger boost sensor and ECM

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

4.CHECK TURBOCHARGER BOOST SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C51	3	N98	132	Existed

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

Is the inspection result normal?

YES >> GO TO 6.

NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C26, N30
- Harness for open and short between turbocharger boost sensor and ECM

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

6.CHECK TURBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between turbocharger boost sensor harness connector and ECM harness connector.

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C51	2	N98	158	Existed

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

Is the inspection result normal?

< COMPONENT DIAGNOSIS >

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

7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C26, N30
- Harness for open and short between turbocharger boost sensor and ECM

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

8.CHECK TURBOCHARGER BOOST SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connectors C26, N30.
2. Check harness continuity between harness connector N30 and ECM harness connector.

Turbocharger boost sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
N30	53A	N98	131	Existed

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

Is the inspection result normal?

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

9.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors N30
- Harness for open and short between harness connector N30 and ECM

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

10.CHECK TURBOCHARGER BOOST SENSOR

Refer to [EC-122, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 11.
NO >> Replace fuel rail.

11.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:000000004942214

1.CHECK TURBOCHARGER BOOST SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Remove turbocharger boost sensor with its harness connected.
4. Use pump to apply pressure to sensor.
NOTE:
 - Always calibrate the pressure pump gauge when using it.
 - Inspection should be done at room temperature [10 – 30°C (50 – 86°F)].
5. Check the voltage between turbocharger boost sensor harness connector.

<https://truckmanualshub.com/>
P0235 TC BOOST SENSOR

< COMPONENT DIAGNOSIS >

[ZD]

ECM			Condition (pressure gauge)	Voltage
Connector	+	-		
	Terminal	Terminal		
N98	158 (Turbocharger boost sensor signal)	132	0 kPa (0 mbar, 0 mmHg, 0 inHg)	Approx. 2.3 V
			40 kPa (400 mbar, 300 mmHg, 11.81 inHg)	Approx. 2.9 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger boost sensor.

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https://truckmanualshub.com/
P0262, P0265, P0268, P0271 FUEL INJECTOR

< COMPONENT DIAGNOSIS >

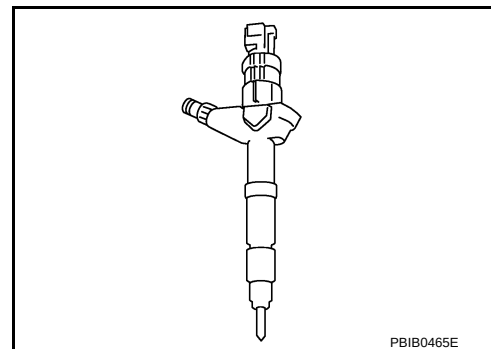
[ZD]

P0262, P0265, P0268, P0271 FUEL INJECTOR

Description

INFOID:000000004942215

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. 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.



DTC Logic

INFOID:000000004942216

DTC DETECTION LOGIC

DTC No.		GST	Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III					
	ID FLAG				
P0262	1	P0262	No. 1 cylinder fuel injector circuit high input	An improper voltage signal is sent to ECM through No. 1 cylinder fuel injector.	• Harness or connectors (The fuel injector circuit is shorted.) • Fuel injector
	4				
P0265	1	P0265	No. 2 cylinder fuel injector circuit high input	An improper voltage signal is sent to ECM through No. 2 cylinder fuel injector.	
	4				
P0268	1	P0268	No. 3 cylinder fuel injector circuit high input	An improper voltage signal is sent to ECM through No. 3 cylinder fuel injector.	
	4				
P0271	1	P0271	No. 4 cylinder fuel injector circuit high input	An improper voltage signal is sent to ECM through No. 4 cylinder fuel injector.	
	4				

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

TESTING CONDITION

Before performing the following procedure, confirm the ambient temperature is more than -20°C (-4°F).

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
2. Erase DTC.

Is DTC erased?

YES >> INSPECTION END

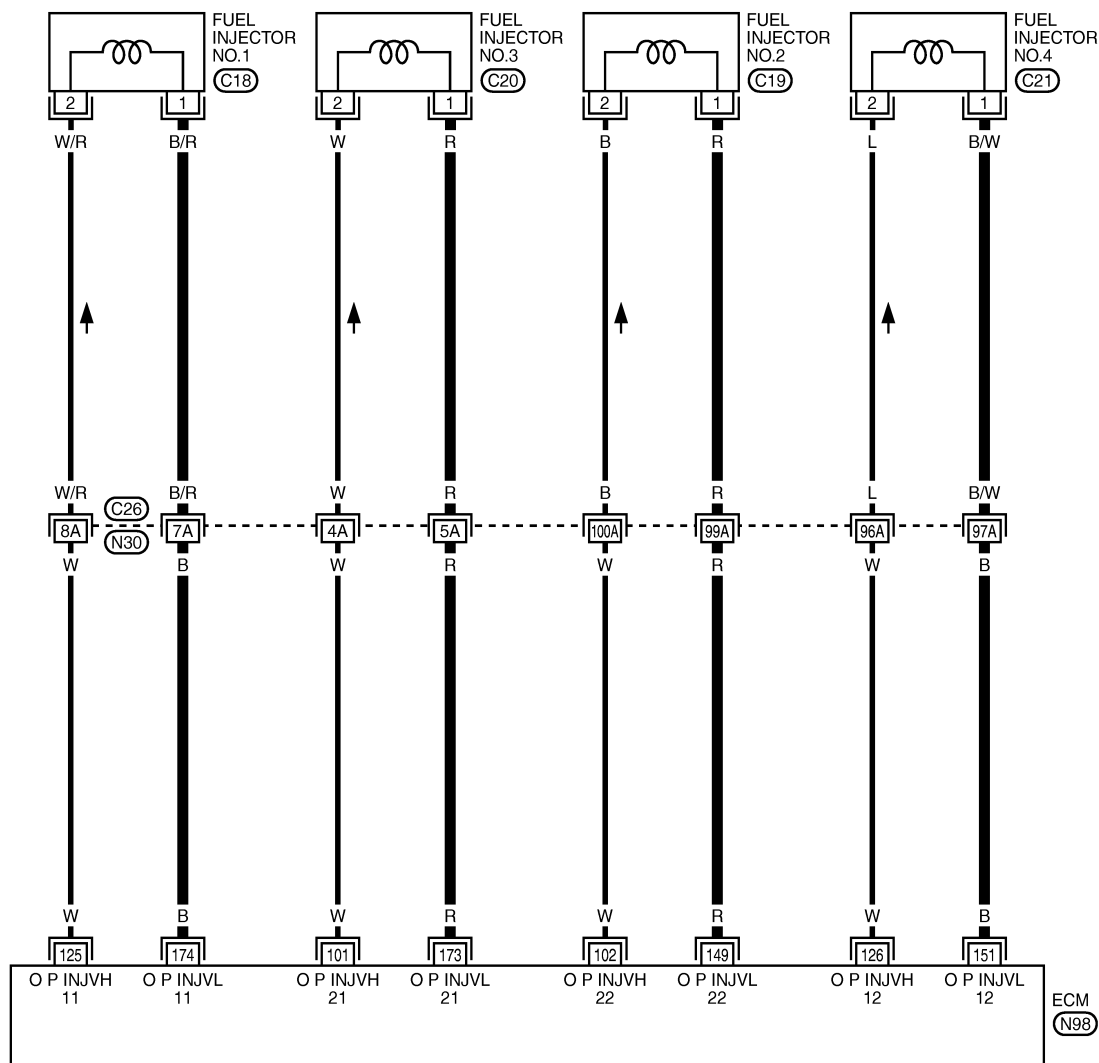
NO >> Go to [EC-125, "Diagnosis Procedure"](#).

Wiring Diagram

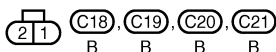
INFOID:000000004942217

EC-INJEC3-01

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



124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101
148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125
172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156	155	154	153	152	151	150	149
196	195	194	193	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176	175	174	173



REFER TO THE FOLLOWING.

(C26) - SUPER MULTIPLE JUNCTION (SMJ)

MBWA1889E

Diagnosis Procedure

INFOID:000000004942218

1. CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.

https://truckmanualshub.com/
P0262, P0265, P0268, P0271 FUEL INJECTOR

[ZD]

< COMPONENT DIAGNOSIS >

4. Check harness for short to ground and short to power between fuel injector harness connector and ECM harness connector.

DTC	Fuel injector			ECM	
	Cylinder	Connector	Terminal	Connector	Terminal
P0262	No.1	C18	1	N98	174
P0265	No.2	C19	1		149
P0268	No.3	C20	1		173
P0271	No.4	C21	1		151

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C26, N30
- Harness for short between fuel injector and ECM

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

3.CHECK FUEL INJECTOR

Refer to [EC-126, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.REPLACE FUEL INJECTOR

1. Replace malfunctioning fuel injector.
2. Perform INJECTOR ADJUSTMENT VALUE REGISTRATION. Refer to [EC-11, "INJECTOR ADJUSTMENT VALUE REGISTRATION : Special Repair Requirement"](#).

>> INSPECTION END

5.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000004942219

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as per the following items.

Terminal	Resistance
1 and 2	0.2 - 0.3 Ω [at 20 - 70°C (68 - 158 °F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE FUEL INJECTOR

1. Replace malfunctioning fuel injector.

<https://truckmanualshub.com/>
P0262, P0265, P0268, P0271 FUEL INJECTOR

< COMPONENT DIAGNOSIS >

[ZD]

2. Perform INJECTOR ADJUSTMENT VALUE REGISTRATION. Refer to [EC-11. "INJECTOR ADJUSTMENT VALUE REGISTRATION : Special Repair Requirement"](#).

>> INSPECTION END

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- N
- O
- P

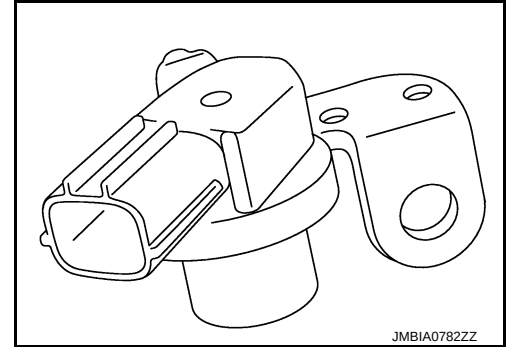
P0335 CKP SENSOR

Description

INFOID:000000004942224

The crankshaft position (CKP) sensor is located on the cylinder block front facing the gear teeth of the signal plate installed to the crankshaft pulley.

The ECM receives the voltage signal and detects the fluctuation of the engine revolution.



JMBIA0782ZZ

DTC Logic

INFOID:000000004942225

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0335	1	P0335	Crankshaft position sensor circuit	Crankshaft position sensor signal is not detect by the ECM when engine is running.	• Harness or connectors (The sensor circuit is open or shorted.) • Crankshaft position sensor
	2	P0336	Crankshaft position sensor circuit range/performance	Crankshaft position sensor signal is not in the normal pattern when engine is running.	• Harness or connectors (The sensor circuit is open or shorted.) • Crankshaft position sensor • Signal plate

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
If engine could not start, keep ignition switch at START position for 2 seconds.
2. Erase DTC.

Is DTC erased?

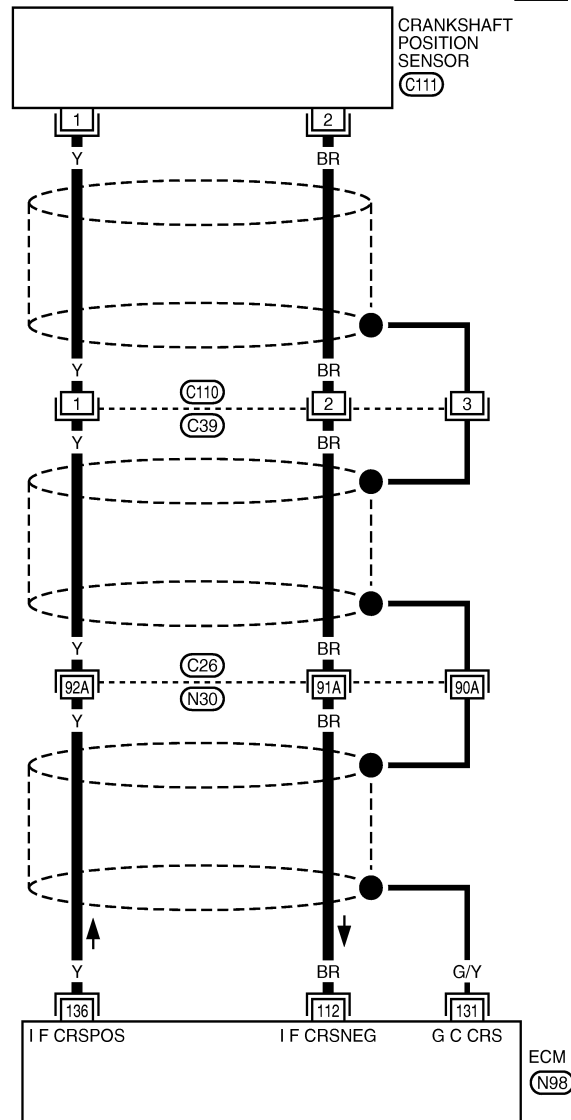
- YES >> INSPECTION END
 NO >> Go to [EC-129, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000004942226

EC-CKPS-01

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



124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101
148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125
172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156	155	154	153	152	151	150	149
196	195	194	193	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176	175	174	173

N98
B



1 2 3 C39
GR

1 2 C111

REFER TO THE FOLLOWING.

C26 - SUPER MULTIPLE
JUNCTION (SMJ)

JMBWA0090GB

Diagnosis Procedure

INFOID:000000004942227

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection C12. Refer to [EC-58, "Ground Inspection"](#).

Is the inspection result normal?

< COMPONENT DIAGNOSIS >

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

2.CHECK CKP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

CKP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C111	1	N98	136	Existed
	2		112	

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

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector C26, N30
- Harness connector C39, C110
- Harness for open and short between ECM and CKP sensor

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

4.CHECK CKP SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect harness connector C39, C110.
2. Check the continuity between harness connector C39 and ECM harness connector.

Harness connector		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C39	3	N98	131	Existed

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

Is the inspection result normal?

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

5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector C39
- Harness connector C26, N30
- Harness for open and short between harness connector C39 and ECM

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

6.CHECK CKP SENSOR

Refer to [EC-131. "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> Replace CKP sensor.

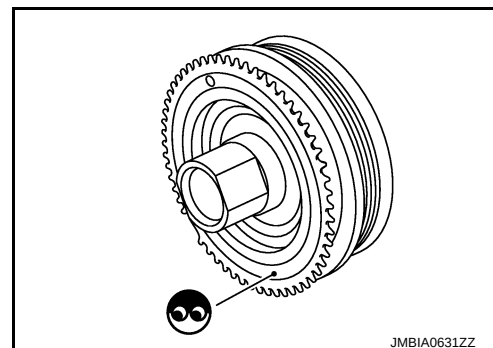
7.CHECK SIGNAL PLATE

< COMPONENT DIAGNOSIS >

Visually check for chipping signal plate gear tooth.

Is the inspection result normal?

- YES >> GO TO 8.
 NO >> Replace the signal plate.



8.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

Component Inspection

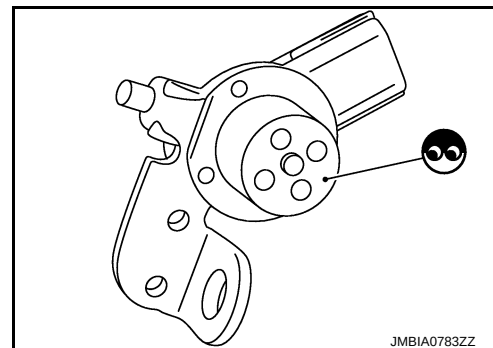
INFOID:000000004942228

1.CHECK CKP SENSOR-I

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

Is the inspection result normal?

- YES >> GO TO 2.
 NO >> Replace crankshaft position sensor.



2.CHECK CKP SENSOR-II

Check resistance between crankshaft position sensor terminal.

Terminal	Resistance
1 and 2	500 – 600Ω [at 25°C(77°F)]

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Replace crankshaft position sensor.

P0340 CMP SENSOR

Description

INFOID:000000004942229

The camshaft position (CMP) sensor senses the retraction with camshaft (left side) to identify a particular cylinder. The camshaft position (CMP) sensor senses the piston position.

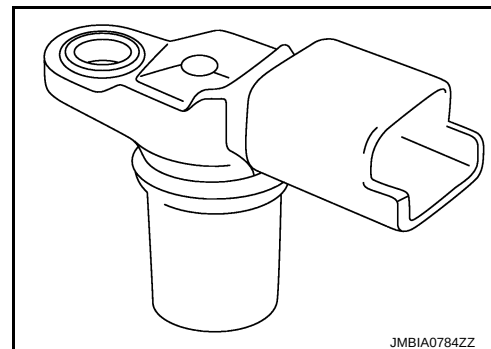
When the crankshaft position (CKP) sensor system becomes inoperative, the camshaft position (CMP) sensor provides various controls of engine parts instead, utilizing timing of cylinder identification signals.

The sensor consists of a permanent magnet and Hall IC.

When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.

The changing gap causes the magnetic field near the sensor to change.

Due to the changing magnetic field, the voltage from the sensor changes.



DTC Logic

INFOID:000000004942230

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0340	1	P0340	Camshaft position sensor circuit	Camshaft position sensor signal is not detect by the ECM when engine is running.	• Harness or connectors (The sensor circuit is open or shorted.) • Camshaft position sensor
	2	P0341	Camshaft position sensor circuit range/performance	Camshaft position sensor signal is not in the normal pattern when engine is running.	• Harness or connectors (The sensor circuit is open or shorted.) • Camshaft position sensor • Signal plate

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
If engine could start, keep ignition switch at START position for 2 seconds.
2. Erase DTC.

Is DTC erased?

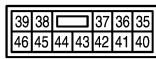
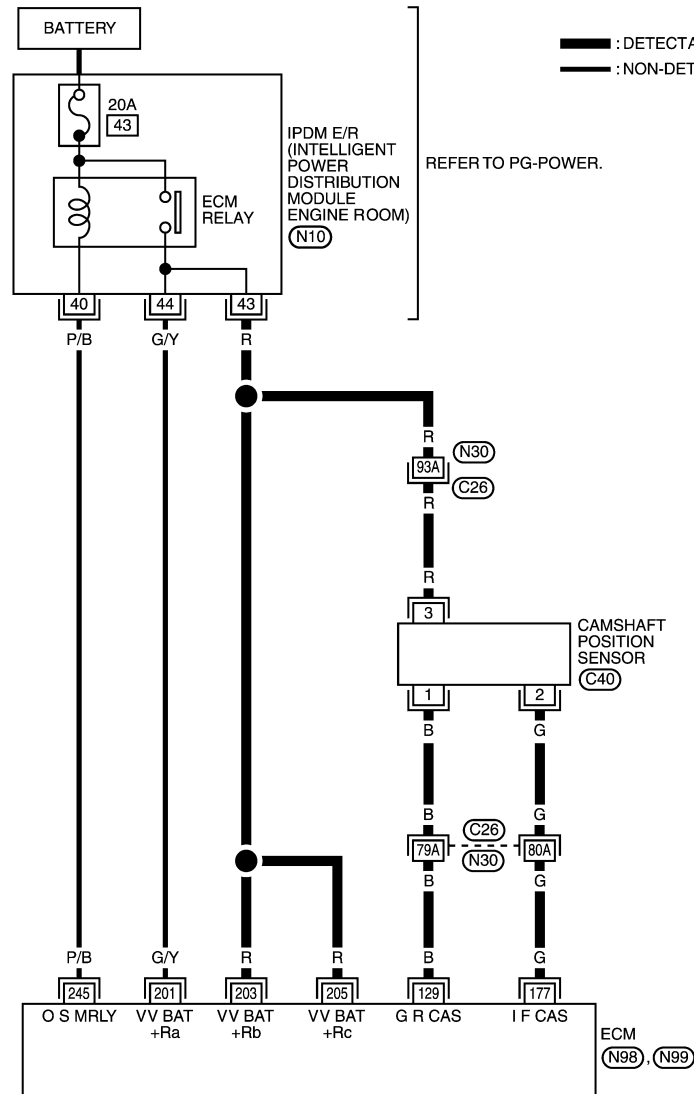
- YES >> INSPECTION END
 NO >> Go to [EC-133, "Diagnosis Procedure"](#).

Wiring Diagram

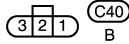
INFOID:000000004942231

EC-CMPS-01

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

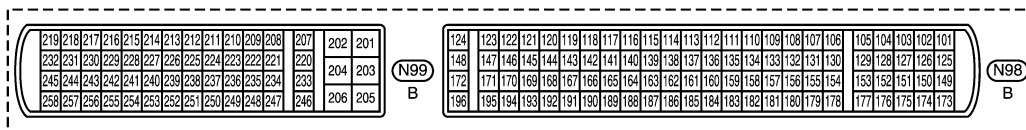


N10
BR



C40
B

REFER TO THE FOLLOWING.
(C26) - SUPER MULTIPLE JUNCTION (SMJ)



N99
B



JSBWAA0006GB

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection C12. Refer to [EC-58, "Ground Inspection"](#).

Is the inspection result normal?

INFOID:000000004942232

< COMPONENT DIAGNOSIS >

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

2.CHECK CMP SENSOR POWER SUPPLY CIRCUIT

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

CMP sensor		Ground	Voltage
Connector	Terminal		
C40	3	Ground	Battery voltage

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors N30, C26
- Harness for open and short between camshaft position sensor and IPDM E/R
- Harness for open and short between camshaft position sensor and ECM

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

4.CHECK CMP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C40	1	N98	129	Existed

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

Is the inspection result normal?

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

5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors N30, C26
- Harness for open and short between camshaft position sensor and ECM

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

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

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

CMP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C40	2	N98	177	Existed

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

Is the inspection result normal?

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

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors N30, C26
- Harness for open and short between camshaft position sensor and ECM

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

8. CHECK CAMSHAFT POSITION SENSOR

Refer to [EC-135. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace camshaft position sensor.

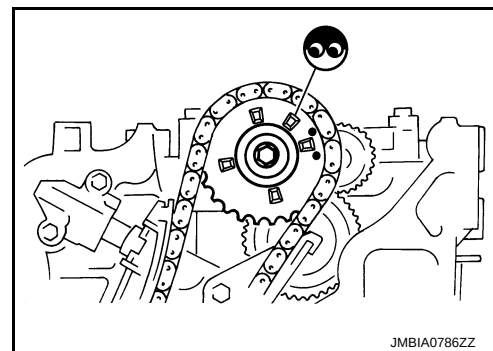
9. CHECK SIGNAL PLATE

Visually check for chipping signal plate of camshaft sprocket.

Is the inspection result normal?

YES >> GO TO 10.

NO >> Replace camshaft sprocket (intake).



10. CHECK INTERMITTENT INCIDENT

Refer to [EC-54. "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:000000004942233

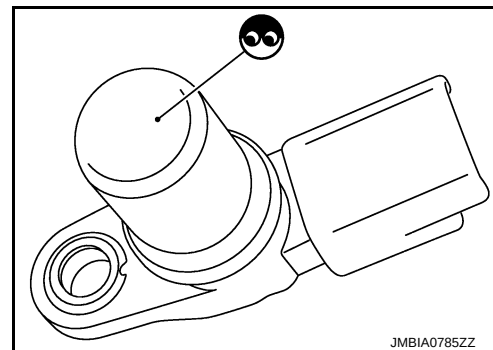
1. CHECK CMP SENSOR-I

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

Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace camshaft position sensor.



2. CHECK CMP SENSOR-II

Check the resistance between camshaft position sensor terminal as per the following items.

< COMPONENT DIAGNOSIS >

[ZD]

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace camshaft position sensor.

< COMPONENT DIAGNOSIS >

[ZD]

P0380 GLOW RELAY

DTC Logic

INFOID:000000004942234

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0380	1	P0380	Glow relay circuit	An excessively high voltage is sent to ECM through glow relay.	• Harness or connectors (The glow relay circuit is open or shorted.) • Glow relay
	2			An excessively low voltage is sent to ECM through glow relay.	
	4				
	8			An improper voltage is sent to ECM through glow relay.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC erased?

- YES >> INSPECTION END
 NO >> Go to [EC-138, "Diagnosis Procedure"](#).

INFOID:0000000004942235



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

REFER TO
PG-POWER.

RELAY
(C46),

GLOW
PLUG
(C41)

I REFER TO THE FOLLOWING.

**(C26) - SUPER MULTIPLE
JUNCTION (SMJ)**

JSBWA0007GB

INFOID:0000000004942236

1. Turn ignition switch OFF.
2. Disconnect glow relay.
3. Turn ignition switch ON.

< COMPONENT DIAGNOSIS >

[ZD]

4. Check voltage between glow relay harness connector and ground.

Glow relay		Ground	Voltage
Connector	Terminal		
C47	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors N30, C26
- Harness for open and short between glow relay and IPDM E/R
- Harness for open and short between glow relay and ECM

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

3.CHECK GLOW RELAY OUTPUT SIGNAL CIRCUIT FOR SHORT TO GROUND

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

Glow relay		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C47	2	N99	254	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C26, N30
- Harness for open and short between glow relay and ECM

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

5.CHECK GLOW RELAY

Refer to [EC-139, "Component Inspection \(Glow Relay\)"](#).

Is the inspection result normal?

YES >> GO TO 6

NO >> Replace glow relay.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

Is the inspection result normal?

YES >> Replace IPDM E/R.

NO >> Repair or replace harness or connectors.

Component Inspection (Glow Relay)

INFOID:000000004942237

1.CHECK GLOW RELAY

1. Turn ignition switch OFF.
2. Disconnect glow relay.

< COMPONENT DIAGNOSIS >

3. Check continuity between glow relay terminals under the following conditions.

Terminal	Conditions	Continuity
3 and 5	12V direct current supply between terminals (1) and (2)	Yes
	No current supply	No

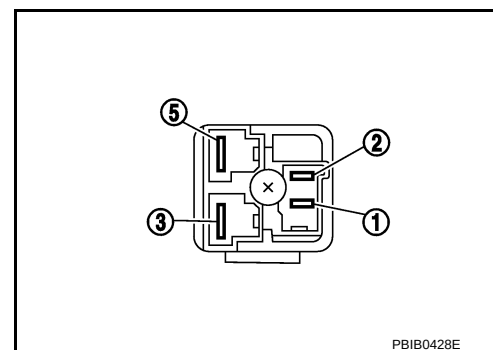
NOTE:

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace glow relay.



P0400 EGR FUNCTION

DTC Logic

INFOID:000000004942238

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition		Possible cause
CONSULT-III		GST				
	ID FLAG					
P0400	1	P0400	Exhaust gas recirculation flow	A)	The EGR volume control valve closed position is not in the specified range.	• Harness or connector (EGR volume control motor circuit is shorted.) • Incorrect EGR volume control valve installation • EGR volume control valve stuck closed • EGR volume control valve
				B)	Excessively high duty voltage signal is sent to the valve for the specified time.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Turn ignition switch ON.
4. Erase DTC.

Is DTC erased?

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

3. DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Start engine and warm it up to the normal operation temperature.
2. Stop engine and wait at least 30 seconds.
3. Restart engine and let it idle for 5 seconds
4. Erase DTC.

Is DTC erased?

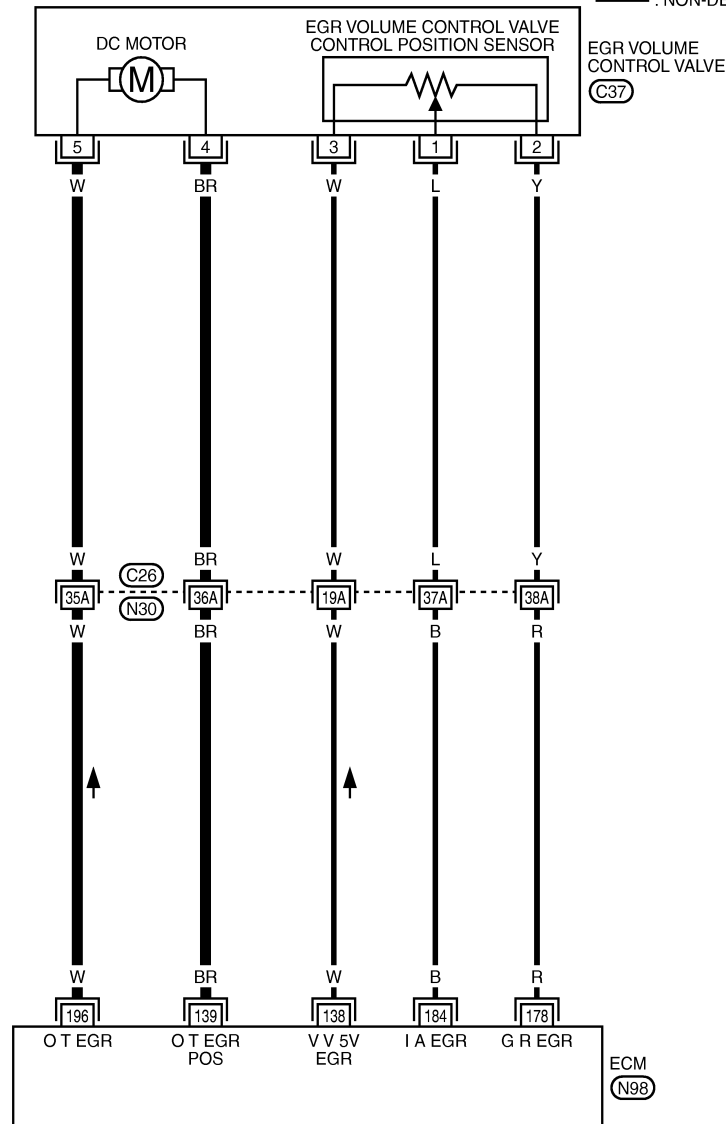
YES >> INSPECTION END
NO >> Go to [EC-142, "Diagnosis Procedure"](#).

Wiring Diagram

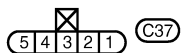
INFOID:000000004942239

EC-EGRC2-01

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



124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101
148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125
172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156	155	154	153	152	151	150	149
196	195	194	193	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176	175	174	173



REFER TO THE FOLLOWING.

(C26) - SUPER MULTIPLE JUNCTION (SMJ)

JMBWA0091GB

INFOID:000000004942240

Diagnosis Procedure

1. CHECK GROUND CONNECTIONS

- Turn ignition switch OFF.
- Check Ground connection C12. Refer to [EC-58, "Ground Inspection"](#).

Is the inspection result normal?

< COMPONENT DIAGNOSIS >

[ZD]

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

2.CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect EGR volume control valve harness connector.
2. Disconnect ECM harness connector.
3. Check the short to ground and short to power between EGR volume control valve harness connector and ECM harness connector.

EGR volume control valve		ECM	
Connector	Terminal	Connector	Terminal
C37	4	N98	139
	5		196

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C26, N30
- Harness for short between EGR volume control valve and ECM

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

4.CHECK EGR VOLUME CONTROL VALVE INSTALLATION

Check that EGR volume control valve is installed normally. Refer to [EM-19, "Removal and Installation"](#).

Is the inspection result normal?

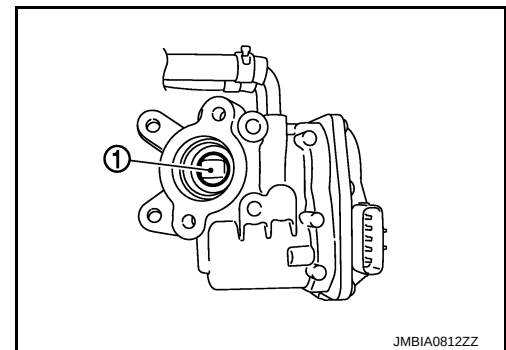
- YES >> GO TO 5.
 NO >> Install EGR volume control valve normally.

5.CHECK EGR VOLUME CONTROL VALVE VISUALLY

1. Remove the EGR volume control valve. Refer to [EM-19, "Removal and Installation"](#).
2. Check that no foreign matter is caught between the EGR volume control valve (1) and the housing.

Is the inspection result normal?

- YES >> GO TO 6.
 NO >> Remove the foreign matter and clean the EGR volume control valve.



6.CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR

Refer to [EC-153, "Component Inspection"](#).

Is the inspection result normal?

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

7.REPLACE EGR VOLUME CONTROL VALVE

1. Replace EGR volume control valve.
2. Perform EGR Volume Control Valve Closed Position Learning Value Clear. Refer to [EC-12, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING VALUE CLEAR : Special Repair Requirement"](#).
3. Perform EGR Volume Control Valve Closed Position Learning. Refer to [EC-12, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).

< COMPONENT DIAGNOSIS >

[ZD]

>> INSPECTION END

8. CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

P0401 EGR FUNCTION

DTC Logic

INFOID:000000004942241

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0401	1	P0401	Exhaust gas recirculation flow insufficient	The exhaust gas recirculation flow is insufficient.	• Harness or connectors (The EGR volume control valve circuit is open or shorted.) • EGR volume control valve stuck closed • EGR passage clogged • EGR volume control valve

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

Ⓐ With CONSULT-III

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-III.
2. Start engine and let it idle speed.
3. Maintain the following conditions for at least 40 consecutive seconds.

COOLAN TEMP/S	50 - 89 °C (122 - 192 °F)
I/C INT/A T/S	0 - 37 °C (32 - 99 °F)
BARO SEN	More than 90 kPa
P/N POSI SW	ON

4. Erase DTC.

Ⓑ With GST

Follow the procedure "With CONSULT-III" above.

Is DTC erased?

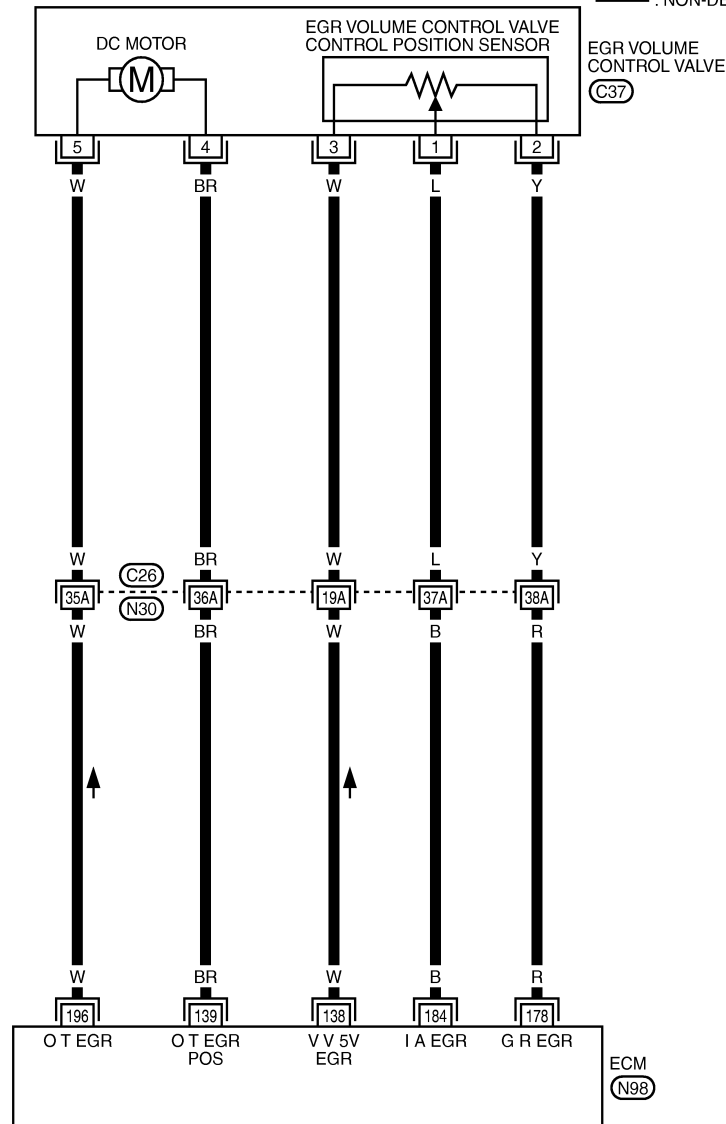
- YES >> INSPECTION END
- NO >> Go to [EC-146. "Diagnosis Procedure"](#).

Wiring Diagram

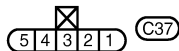
INFOID:000000004942242

EC-EGRC1-01

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



124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101
148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125
172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156	155	154	153	152	151	150	149
196	195	194	193	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176	175	174	173



REFER TO THE FOLLOWING.

(C26) - SUPER MULTIPLE JUNCTION (SMJ)

JMBWA0092GB

Diagnosis Procedure

INFOID:000000004942243

1. CHECK EGR PASSAGE

Check the following for clogging and cracks.

- EGR tube
- EGR hose

< COMPONENT DIAGNOSIS >

[ZD]

- EGR cooler

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace.

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection C12. Refer to [EC-58, "Ground Inspection"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace ground connection.

3.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.
2. Turn ignition switch ON.
3. Check voltage between EGR volume control valve harness connector and ground.

EGR volume control valve		Ground	Voltage
Connector	Terminal		
C37	3	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector C26, N30
- Harness for open and short between EGR volume control valve and ECM

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

5.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C37	2	N98	178	Existed

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

Is the inspection result normal?

YES >> GO TO 7.

NO >> GO TO 6.

6.DETEDCT MALFUNCTIONING PART

Check the following.

- Harness connector C26, N30
- Harness for open and short between EGR volume control valve and ECM

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

7.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EGR volume control valve harness connector and ECM harness connector.

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C37	1	N98	184	Existed

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

Is the inspection result normal?

YES >> GO TO 9.

NO >> GO TO 8.

8.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector C26, N30
- Harness for open and short between EGR volume control valve and ECM.

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

9.CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EGR volume control valve harness connector and ECM harness connector.

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C37	4	N98	139	Existed
			196	Not existed
	5		139	Not existed
			196	Existed

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

Is the inspection result normal?

YES >> GO TO 11.

NO >> GO TO 10.

10.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C26, N30
- Harness for open and short between EGR volume control valve and ECM.

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

11.CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR

Refer to [EC-153. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 12.

NO >> GO TO 13.

12.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR

Refer to [EC-161. "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 14.

NO >> GO TO 13.

13.REPLACE EGR VOLUME CONTROL VALVE

1. Replace EGR volume control valve.
2. Perform EGR Volume Control Valve Closed Position Learning Value Clear. Refer to [EC-12. "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING VALUE CLEAR : Special Repair Requirement"](#).

< COMPONENT DIAGNOSIS >

[ZD]

3. Perform EGR Volume Control Valve Closed Position Learning. Refer to [EC-12, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).

A

>> INSPECTION END

14.CHECK INTERMITTENT INCIDENT

EC

Refer to [EC-54, "Description"](#).

C

>> INSPECTION END

D

E

F

G

H

I

J

K

L

M

N

O

P

P0403 EGR VOLUME CONTROL VALVE

< COMPONENT DIAGNOSIS >

[ZD]**P0403 EGR VOLUME CONTROL VALVE****DTC Logic**

INFOID:000000004942244

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0403	8	P0403	Exhaust gas recirculation control circuit	ECM driver IC is malfunctioning.	• ECM • EGR volume control valve • Harness and connector

DTC CONFIRMATION PROCEDURE**1. PRECONDITIONING**

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 5 seconds.
2. Erase DTC.

Is DTC erased?

YES >> INSPECTION END

NO >> Go to [EC-151. "Diagnosis Procedure"](#).

P0403 EGR VOLUME CONTROL VALVE

< COMPONENT DIAGNOSIS >

[ZD]

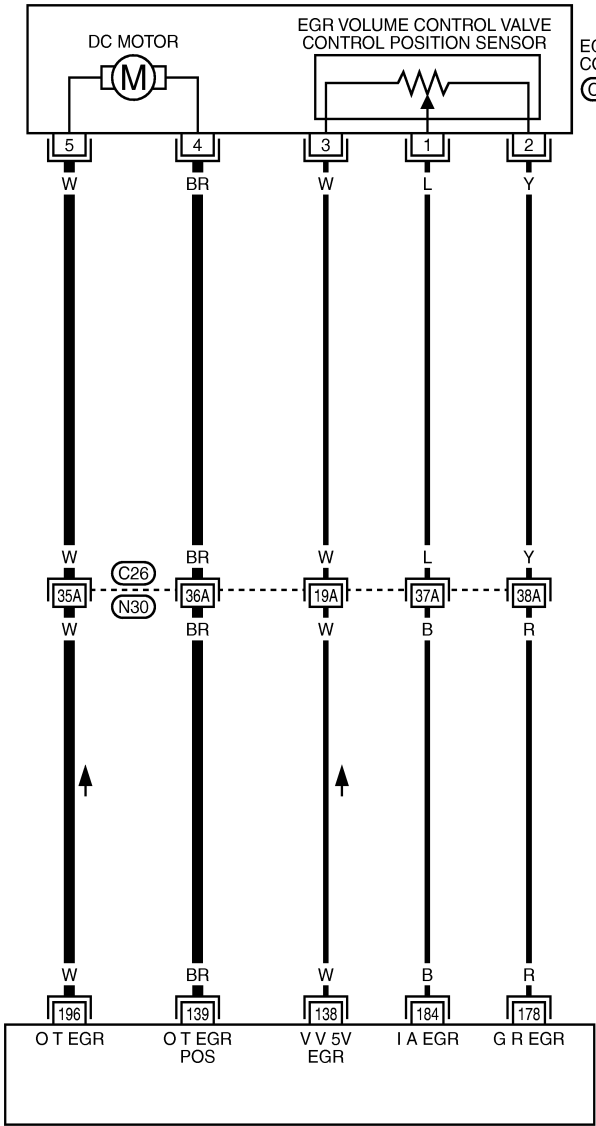
Wiring Diagram

INFOID:000000004942245

EC-EGRC2-01

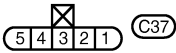
— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC

EGR VOLUME
CONTROL VALVE
(C37)



124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101
148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125
172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156	155	154	153	152	151	150	149
196	195	194	193	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176	175	174	173

(N98)
B



REFER TO THE FOLLOWING.

(C26) - SUPER MULTIPLE
JUNCTION (SMJ)

JMBWA0091GB

Diagnosis Procedure

INFOID:000000004942246

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection C12. Refer to [EC-58, "Ground Inspection"](#).

Is the inspection result normal?

P0403 EGR VOLUME CONTROL VALVE**[ZD]**

< COMPONENT DIAGNOSIS >

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

2.CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect EGR volume control valve harness connector.
3. Check the continuity between EGR volume control valve harness connector and ECM harness connector.

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C37	4	N98	139	Existed
			196	Not existed
	5		139	Not existed
			196	Existed

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

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector C26, N30
- Harness for open and short between EGR volume control valve and ECM.

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

4.CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR

Refer to [EC-153, "Component Inspection"](#).

Is the inspection result normal?

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

5.REPLACE EGR VOLUME CONTROL VALVE

1. Replace EGR volume control valve.
2. Perform EGR Volume Control Valve Closed Position Learning Value Clear. Refer to [EC-12, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING VALUE CLEAR : Special Repair Requirement"](#).
3. Perform EGR Volume Control Valve Closed Position Learning. Refer to [EC-12, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).

>> INSPECTION END

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

Is the inspection result normal?

- YES >> GO TO 7.
 NO >> Repair or replace harness or connectors.

7.REPLACE ECM

1. Replace ECM.
2. Go to [EC-10, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"](#).

>> INSPECTION END

P0403 EGR VOLUME CONTROL VALVE

< COMPONENT DIAGNOSIS >

[ZD]

Component Inspection

INFOID:000000004942247

1.CHECK EGR VOLUME CONTROL VALVE MOTOR

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Check resistance between EGR volume control valve terminal as per the following items.

Terminal	Resistance
4 and 5	Less than 100 Ω [at 25°C (77°F)]

Is the inspection result normal?

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

2.REPLACE EGR VOLUME CONTROL VALVE

1. Replace EGR volume control valve.
2. Perform EGR Volume Control Valve Closed Position Learning Value Clear. Refer to [EC-12. "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING VALUE CLEAR : Special Repair Requirement"](#).
3. Perform EGR Volume Control Valve Closed Position Learning. Refer to [EC-12. "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).

>> INSPECTION END

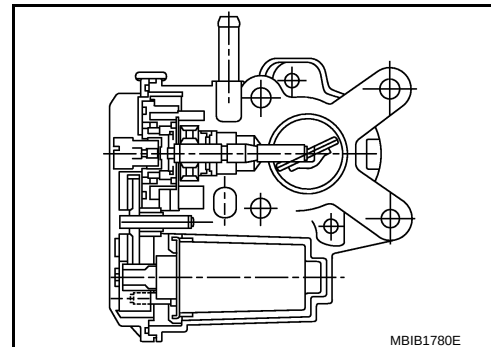
P0404 EGR VOLUME CONTROL VALVE

< COMPONENT DIAGNOSIS >

[ZD]**P0404 EGR VOLUME CONTROL VALVE****Description**

INFOID:000000004942248

The EGR volume control valve consists of valve, actuator and position sensor, etc. The valve is installed in EGR passage, and operated by the actuator according to the output signal of the ECM. The actuator used DC motor and it opens or closes the valve to change the EGR flow rate.

**DTC Logic**

INFOID:000000004942249

DTC DETECTION LOGIC

DTC No.		GST	Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III					
	ID FLAG				
P0404	1	P0490	Exhaust gas recirculation control circuit high	ECM detect a DC motor circuit for EGR volume control valve is short to power.	• Harness or connector (EGR volume control motor circuit is open or shorted.) • EGR volume control valve
	2	P0489	Exhaust gas recirculation control circuit low	ECM detect a DC motor circuit for EGR volume control valve is short to ground.	
	4	P0404	Exhaust gas recirculation control circuit open/shorted	ECM detect a DC motor circuit for EGR volume control valve is open or shorted	

DTC CONFIRMATION PROCEDURE**1. PRECONDITIONING**

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC erased?

- YES >> INSPECTION END
 NO >> Go to [EC-155, "Diagnosis Procedure"](#).

P0404 EGR VOLUME CONTROL VALVE

< COMPONENT DIAGNOSIS >

[ZD]

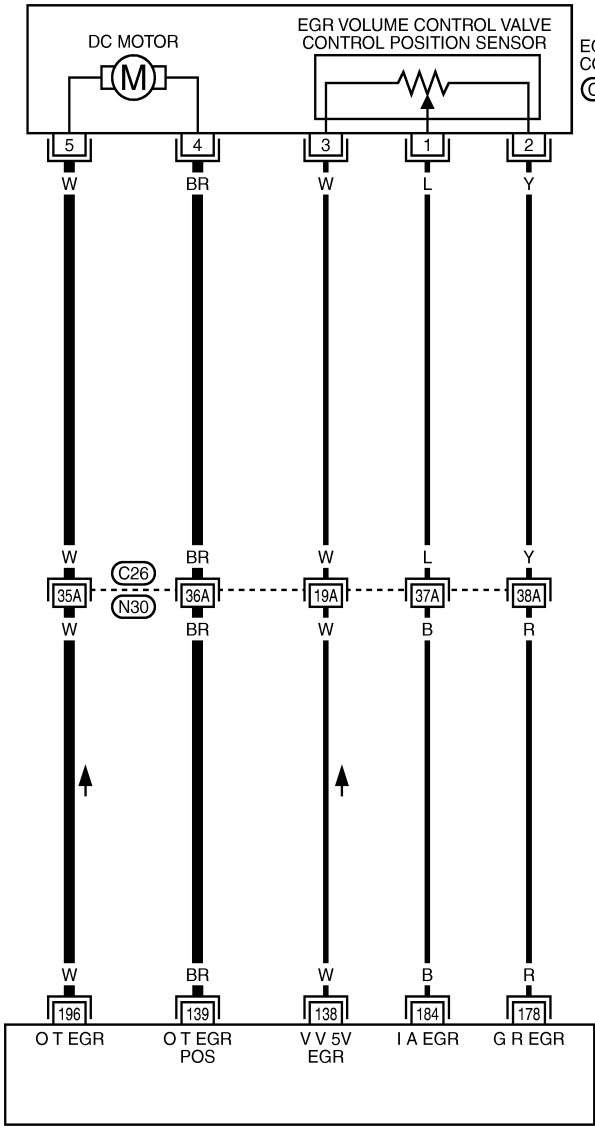
Wiring Diagram

INFOID:000000004942250

EC-EGRC2-01

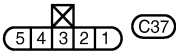
— : DETECTABLE LINE FOR DTC
— : NON-DETECTABLE LINE FOR DTC

EGR VOLUME
CONTROL VALVE
(C37)



124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101
148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125
172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156	155	154	153	152	151	150	149
196	195	194	193	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176	175	174	173

(N98)
B



REFER TO THE FOLLOWING.

(C26) - SUPER MULTIPLE
JUNCTION (SMJ)

JMBWA0091GB

Diagnosis Procedure

INFOID:000000004942251

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection C12. Refer to [EC-58, "Ground Inspection"](#).

Is the inspection result normal?

P0404 EGR VOLUME CONTROL VALVE**[ZD]**

< COMPONENT DIAGNOSIS >

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

2.CHECK EGR VOLUME CONTROL VALVE CONTROL NOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect EGR volume control valve harness connector.
3. Check the continuity between EGR volume control valve harness connector and ECM harness connector.

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C37	4	N98	139	Existed
			196	Not existed
	5		139	Not existed
			196	Existed

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

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector C26, N30
- Harness for open and short between EGR volume control valve and ECM

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

4.CHECK EGR VOLUME CONTROL VALVE CONTROL MOTOR

Refer to [EC-156, "Component Inspection"](#).

Is the inspection result normal?

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

5.REPLACE EGR VOLUME CONTROL VALVE

1. Replace EGR volume control valve.
2. Perform EGR Volume Control Valve Closed Position Learning Value Clear. Refer to [EC-12, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING VALUE CLEAR : Special Repair Requirement"](#).
3. Perform EGR Volume Control Valve Closed Position Learning. Refer to [EC-12, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).

>> INSPECTION END

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:000000004942252

1.CHECK EGR VOLUME CONTROL VALVE MOTOR

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Check resistance between EGR volume control valve terminal as per the following items.

P0404 EGR VOLUME CONTROL VALVE

< COMPONENT DIAGNOSIS >

[ZD]

Terminal	Resistance
4 and 5	Less than 100 Ω [at 25°C (77°F)]

Is the inspection result normal?

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

2.REPLACE EGR VOLUME CONTROL VALVE

1. Replace EGR volume control valve.
2. Perform EGR Volume Control Valve Closed Position Learning Value Clear. Refer to [EC-12. "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING VALUE CLEAR : Special Repair Requirement"](#).
3. Perform EGR Volume Control Valve Closed Position Learning. Refer to [EC-12. "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).

>> INSPECTION END

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P0409 EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR

< COMPONENT DIAGNOSIS >

[ZD]**P0409 EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR****Description**

INFOID:000000004942253

The EGR volume control valve control position sensor consists of a permanent magnet and Hall IC. It senses the valve shaft movement and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the valve from this signals, and controls the DC motor to make the valve opening angle in response to driving conditions.

DTC Logic

INFOID:000000004942254

DTC DETECTION LOGIC**NOTE:**

If DTC P0409 (GST: P0405, P0406) is displayed with DTC P0651 (GST: P0652, P0653), first perform the trouble diagnosis for DTC P0651 (GST: P0652, P0653). Refer to [EC-171. "DTC Logic"](#).

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0409	1	P0406	EGR volume control valve control position 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.) • EGR volume control valve
	2	P0405	EGR volume control valve control position sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE**1. PRECONDITIONING**

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC erased?

YES >> INSPECTION END

NO >> Go to [EC-159. "Diagnosis Procedure"](#).

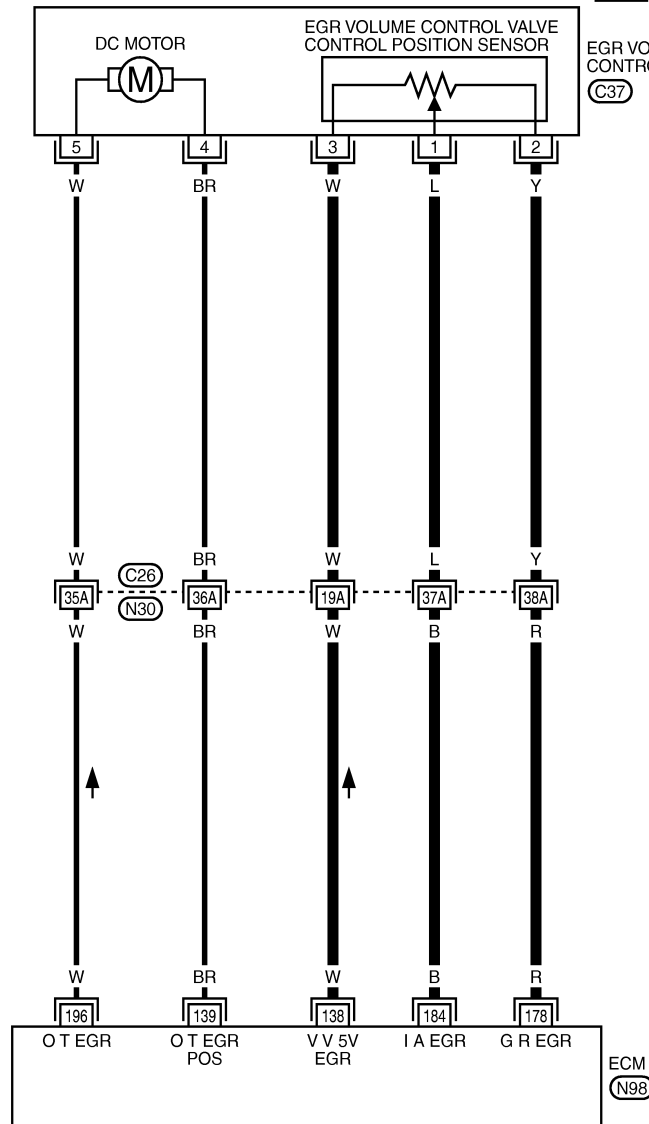
Wiring Diagram

INFOID:0000000004942255

EC-EGRC3-01

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

EGR VOLUME
CONTROL VALVE
C37



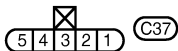
124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101
148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125
172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156	155	154	153	152	151	150	149
196	195	194	193	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176	175	174	173

N98
B



REFER TO THE FOLLOWING.

(C26) - SUPER MULTIPLE JUNCTION (SMJ)



JMBWA0093GB

Diagnosis Procedure

INFOID:0000000004942256

1.CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Check ground connection C12. Refer to EC-58, "Ground Inspection".

Is the inspection result normal?

P0409 EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR

< COMPONENT DIAGNOSIS >

[ZD]

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

2.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect EGR volume control valve harness connector.
2. Turn ignition switch ON.
3. Check the voltage between EGR volume control valve control position sensor harness connector and ground.

EGR volume control valve		Ground	Voltage
Connector	Terminal		
C37	3	Ground	Approx. 5V

Is the inspection result normal?

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

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C26, N30
- Harness for open and short between EGR volume control valve and ECM

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

4.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C37	2	N98	178	Existed

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

Is the inspection result normal?

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

5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors C26, N30
- Harness for open and short between EGR volume control valve and ECM

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

6.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR INPUT CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between EGR volume control valve harness connector and ECM harness connector.

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C37	1	N98	184	Existed

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

Is the inspection result normal?

- YES >> GO TO 8.

P0409 EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR

< COMPONENT DIAGNOSIS >

[ZD]

NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector C26, N30
- Harness for open and short between EGR volume control valve and ECM

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

8.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSORRefer to [EC-161. "Component Inspection"](#).Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 9.

9.REPLACE EGR VOLUME CONTROL VALVE

1. Replace EGR volume control valve.
2. Perform EGR volume control valve closed position learning value clear. Refer to [EC-12. "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING VALUE CLEAR : Special Repair Requirement"](#).
3. Perform EGR volume control valve closed position learning. Refer to [EC-12. "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).

>> INSPECTION END

10.CHECK INTERMITTENT INCIDENTRefer to [EC-54. "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:000000004942257

1.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR

⑧ With CONSULT-III

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON and select "EGR/V ANGLE" in "ACTIVE TEST" mode with CONSULT-III.
4. Change the valve opening percentage with touching "Qu" or "Qd" on CONSULT-III screen.
5. Check "EGR V/POS SEN" voltage under the following conditions.

Condition (EGR/V ANGLE)	Voltage (EGR V/POS SEN)
100 %	3,800 - 4,200 mV
0 %	1,000 - 1,400 mV

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE EGR VOLUME CONTROL VALVE

1. Replace EGR volume control valve.
2. Perform EGR volume control valve closed position learning value clear. Refer to [EC-12. "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING VALUE CLEAR : Special Repair Requirement"](#).
3. Perform EGR volume control valve closed position learning. Refer to [EC-12. "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).

>> INSPECTION END

< COMPONENT DIAGNOSIS >

[ZD]**P0500 VSS****Description**

INFOID:000000004942258

The vehicle speed signal is sent to the combination meter from the "ABS actuator and electric unit (control unit)" through CAN communication line. The combination meter then sends a signal to the ECM through CAN communication line.

DTC Logic

INFOID:000000004942259

DTC DETECTION LOGIC**NOTE:**

- If DTC P0500 is displayed with DTC U1001, first perform trouble diagnosis for DTC U1001. Refer to [EC-59, "DTC Logic"](#).
- If DTC P0500 is displayed with DTC U1010, first perform trouble diagnosis for DTC U1010. Refer to [EC-61, "DTC Logic"](#).

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0500	8	P0500	Vehicle speed sensor	• The almost 0 km/h (0 MPH) signal is sent to ECM even when vehicle is being driven.	• Harness or connectors (The CAN communication line is open or shorted.) • ABS actuator and electric unit (control unit) • Combination meter

DTC CONFIRMATION PROCEDURE**1. PRECONDITIONING**

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE With CONSULT-III

1. Start engine and warm it up to normal operating temperature.
2. Select "DATA MONITOR" mode with CONSULT-III.
3. Maintain the following conditions for at least 15 consecutive seconds.

CKPS-PRM (TDC)	More than 2,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
TRG INJ QTY	More than 20 mg/st (VIN<VWA***F24**051597) More than 5 mg/st (VIN>VWA***F24**051597)
Shift lever	Except neutral

NOTE:

Keep the accelerator pedal as steady as possible during the cruising.

CAUTION:

Always drive at a safe speed.

4. Erase DTC.

 With GST

1. Start engine and warm it up to normal operating temperature.
2. Maintain the following conditions for at least 15 consecutive seconds.

< COMPONENT DIAGNOSIS >

[ZD]

VIN<VWA***F24**051597

Engine speed	More than 2,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
Calculated load value	More than 25% (5M/T) More than 20% (6M/T)
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

VIN>VWA***F24**051597

Engine speed	More than 2,000 rpm
COOLAN TEMP/S	More than 70°C (158°F)
Shift lever	Except neutral

NOTE:

Keep the accelerator pedal as steady as possible during the cruising.

CAUTION:**Always drive at a safe speed.**

3. Erase DTC.

Is DTC erased?

YES >> INSPECTION END

NO >> Go to [EC-163. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000004942260

1.CHECK DTC WITH "ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)"Refer to [BRC-8. "How to Perform Trouble Diagnosis for Quick and Accurate Repair"](#).Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning part.

2.CHECK DTC WITH "COMBINATION METER"Refer to [DI-15. "Trouble Diagnosis"](#).

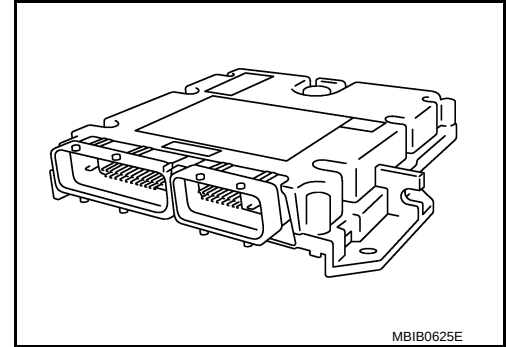
>> INSPECTION END

< COMPONENT DIAGNOSIS >

P0606 ECM**Description**

INFOID:000000004942261

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



MBIB0625E

DTC Logic

INFOID:000000004942262

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III	ID FLAG	GST			
P0606	—	P0606	Engine control module (Processor)	ECM calculation is function is malfunctioning.	• ECM

DTC CONFIRMATION PROCEDURE**1. PRECONDITIONING**

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 second.
2. Erase DTC.

Is DTC erased?

YES >> INSPECTION END
 NO >> Go to [EC-164, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000004942263

1. INSPECTION START

1. Perform DTC Confirmation Procedure. Refer to [EC-164, "DTC Logic"](#).
2. Erase DTC.

Is DTC erased?

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

2. REPLACE ECM

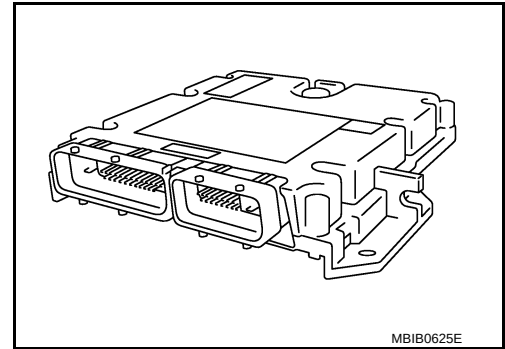
1. Replace ECM.
2. Go to [EC-10, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"](#).

>> INSPECTION END

P0607 ECM**Description**

INFOID:000000004942264

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



MBIB0625E

DTC Logic

INFOID:000000004942265

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0607	—	P0607	Engine control module (IC error)	ECM calculation function is malfunctioning.	ECM

DTC CONFIRMATION PROCEDURE**1. PRECONDITIONING**

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 second.
2. Erase DTC.

Is DTC erased?

YES >> INSPECTION END

NO >> Go to [EC-165, "Diagnosis Procedure"](#).**Diagnosis Procedure**

INFOID:000000004942266

1. INSPECTION START

1. Perform DTC Confirmation Procedure. Refer to [EC-165, "DTC Logic"](#).
2. Erase DTC.

Is DTC erased?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE ECM

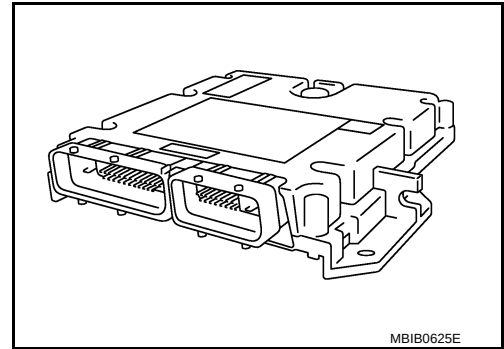
1. Replace ECM.
2. Go to [EC-10, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"](#).

>> INSPECTION END

P0611 ECM**Description**

INFOID:000000004942267

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



MB1B0625E

DTC Logic

INFOID:000000004942268

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0611	1	P0611	Engine control module (ROM)	ECM ROM is malfunctioning.	• ECM
	2				
	4				
	8				

DTC CONFIRMATION PROCEDURE**1. PRECONDITIONING**

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 second.
2. Erase DTC.

Is DTC erased?

YES >> INSPECTION END

NO >> Go to [EC-166, "Diagnosis Procedure"](#).**Diagnosis Procedure**

INFOID:000000004942269

1. INSPECTION START

1. Perform DTC Confirmation Procedure. Refer to [EC-166, "DTC Logic"](#).
2. Erase DTC.

Is DTC erased?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE ECM

1. Replace ECM.

P0611 ECM

< COMPONENT DIAGNOSIS >

[ZD]

2. Go to [EC-10, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"](#).

>> INSPECTION END

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P0641 SENSOR POWER SUPPLY

DTC Logic

INFOID:000000004942270

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0641	1	P0643	Sensor power supply circuit high input	ECM detects a voltage of power source for sensor is excessively high.	• Harness or connectors (APP sensor 1 circuit is short-ed.) • Accelerator pedal position sensor (APP sensor 1) • ECM
	2	P0642	Sensor power supply circuit low input	ECM detects a voltage of power source for sensor is excessively low	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 second.
2. Erase DTC.

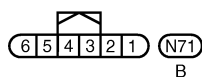
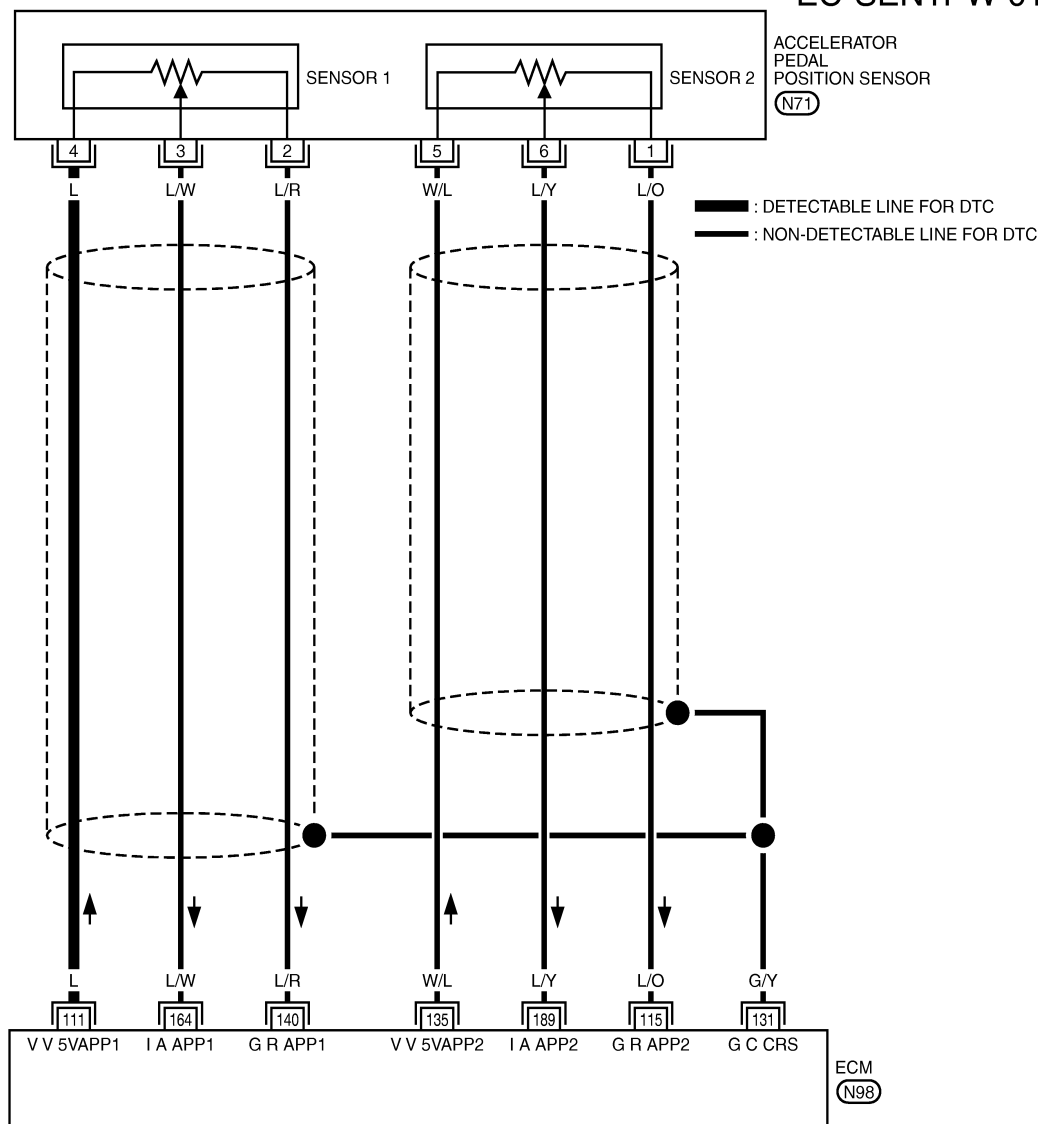
Is DTC erased?

YES >> INSPECTION END
NO >> Go to [EC-169. "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000004942271

EC-SEN1PW-01



124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101
148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125
172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156	155	154	153	152	151	150	149
196	195	194	193	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176	175	174	173



MBWA1731E

INFOID:000000004942272

Diagnosis Procedure

1. CHECK GROUND CONNECTION

- Turn ignition switch OFF.
- Check ground connection C12. Refer to [EC-58, "Ground Inspection"](#).

Is the inspection result normal?

< COMPONENT DIAGNOSIS >

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

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
N71	4	Ground	Approx. 5V

Is the inspection result normal?

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

3.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness for short to power and short to ground between APP sensor harness connector and ECM harness connector.

APP sensor		ECM	
Connector	Terminal	Connector	Terminal
N71	4	N98	111

Is the inspection result normal?

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

4.CHECK APP SENSOR

Refer to [EC-99, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Replace accelerator pedal assembly.

5.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

Is the inspection result normal?

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

6.REPLACE ECM

1. Replace ECM.
2. Go to [EC-10, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"](#).

>> INSPECTION END

P0651 SENSOR POWER SUPPLY

DTC Logic

INFOID:000000004942273

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0651	1	P0653	Sensor power supply circuit high input	ECM detects a voltage of power source for sensor is excessively high.	• Harness or connectors (EGR volume control valve control position sensor circuit is shorted.) (Turbocharger boost sensor circuit is shorted.) (Fuel rail pressure sensor circuit is shorted.) • EGR volume control valve control position sensor • Turbocharger boost sensor • Fuel rail pressure sensor • ECM
	2	P0652	Sensor power supply circuit low input	ECM detects a voltage of power source for sensor is excessively low	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC erased?

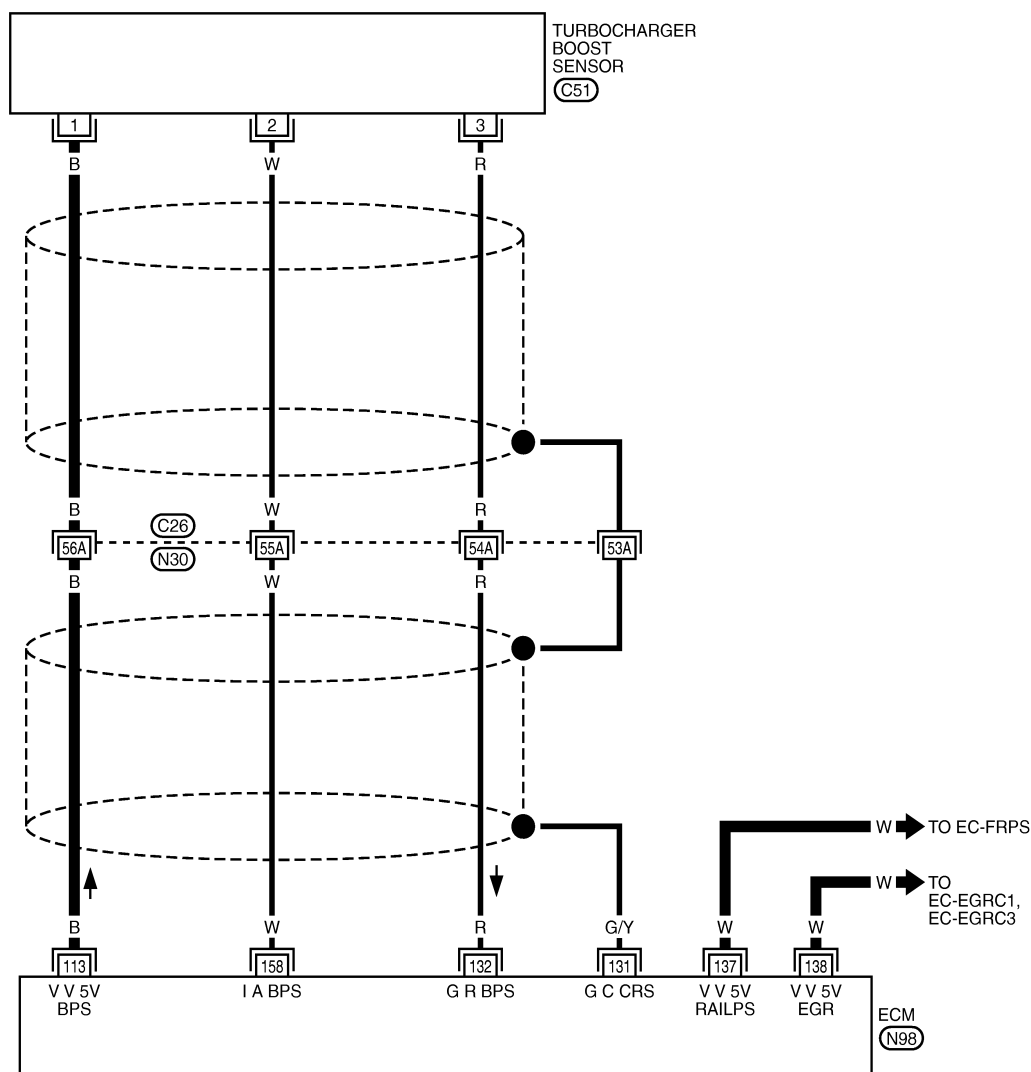
- YES >> INSPECTION END
NO >> Go to [EC-172, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000004942274

EC-SEN2PW-01

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



124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101
148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125
172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156	155	154	153	152	151	150	149
196	195	194	193	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176	175	174	173

(N98) B H.S.

3 2 1 (C51) GR

REFER TO THE FOLLOWING.

(C26) - SUPER MULTIPLE JUNCTION (SMJ)

MBWA1893E

Diagnosis Procedure

INFOID:000000004942275

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection C12. Refer to [EC-58, "Ground Inspection"](#).

Is the inspection result normal?

< COMPONENT DIAGNOSIS >

[ZD]

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

2.CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY CIRCUIT

1. Disconnect turbocharger boost sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger boost sensor harness connector and ground.

Turbocharger boost sensor		Ground	Voltage
Connector	Terminal		
C51	1	Ground	Approx. 5V

Is the inspection result normal?

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

3.CHECK SENSOR POWER SUPPLY CIRCUITS FOR SHORT

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
N98	113	Turbocharger boost sensor	C51	1
	137	Fuel rail pressure sensor	C43	1
	138	EGR volume control valve control position sensor	C37	3

Is the inspection result normal?

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

4.CHECK FUEL RAIL PRESSURE SENSOR

Refer to [EC-104, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Replace fuel rail pressure sensor.

5.CHECK EGR VOLUME CONTROL VALVE CONTROL POSITION SENSOR

Refer to [EC-161, "Component Inspection"](#).

Is the inspection result normal?

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

6.REPLACE EGR VOLUME CONTROL VALVE

1. Replace EGR volume control valve.
2. Perform "EGR volume control valve closed position learning value clear". Refer to [EC-12, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING VALUE CLEAR : Special Repair Requirement"](#).
3. Perform "EGR volume control valve closed position learning". Refer to [EC-12, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).

>> INSPECTION END

7.CHECK TURBOCHARGER BOOST SENSOR

Refer to [EC-122, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 8.
NO >> Replace turbocharger boost sensor.

< COMPONENT DIAGNOSIS >

[ZD]

8.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

Is the inspection result normal?

YES >> GO TO 9.

NO >> Repair or replace harness or connectors.

9.REPLACE ECM

1. Replace ECM.
2. Go to [EC-10, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"](#).

>> INSPECTION END

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P0697 SENSOR POWER SUPPLY

< COMPONENT DIAGNOSIS >

[ZD]

P0697 SENSOR POWER SUPPLY

DTC Logic

INFOID:000000004942286

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P0697	1	P0699	Sensor power supply circuit high input	ECM detects a voltage of power source for sensor is excessively high.	• Harness or connectors (APP sensor 2 circuit is shorted.) • Accelerator pedal position sensor (APP sensor 2) • ECM
	2	P0698	Sensor power supply circuit low input	ECM detects a voltage of power source for sensor is excessively low	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC erased?

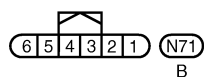
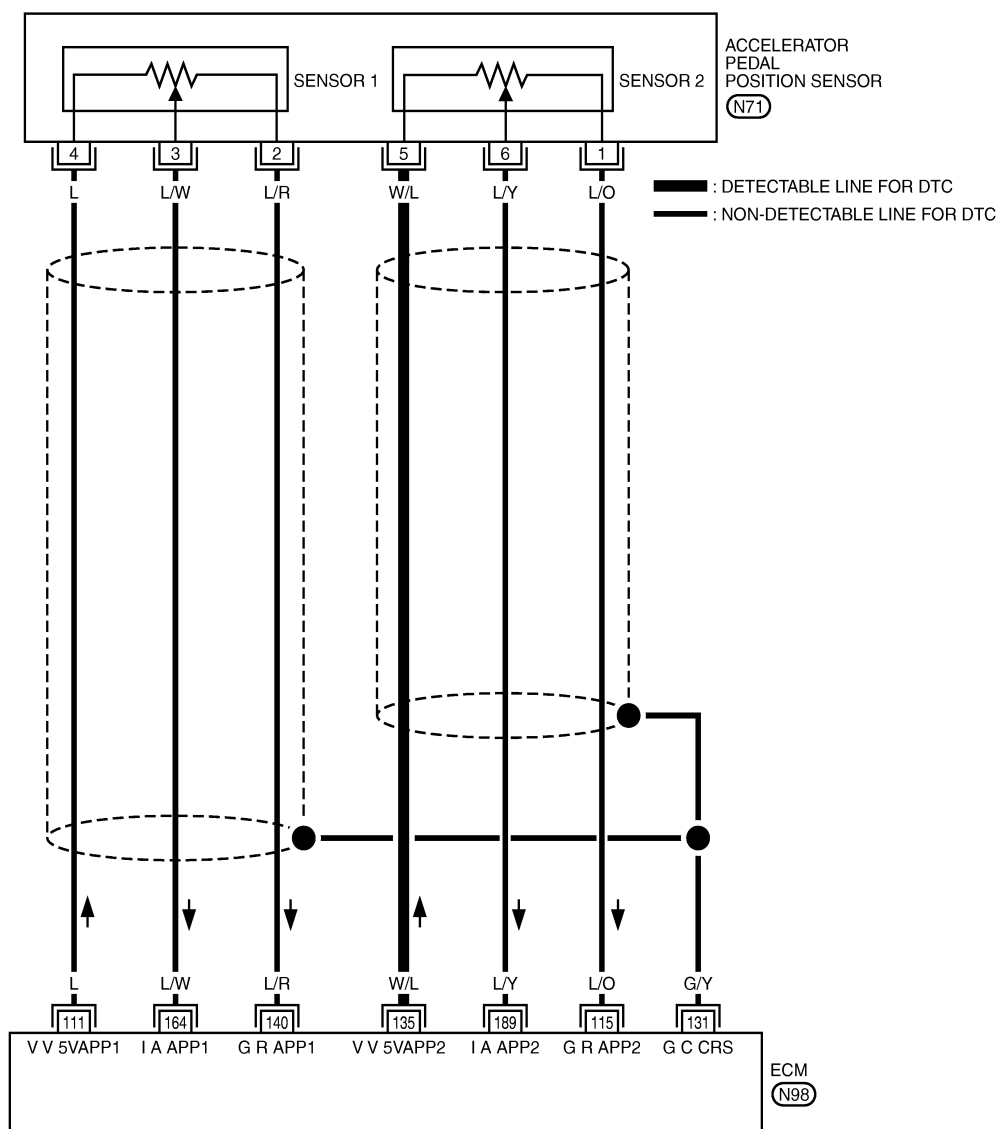
YES >> INSPECTION END

NO >> Go to [EC-176, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000004942287

EC-SEN3PW-01



124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101
148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125
172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156	155	154	153	152	151	150	149
196	195	194	193	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176	175	174	173



JMBWA0094GB

INFOID:000000004942288

Diagnosis Procedure

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection C12. Refer to [EC-58, "Ground Inspection"](#).

Is the inspection result normal?

< COMPONENT DIAGNOSIS >

[ZD]

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

2.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
N71	5	Ground	Approx. 5 V

Is the inspection result normal?

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

3.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness for short to ground and short to power between APP sensor harness connector and ECM harness connector.

APP sensor		ECM	
Connector	Terminal	Connector	Terminal
N71	5	N98	135

Is the inspection result normal?

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

4.CHECK APP SENSOR

Refer to [EC-99, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 5.
NO >> Replace accelerator pedal assembly.

5.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

Is the inspection result normal?

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

6.REPLACE ECM

1. Replace ECM.
2. Go to [EC-10, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"](#).

>> INSPECTION END

P1089 FUEL PUMP

< COMPONENT DIAGNOSIS >

[ZD]**P1089 FUEL PUMP****Description**

INFOID:000000004942289

The fuel pump is installed in the engine. Utilizing the revolutions of the engine via gears, the fuel pump discharges high-pressure fuel to the fuel rail. The fuel pressure is controlled by the ECM.

DTC Logic

INFOID:000000004942290

DTC DETECTION LOGIC**NOTE:**

If DTC P1089 (GST: P0089) is displayed with DTC P0651 (GST: P0652, P0653), first perform trouble diagnosis for DTC P0651 (GST: P0652, P0653). Refer to [EC-171, "DTC Logic"](#).

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P1089	1	P0089	Fuel pump performance	Fuel pressure is lower than the target value.	• Fuel pump • Fuel injector • Air mixture with fuel • Lack of fuel • Fuel rail pressure sensor • Fuel rail pressure relief valve

DTC CONFIRMATION PROCEDURE**1. PRECONDITIONING**

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

- Start engine and warm it up to normal operating temperature.
- Let engine idle for at least 5 seconds.
- Erase DTC.

Is DTC erased?

YES >> INSPECTION END
 NO >> Go to [EC-178, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000004942291

1. CHECK FUEL RAIL PRESSURE SENSOR

Refer to [EC-104, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 2.
 NO >> Replace fuel rail.

2. CHECK FUEL INJECTOR

Refer to [EC-109, "Component Inspection"](#).

Is the inspection result normal?

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

3. REPLACE FUEL INJECTOR

- Replace malfunctioning fuel injector

P1089 FUEL PUMP

< COMPONENT DIAGNOSIS >

[ZD]

2. Perform INJECTOR ADJUSTMENT VALUE REGISTRATION. Refer to [EC-11. "INJECTOR ADJUSTMENT VALUE REGISTRATION : Special Repair Requirement"](#).

>> INSPECTION END

4.CHECK FUEL PUMPRefer to [EC-179. "Component Inspection"](#).Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace fuel pump.

5.CHECK FUEL RAIL PRESSURE RELIEF VALVERefer to [EC-69. "Component Inspection"](#).Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace fuel rail.

6.CHECK INTERMITTENT INCIDENTRefer to [EC-54. "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:0000000004942292

1.CHECK FUEL PUMP

1. Turn ignition switch OFF
2. Disconnect fuel pump harness connector.
3. Check the resistance between fuel pump terminals as per the following items.

Terminals	Resistance
1 and 2	2.6 – 3.5Ω [at 20 – 40°C (68 – 104°F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace fuel pump.

P1090 FUEL PUMP

< COMPONENT DIAGNOSIS >

[ZD]**P1090 FUEL PUMP****Description**

INFOID:000000004942293

The fuel pump is installed in the engine. Utilizing the revolutions of the engine via gears, the fuel pump discharges high-pressure fuel to the fuel rail. The fuel pressure is controlled by the ECM.

DTC Logic

INFOID:000000004942294

DTC DETECTION LOGIC**NOTE:**

If DTC P1090 (GST: P0089) is displayed with DTC P0651 (GST: P0652, P0653), first perform trouble diagnosis for DTC P0651 (GST: P0652,P0653). Refer to [EC-171, "DTC Logic"](#).

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P1090	1	P0089	Fuel pump performance	Fuel pressure is higher than the target value.	• Fuel pump • Fuel rail pressure sensor

DTC CONFIRMATION PROCEDURE**1. PRECONDITIONING**

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Let engine idle for at least 10 seconds.
3. Erase DTC.

Is DTC erased?

YES >> INSPECTION END
 NO >> Go to [EC-180, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000004942295

1. CHECK FUEL PUMP

Refer to [EC-181, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 2.
 NO >> Replace fuel pump.

2. CHECK FUEL RAIL PRESSURE SENSOR

Refer to [EC-104, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 3.
 NO >> Replace fuel rail.

3. CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

< COMPONENT DIAGNOSIS >

[ZD]**Component Inspection**

INFOID:000000004942296

1.CHECK FUEL PUMP

1. Turn ignition switch OFF
2. Disconnect fuel pump harness connector.
3. Check the resistance between fuel pump terminals as per the following items.

Terminals	Resistance
1 and 2	2.6 – 3.5Ω [at 20 – 40°C (68 – 104°F)]

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Replace fuel pump.

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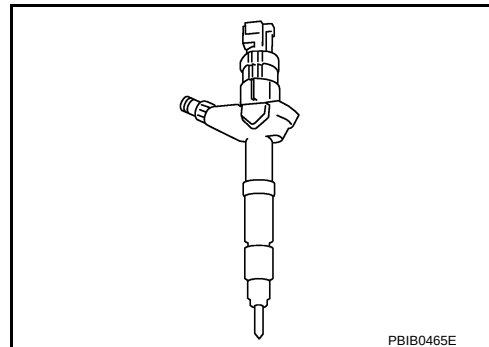
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P1276, P1277 FUEL INJECTOR

Description

INFOID:000000004942297

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. 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.



DTC Logic

INFOID:000000004942298

DTC DETECTION LOGIC

DTC No.		GST	Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III					
	ID FLAG				
P1276	1	P1276	No. 1 or 4 cylinder fuel injector circuit low input	ECM detects the No.1 or 4 cylinder fuel injector circuit is short to ground.	• Harness or connectors (The fuel injector circuit is shorted.) • Fuel injector
P1277	1	P1277	No. 2 or 3 cylinder fuel injector circuit low input	ECM detects the No. 2 or 3 cylinder fuel injector circuit is short to ground.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm the ambient temperature is more than -20°C (-4°F).

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
2. Erase DTC.

Is DTC erased?

YES >> INSPECTION END

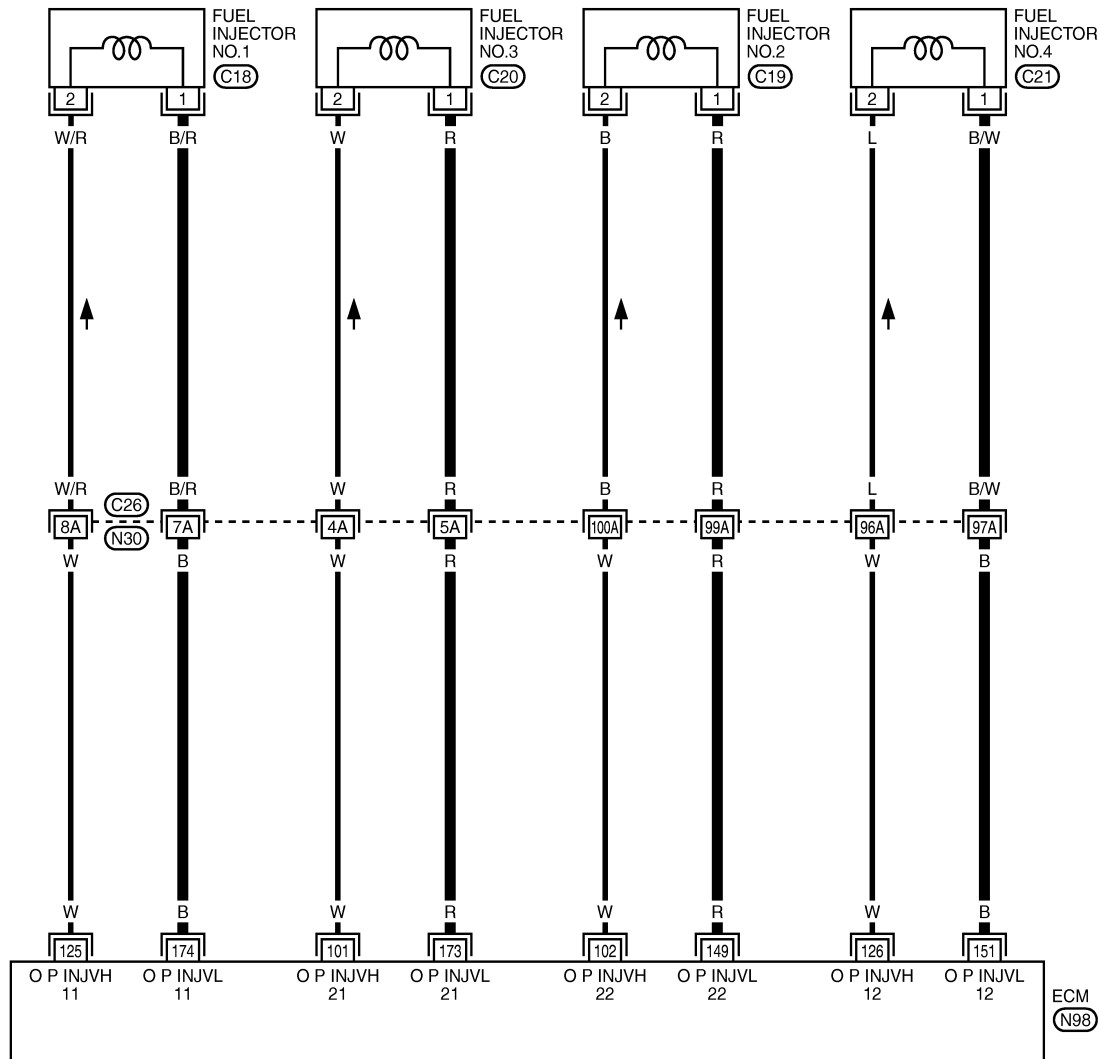
NO >> Go to [EC-183, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000004942299

EC-INJEC3-01

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



124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101
148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125
172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156	155	154	153	152	151	150	149
196	195	194	193	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176	175	174	173

(N98)
B



(2) 1 (C18), (C19), (C20), (C21)
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REFER TO THE FOLLOWING.

(C26) - SUPER MULTIPLE JUNCTION (SMJ)

MBWA1889E

Diagnosis Procedure

INFOID:000000004942300

1. CHECK FUEL INJECTOR OUTPUT SIGNAL CIRCUIT FOR SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.

< COMPONENT DIAGNOSIS >

4. Check the short to ground and short to power between fuel injector harness connector and ECM harness connector.

DTC	Fuel injector			ECM	
	Cylinder	Connector	Terminal	Connector	Terminal
P1276	1	C18	1	N98	174
	4	C21	1		151
P1277	2	C19	1		149
	3	C20	1		173

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors N30, C26
- Harness for short between fuel injector and ECM

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

3.CHECK FUEL INJECTOR

Refer to [EC-184, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.REPLACE FUEL INJECTOR

1. Replace malfunctioning fuel injector.
2. Perform INJECTOR ADJUSTMENT VALUE REGISTRATION. Refer to [EC-11, "INJECTOR ADJUSTMENT VALUE REGISTRATION : Special Repair Requirement"](#).

>> INSPECTION END

5.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:000000004942301

1.CHECK FUEL INJECTOR

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Check resistance between fuel injector terminals as per the following items.

Terminal	Resistance
1 and 2	0.2 - 0.3 Ω [at 20 - 70°C (68 - 158 °F)]

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.REPLACE FUEL INJECTOR

1. Replace malfunctioning fuel injector.

<https://truckmanualshub.com/>
P1276, P1277 FUEL INJECTOR

< COMPONENT DIAGNOSIS >

[ZD]

2. Perform INJECTOR ADJUSTMENT VALUE REGISTRATION. Refer to [EC-11. "INJECTOR ADJUSTMENT VALUE REGISTRATION : Special Repair Requirement"](#).

>> INSPECTION END

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P1409 EGR FUNCTION

DTC Logic

INFOID:000000004942302

DTC DETECTION LOGIC

NOTE:

If DTC P1409 is displayed with DTC P0651 (GST: P0652, P0653), first perform the trouble diagnosis for DTC P0651 (GST: P0652, P0653). Refer to [EC-171, "DTC Logic"](#).

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P1409	1	P1409	EGR volume control valve position learning error	ECM detect the non-permissible relation between the memorized voltage and the full closed position voltage.	• Harness or connectors (The sensor circuit is open or shorted.) • EGR volume control valve control position sensor • EGR volume control valve stuck

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Turn ignition switch ON.
4. Erase DTC.

Is DTC erased?

- YES >> INSPECTION END
NO >> Go to [EC-186, "Diagnosis Procedure"](#).

Diagnosis Procedure

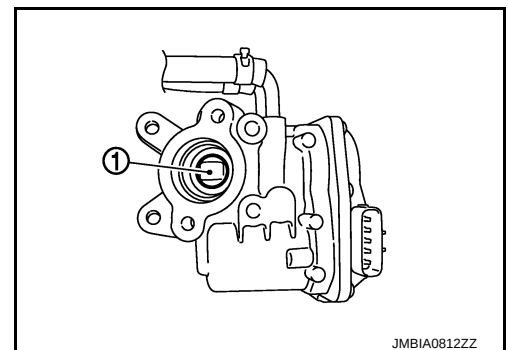
INFOID:000000004942303

1. CHECK EGR VOLUME CONTROL VALVE VISUALLY

1. Remove the EGR volume control valve. Refer to [EM-19, "Removal and Installation"](#).
2. Check that no foreign matter is caught between the EGR volume control valve (1) and the housing.

Is the inspection result normal?

- YES >> GO TO 2.
NO >> Remove the foreign matter and clean the EGR volume control valve.



2. REPLACE EGR VOLUME CONTROL VALVE

1. Replace the EGR volume control valve.
2. Perform "EGR volume control valve closed position learning value clear" [EC-12, "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING VALUE CLEAR : Special Repair Requirement"](#).

< COMPONENT DIAGNOSIS >

[ZD]

3. Perform "EGR volume control valve closed position learning"[EC-12. "EGR VOLUME CONTROL VALVE CLOSED POSITION LEARNING : Special Repair Requirement"](#).

>> INSPECTION END

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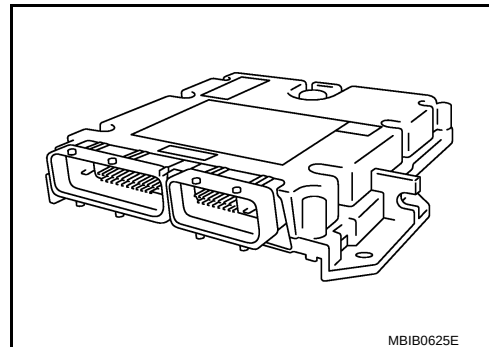
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P

P1603 ECM**Description**

INFOID:000000004942304

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



MBIB0625E

DTC Logic

INFOID:000000004942305

DTC DETECTION LOGIC

DTC No.		GST	Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III	ID FLAG				
P1603	2 4	P0603	Engine control module (ROM)	ECM ROM is malfunctioning.	• ECM

DTC CONFIRMATION PROCEDURE**1. PRECONDITIONING**

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 seconds.
2. Turn ignition switch OFF and wait at least 30 seconds.
3. Turn ignition switch ON.
4. Erase DTC.

Is DTC erased?

YES >> INSPECTION END

NO >> Go to [EC-188, "Diagnosis Procedure"](#).**Diagnosis Procedure**

INFOID:000000004942306

1. PERFORM DTC CONFIRMATION PROCEDURE

1. Perform DTC confirmation procedure. Refer to [EC-188, "DTC Logic"](#).
2. Erase DTC.

Is DTC erased?

YES >> INSPECTION END

NO >> GO TO 2.

2. REPLACE ECM

1. Replace ECM.
2. Go to [EC-10, "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"](#).

< COMPONENT DIAGNOSIS >

[ZD]

>> INSPECTION END

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P1625 INJECTOR ADJUSTMENT VALUE

< COMPONENT DIAGNOSIS >

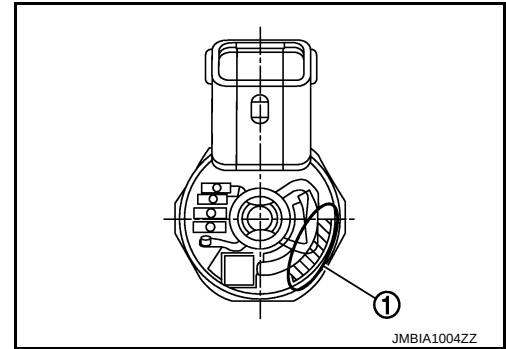
[ZD]**P1625 INJECTOR ADJUSTMENT VALUE****Description**

INFOID:000000004942307

Injector adjustment value (1) indicates manufacturing tolerance and the value is printed on the top of fuel injector (Example: C1TGMA). The injector adjustment value which is correctly stored in ECM is needed for precise fuel injection control.

A performance of emission control and a drivability may effect when there is a mismatch between the following two values.

- The injector adjustment value stored in ECM
- The injector adjustment value of the fuel injector which is installed on the vehicle

**DTC Logic**

INFOID:000000004942308

DTC DETECTION LOGIC

DTC No.		GST	Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III					
	ID FLAG				
P1625	4	P1625	Injector adjustment value data uninput	Injector adjustment value is not stored in ECM.	Injector adjustment value (Injector adjustment value is not written onto ECM memo-ry yet.)

DTC CONFIRMATION PROCEDURE**1. PRECONDITIONING**

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC erased?

YES >> INSPECTION END

NO >> Go to [EC-190, "Diagnosis Procedure"](#).**Diagnosis Procedure**

INFOID:000000004942309

1. PERFORM INJECTOR ADJUSTMENT VALUE REGISTRATION

Perform INJECTOR ADJUSTMENT VALUE REGISTRATION. Refer to [EC-11, "INJECTOR ADJUSTMENT VALUE REGISTRATION : Special Repair Requirement"](#).

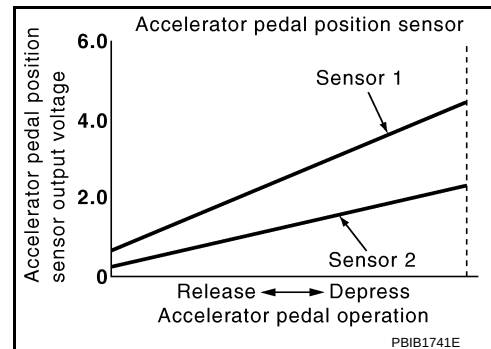
>> INSPECTION END

P2135 APP SENSOR

Description

INFOID:000000004942310

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.



DTC Logic

INFOID:000000004942311

DTC DETECTION LOGIC

NOTE:

- If DTC P2135 is displayed with DTC P0641 (GST: P0642, P0643), first perform the trouble diagnosis for DTC P0641 (GST: P0642, P0643). Refer to [EC-168, "DTC Logic"](#).
- If DTC P2135 is displayed with DTC P0697 (GST: P0698, P0699), first perform the trouble diagnosis for DTC P0697 (GST: P0698, P0699). Refer to [EC-175, "DTC Logic"](#).

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P2135	8	P2135	Accelerator pedal position sensor 1, 2 signal correlation	The correlation between APP sensor 1 signal and APP sensor 2 signal is out of the normal range.	• Harness or connectors (The APP sensor 1 or 2 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

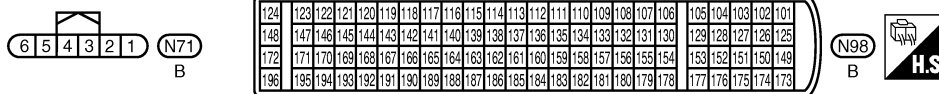
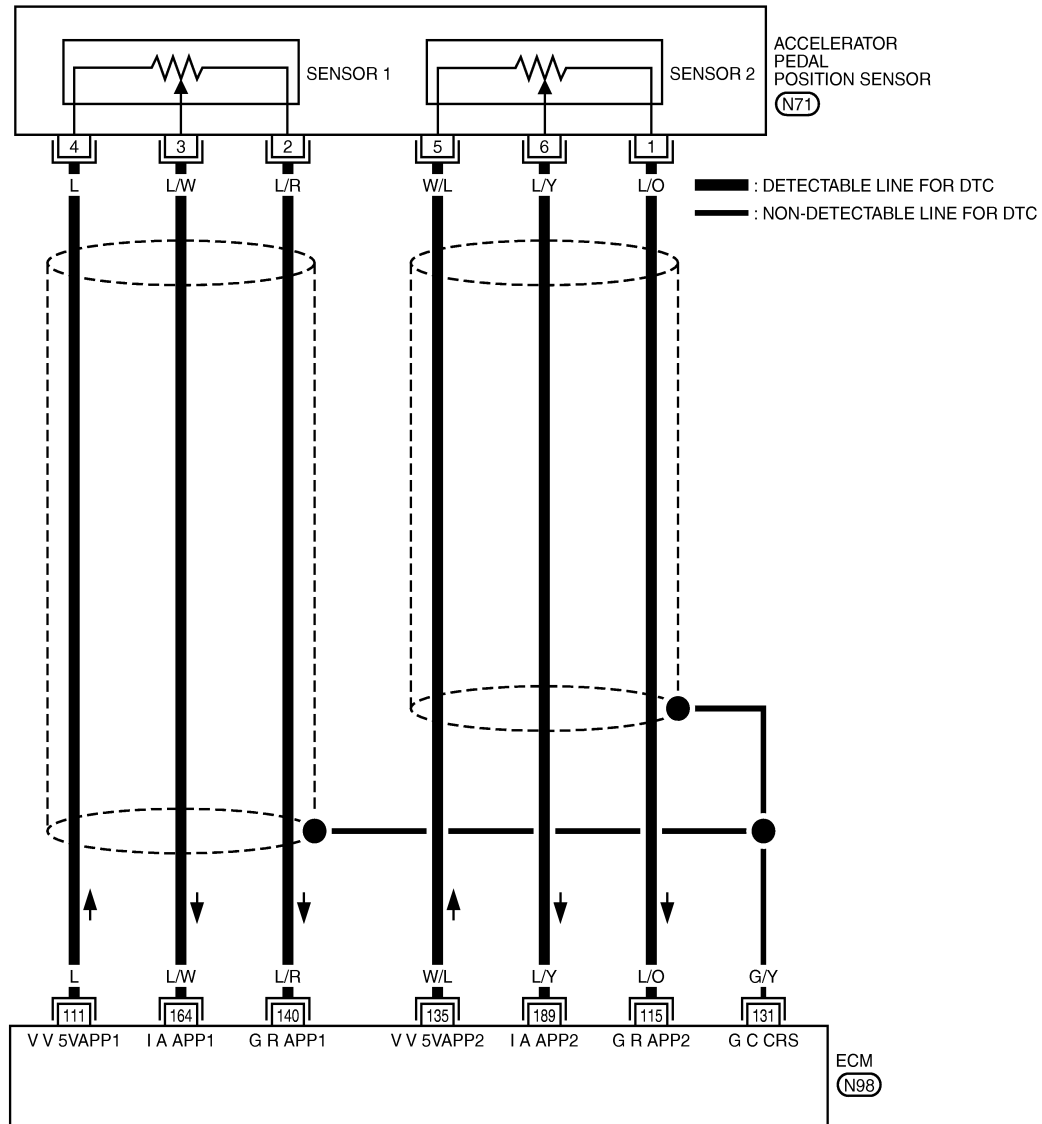
Is DTC erased?

- YES >> INSPECTION END
NO >> Go to [EC-192, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000004942312

EC-APPS3-01



MBWA1730E

INFOID:000000004942313

Diagnosis Procedure

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection C12. Refer to [EC-58, "Ground Inspection"](#).

Is the inspection result normal?

< COMPONENT DIAGNOSIS >

[ZD]

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

2.CHECK APP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between APP sensor harness connector and ground.

APP sensor		Ground	Voltage
Connector	Terminal		
N71	4	Ground	Approx. 5 V
	5		

Is the inspection result normal?

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

3.CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
N71	1	N98	115	Existed
	2		140	

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

Is the inspection result normal?

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

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

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

APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
N71	3	N98	164	Existed
	6		189	

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

Is the inspection result normal?

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

5.CHECK APP SENSOR

Refer to [EC-194, "Component Inspection"](#).

Is the inspection result normal?

- YES >> GO TO 6.
 NO >> Replace accelerator pedal assembly.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:000000004942314

1. CHECK ACCELERATOR PEDAL POSITION SENSOR

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

ECM			Condition		Voltage
Connector	+	-			
	Terminal	Terminal			
N98	164 (APP sensor 1 signal)	140	Accelerator pedal	Fully released	0.6 – 0.9 V
				Fully depressed	3.9 – 4.7 V
	189 (APP sensor 2 signal)	115		Fully released	0.3 – 0.6 V
				Fully depressed	1.95 – 2.40 V

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Replace accelerator pedal assembly.

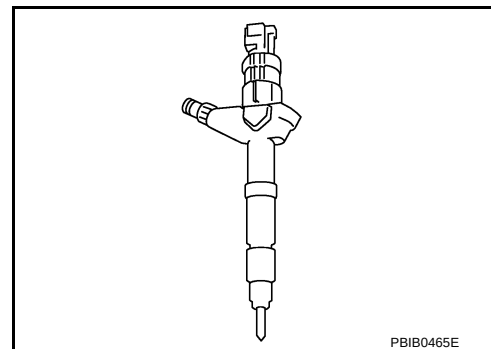
P2146, P2149 FUEL INJECTOR POWER SUPPLY

< COMPONENT DIAGNOSIS >

[ZD]**P2146, P2149 FUEL INJECTOR POWER SUPPLY****Description**

INFOID:000000004942315

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. 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.

**DTC Logic**

INFOID:000000004942316

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P2146	1	P2146	No.1 and 4 cylinder fuel injector power supply circuit high or low input	ECM detects the No.1 or 4 cylinder fuel injector power supply circuit is shorted.	• Harness or connectors (The fuel injector circuit is open or shorted.) • Fuel injector
	8	P0200	Fuel injector power supply circuit open or shorted	ECM detects the fuel injector power supply circuit is open or shorted.	
P2149	1	P2149	No. 2 and 3 cylinder fuel injector power supply circuit high or low input	ECM detects the No.2 or 3 cylinder fuel injector power supply circuit is shorted.	
	8	P0200	Fuel injector power supply circuit open or shorted	ECM detects the fuel injector power supply circuit is open or shorted.	

DTC CONFIRMATION PROCEDURE**1.PRECONDITIONING**

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
2. Erase DTC.

Is DTC erased?

- YES >> INSPECTION END
 NO >> Go to [EC-196, "Diagnosis Procedure"](#).

P2146, P2149 FUEL INJECTOR POWER SUPPLY

[ZD]

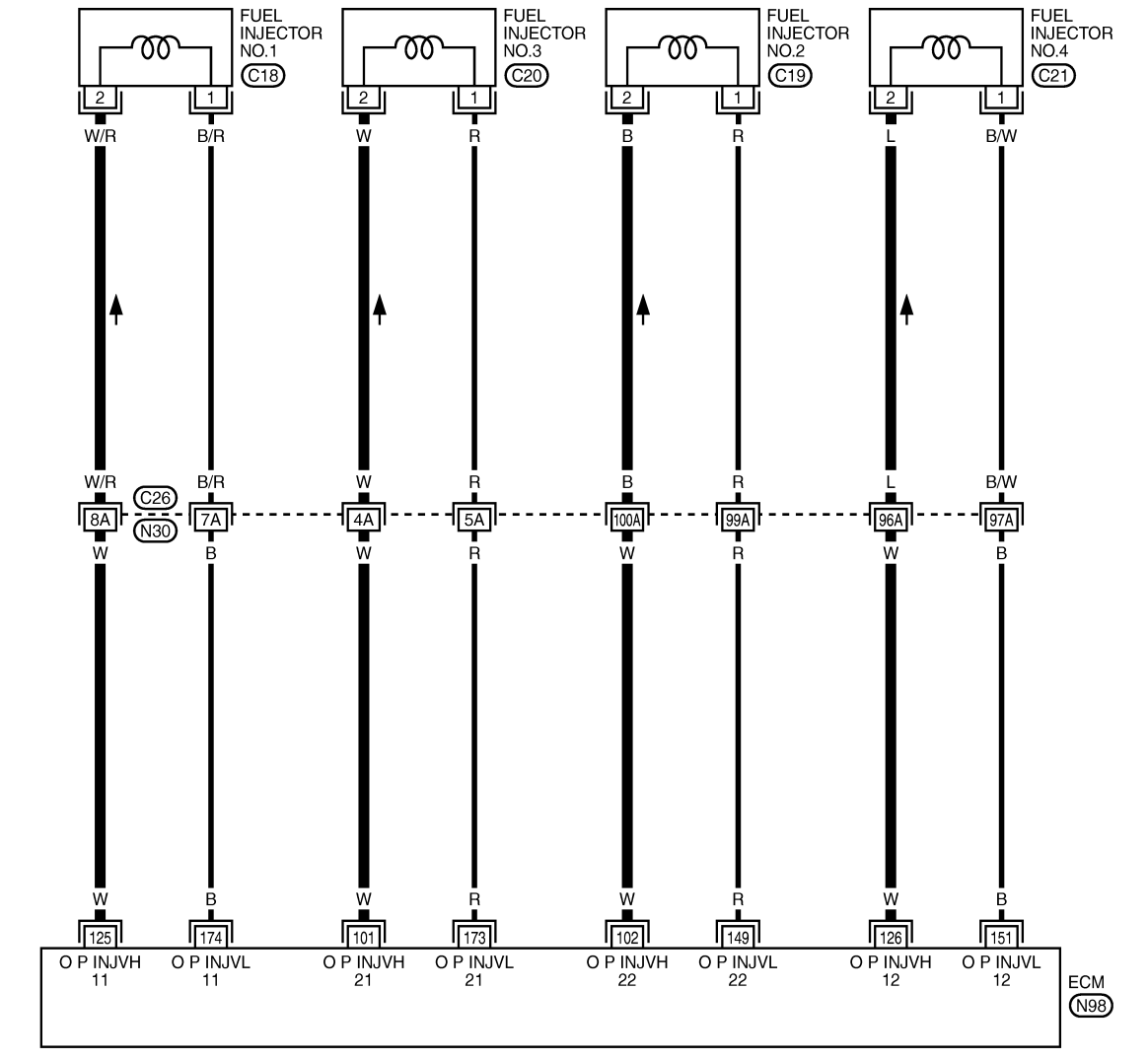
< COMPONENT DIAGNOSIS >

Wiring Diagram

INFOID:000000004942317

EC-INJEC2-01

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



124	123	122	121	120	119	118	117	116	115	114	113	112	111	110	109	108	107	106	105	104	103	102	101
148	147	146	145	144	143	142	141	140	139	138	137	136	135	134	133	132	131	130	129	128	127	126	125
172	171	170	169	168	167	166	165	164	163	162	161	160	159	158	157	156	155	154	153	152	151	150	149
196	195	194	193	192	191	190	189	188	187	186	185	184	183	182	181	180	179	178	177	176	175	174	173

(N98)
B



(2) 1 (C18) (C19) (C20) (C21)
B B B B

REFER TO THE FOLLOWING.

(C26) - SUPER MULTIPLE JUNCTION (SMJ)

MBWA1894E

Diagnosis Procedure

INFOID:000000004942318

1. CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.

P2146, P2149 FUEL INJECTOR POWER SUPPLY

< COMPONENT DIAGNOSIS >

[ZD]

4. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	C18	2	N98	125	Existed
2	C19	2		102	
3	C20	2		101	
4	C21	2		126	

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

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector N30, C26
- Harness for open and short between fuel injector and ECM

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

3.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT FOR SHORT

Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	C18	2	N98	101	Not existed
				102	
				126	
				149	
				151	
				173	
2	C19	2	N98	174	Not existed
				101	
				125	
				126	
				149	
				151	
3	C20	2	N98	173	Not existed
				174	
				102	
				125	
				126	
				149	

P2146, P2149 FUEL INJECTOR POWER SUPPLY

< COMPONENT DIAGNOSIS >

[ZD]

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
4	C21	2	N98	101	Not existed
				102	
				125	
				149	
				151	
				173	
				174	

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 4.

4.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector N30, C26
- Harness for short between fuel injector and ECM

>> Repair short circuit in harness or connectors.

5.CHECK INTERMITTENT INCIDENTRefer to [EC-54, "Description"](#).

>> INSPECTION END

P2226 BARO SENSOR

Description

INFOID:000000004942319

The barometric pressure sensor is built into ECM. The sensor detects ambient barometric pressure and sends the voltage signal to the microcomputer.

DTC Logic

INFOID:000000004942320

DTC DETECTION LOGIC

DTC No.			Trouble diagnosis name	DTC detecting condition	Possible cause
CONSULT-III		GST			
	ID FLAG				
P2226	1	P2229	Barometric pressure sensor circuit high input	An excessively high voltage from the barometric pressure sensor (built-into ECM) is sent to ECM.	• ECM
	2	P2228	Barometric pressure sensor circuit low input	An excessively low voltage from the barometric pressure sensor (built-into ECM) is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure is previously conducted, always turn ignition switch OFF and wait at least 30 seconds before conducting the next test.

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC erased?

YES >> INSPECTION END
NO >> Go to [EC-199. "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000004942321

1. INSPECTION START

1. Perform DTC confirmation procedure. Refer to [EC-199. "DTC Logic"](#).
2. Erase DTC.

Is DTC erased?

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

2. REPLACE ECM

1. Replace ECM.
2. Go to [EC-10. "ADDITIONAL SERVICE WHEN REPLACING CONTROL UNIT : Special Repair Requirement"](#).

>> INSPECTION END

CLUTCH PEDAL POSITION SWITCH

Description

INFOID:000000004942322

Clutch pedal position switch signal is applied to the ECM through the clutch pedal position switch when the clutch pedal is depressed.

Component Function Check

INFOID:000000004942323

1. CHECK FOR CLUTCH PEDAL POSITION SWITCH FUNCTION

With CONSULT-III

1. Turn ignition switch ON.
2. Select "CLUTCH SW" in "DATA MONITOR" mode with CONSULT-III.
3. Check "CLUTCH SW" indication under the following conditions.

Monitor item	Condition		Indication
CLUTCH SW	Clutch pedal	Slightly depressed	ON
		Fully released	OFF

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector the following conditions.

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
N99	207	202	Clutch pedal	Battery voltage
				Approx. 0 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Refer to [EC-201, "Diagnosis Procedure"](#).

CLUTCH PEDAL POSITION SWITCH

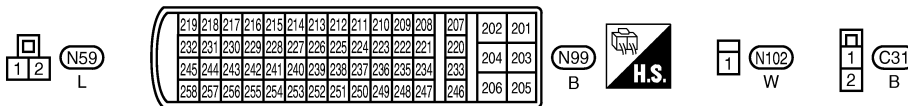
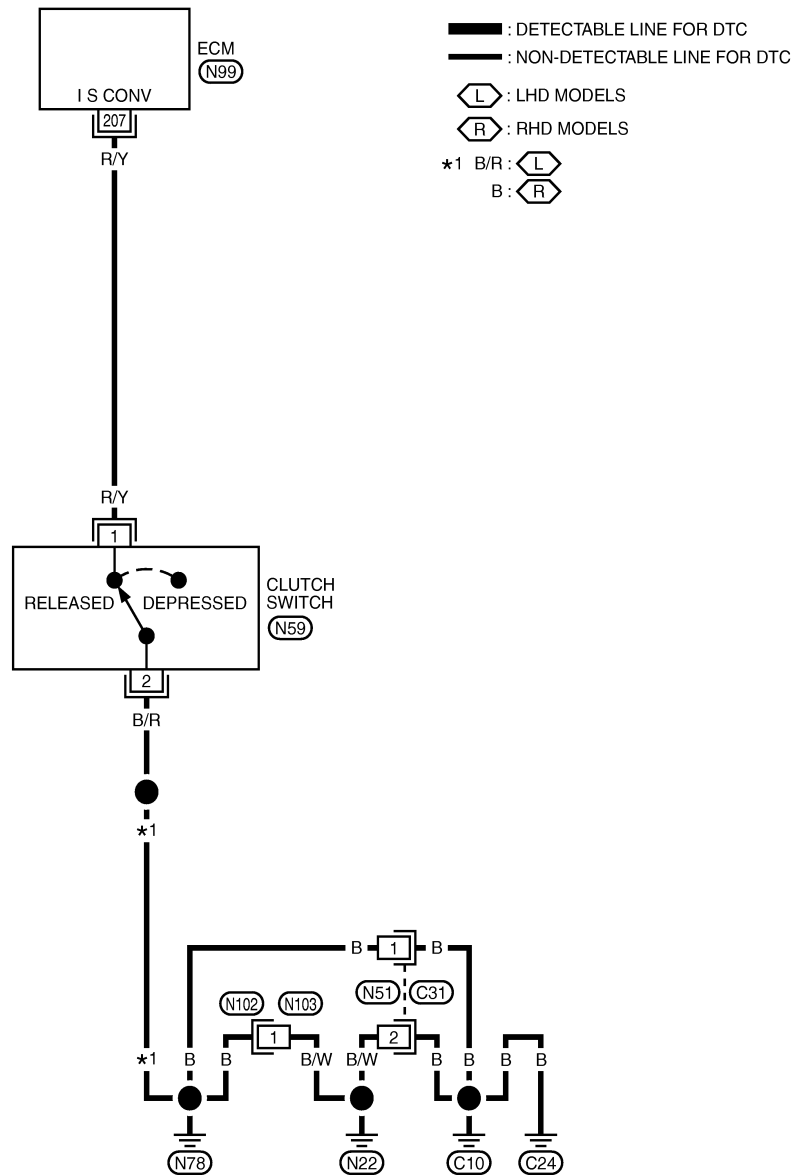
< COMPONENT DIAGNOSIS >

[ZD]

Wiring Diagram

INFOID:000000004942324

EC-CL/SW-01



JMBWA0100GB

Diagnosis Procedure

INFOID:000000004942325

1. CHECK CLUTCH PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect clutch pedal position switch harness connector.
3. Disconnect ECM harness connector.

https://truckmanualshub.com/

CLUTCH PEDAL POSITION SWITCH

< COMPONENT DIAGNOSIS >

[ZD]

4. Check the continuity between clutch pedal position switch harness connector and ECM harness connector.

Clutch pedal position switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
N59	1	N99	207	Existed

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

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

2.CHECK CLUTCH PEDAL POSITION SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between clutch pedal position switch harness connector and ECM harness connector.

Clutch pedal position switch		Ground	Continuity
Connector	Terminal		
N59	2	Ground	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors N51, C131
- Harness connectors N102, N103
- Harness for open and short between clutch pedal position switch and ground

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

4.CHECK CLUTCH PEDAL POSITION SWITCH

Refer to [EC-202, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace clutch pedal assembly.

5.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:000000004942326

1.CHECK CLUTCH PEDAL POSITION SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect clutch pedal position switch harness connector
3. Check the continuity between clutch pedal position switch terminal under the following conditions.

Terminal	Condition		Continuity
1 and 2	Clutch pedal	Slightly depressed	Not existed
		Fully released	Existed

Is the inspection result normal?

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CLUTCH PEDAL POSITION SWITCH

< COMPONENT DIAGNOSIS >

[ZD]

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK CLUTCH PEDAL POSITION SWITCH-II

1. Adjust clutch pedal position switch installation. Refer to [CL-6. "On-Vehicle Inspection and Adjustment"](#).
2. Check the continuity between clutch pedal position switch terminals under the following conditions.

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace clutch pedal assembly.

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GLOW INDICATOR

Description

INFOID:000000004942327

The glow indicator is located in the combination meter. When the glow relay is in the ON position in the pre-plow mode, the glow indicator turns ON for a certain period of time depending on the engine coolant temperature.

Component Function Check

INFOID:000000004942328

1.CHECK GLOW INDICATOR LAMP OPERATION

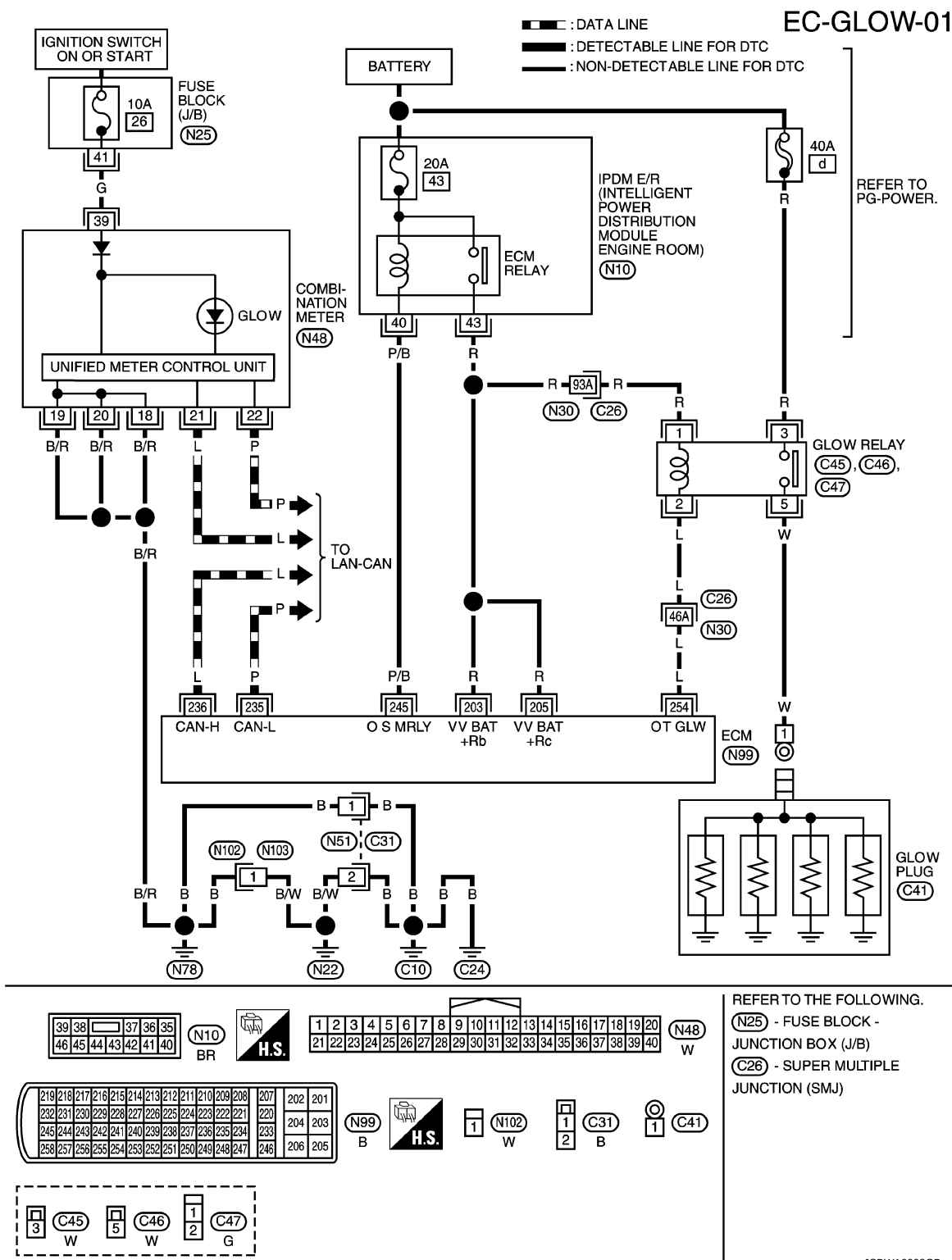
1. Turn ignition switch ON.
2. Check that glow indicator lamp is turned ON, and then glow indication lamp turned OFF.

Is the inspection result normal?

- YES >> INSPECTION END
NO >> Go to [EC-205, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000004942329



GLOW INDICATOR

[ZD]

< COMPONENT DIAGNOSIS >

YES >> GO TO 2.

NO >> Perform trouble diagnoses for DTC U1001. Refer to [EC-60, "Diagnosis Procedure"](#).

2.CHECK COMBINATON METER OPERATION

Refer to [DI-15, "Trouble Diagnosis"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Repair or replace.

3.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

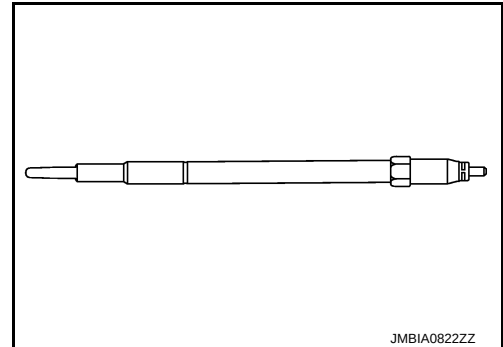
GLOW PLUG**[ZD]**

< COMPONENT DIAGNOSIS >

GLOW PLUG**Description**

INFOID:000000004942331

The glow plug is provided with a metallic heating element to obtain a high-temperature resistance. It glows in response to a signal sent from the ECM, allowing current to flow through the glow plug via the glow relay.



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Component Function Check

INFOID:000000004942332

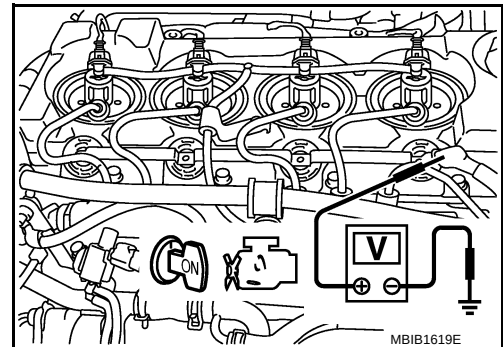
1. CHECK GLOW PLUG OVERALL FUNCTION**Ⓐ With CONSULT-III**

1. Turn ignition switch ON.
2. Select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-III.
3. Confirm that "COOLAN TEMP/S" indicates less than 25°C (77°F). If NG, cool down engine.
4. Turn ignition switch OFF and wait at least 30 seconds.
5. Turn ignition switch ON.
6. Check the voltage between glow plug and ground the following conditions.

Condition	Voltage
For a few seconds after turning ignition switch ON	Battery voltage
More than a few seconds after turning ignition switch ON	Approx. 0 V

Ⓑ Without CONSULT-III

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



ECM			Voltage
Connector	+	-	
	Terminal	Terminal	
N98	185 (Engine coolant temperature sensor signal)	159	More than 3.3

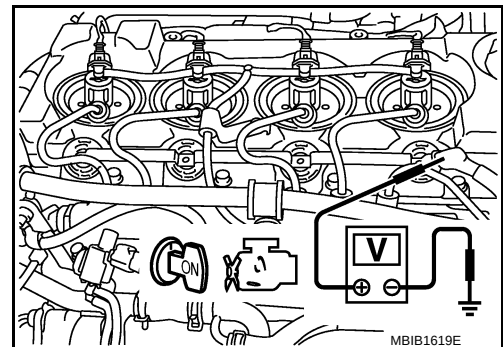
Confirm that the voltage indicates approximately 3.3 V. If NG, cool down engine.

3. Turn ignition switch OFF and wait at least 30 seconds.
4. Turn ignition switch ON.
5. Check the voltage between glow plug and ground the following conditions.

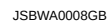
Condition	Voltage
For a few seconds after turning ignition switch ON	Battery voltage
More than a few seconds after turning ignition switch ON	Approx. 0 V

Is the inspection result normal?

- YES >> INSPECTION END
 NO >> Refer to [EC-208, "Diagnosis Procedure"](#).



Wiring Diagram



INFOID:0000000004942334

EC-208

GLOW PLUG**[ZD]**

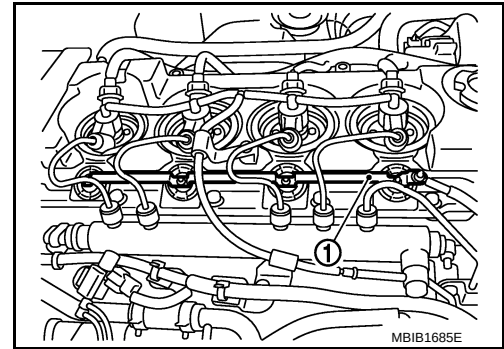
< COMPONENT DIAGNOSIS >

Check glow plate (1) and glow plug nut connections.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace connection.

**2.CHECK GLOW RELAY POWER SUPPLY CIRCUIT**

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

Glow relay		Ground	Voltage
Connector	Terminal		
C47	1	Ground	Battery voltage
C45	3		

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- 40 A fusible link (Letter d)
- Harness connector N30, C26
- Harness for open and short between glow relay and battery
- Harness for open and short between glow relay and ECM
- Harness for open and short between glow relay and IPDM E/R

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

4.CHECK GLOW RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

Glow relay		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C47	2	N99	254	Existed

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

YES >> GO TO 6.

NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

- Harness connector N30, C26
- Harness for open and short between glow relay and ECM

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

GLOW PLUG

< COMPONENT DIAGNOSIS >

[ZD]**6.CHECK GLOW RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT**

1. Disconnect glow plug harness connector.
2. Check the continuity between glow relay harness connector and glow plug harness connector.

Glow relay		Glow plug		Continuity
Connector	Terminal	Connector	Terminal	
C46	5	C41	1	Existed

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

YES >> GO TO 7.

NO >> Check open circuit or short to ground or short to power in harness or connector.

7.CHECK GLOW RELAYRefer to [EC-210, "Component Inspection \(Glow Relay\)"](#).Is the inspection result normal?

YES >> GO TO 8.

NO >> Replace glow relay

8.CHECK GLOW PLUGRefer to [EC-210, "Component Inspection \(Glow Plug\)"](#).Is the inspection result normal?

YES >> GO TO 9.

NO >> Replace malfunctioning glow plug.

9.CHECK INTERMITTENT INCIDENTRefer to [EC-54, "Description"](#).

>> INSPECTION END

Component Inspection (Glow Relay)

INFOID:000000004942335

1.CHECK GLOW RELAY

1. Turn ignition switch OFF.
2. Disconnect glow relay.
3. Check continuity between glow relay terminals under the following conditions.

Terminal	Conditions	Continuity
3 and 5	12V direct current supply between terminals (1) and (2)	Yes
	No current supply	No

NOTE:

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

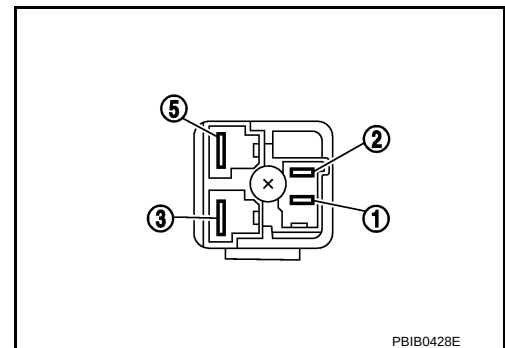
NO >> Replace glow relay.

Component Inspection (Glow Plug)

INFOID:000000004942336

1.CHECK GLOW PLUG

1. Turn ignition switch OFF.
2. Disconnect glow plate.



PBIB0428E

GLOW PLUG

[ZD]

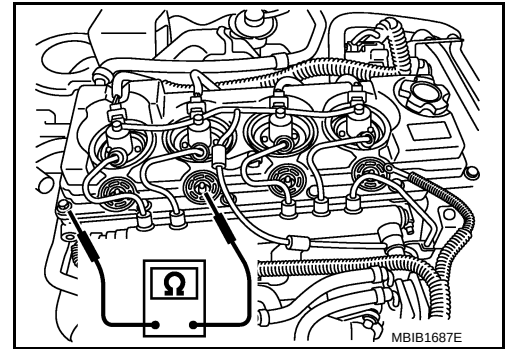
< COMPONENT DIAGNOSIS >

3. Check the resistance between glow plug and ground.

Glow plug		Ground	Resistance
Connector	Terminal		
C41	1	Ground	Approx. 0.8 Ω (at 25°C (77°F))

Is the inspection result normal?

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



2. REPLACE GLOW PLUG

Replace malfunctioning glow plug.

CAUTION:

- Never bump glow plug heating element. If it is bumped, replace glow plug with a new one.
- If glow plug is dropped from a height of 10 cm (3.94 in) or higher, replace with a new one.
- If glow plug installation hole is contaminated with carbon, remove it with a reamer or suitable tool.

>> INSPECTION END

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MALFUNCTION INDICATOR

< COMPONENT DIAGNOSIS >

[ZD]

MALFUNCTION INDICATOR

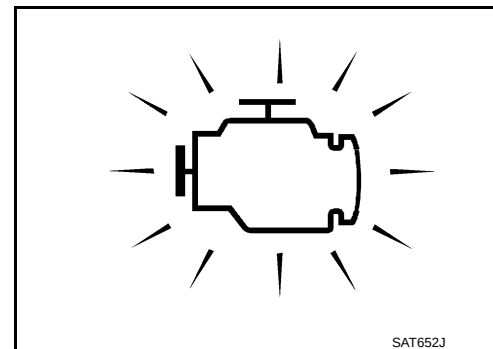
Description

INFOID:000000004942337

The Malfunction Indicator (MI) is located on the combination meter. The MI illuminates when the ignition switch is turned ON without the engine running. This is a bulb check.

When the engine is started, the MI should turn off. If the MI remains on, the on board diagnostic system has detected an engine system malfunction.

For details, refer to [EC-43. "Diagnosis Description"](#).



SAT652J

Component Function Check

INFOID:000000004942338

1. CHECK MI FUNCTION

1. Turn ignition switch ON.
2. Check that MI illuminates.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to [EC-213. "Diagnosis Procedure"](#).

INFOID:0000000004942339



JSBWA0009GB

INFOID:0000000004942340

Is the inspection result normal?

MALFUNCTION INDICATOR

[ZD]

< COMPONENT DIAGNOSIS >

YES >> GO TO 2.

NO >> Perform trouble diagnosis for DTC U1001. Refer to [EC-60, "Diagnosis Procedure"](#).

2.CHECK COMBINATION METER

Refer to [DI-15, "Trouble Diagnosis"](#).

Is the inspection result normal?

YES >> GO TO 3.

NO >> Replace combination meter.

3.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

PNP SWITCH

Description

INFOID:000000004942341

When the gear position is in Neutral, park/neutral position is ON. ECM detects the position because the continuity of the line (the ON signal) exists.

Component Function Check

INFOID:000000004942342

1.PERFORM COMPONENT FUNCTION CHECK

 With CONSULT-III

1. Turn ignition switch ON.
2. Select "P/N POSI SW" "DATA MONITOR" mode with CONSULT-III.
3. Check the "P/N POSI SW" signal under the following conditions.

Position (selector lever)	Indication
Neutral	ON
Except above	OFF

 Without CONSULT-III

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

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
N99	209	202	Selector lever position Neutral	Approx. 0 V
			Except above	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

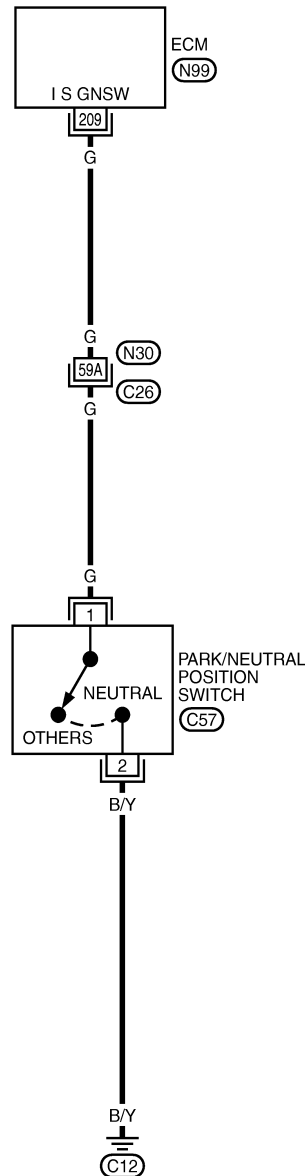
NO >> Go to [EC-216. "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000004942343

EC-PNP/SW-01

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



219	218	217	216	215	214	213	212	211	210	209	208	207	202	201
232	231	230	229	228	227	226	225	224	223	222	221	220	204	203
245	244	243	242	241	240	239	238	237	236	235	234	233	206	205
258	257	256	255	254	253	252	251	250	249	248	247	246		

(N99)
B



1
2
(C57)
B

REFER TO THE FOLLOWING.

(C26) - SUPER MULTIPLE
JUNCTION (SMJ)

MBWA1740E

Diagnosis Procedure

INFOID:000000004942344

1. CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.
3. Check the continuity between PNP switch harness connector and ground.

PNP SWITCH

< COMPONENT DIAGNOSIS >

[ZD]

PNP switch		Ground	Continuity
Connector	Terminal		
C57	2	Ground	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair open circuit or short to power in harness or connectors.

2.CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

PNP switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
C57	1	N99	209	Existed

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

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following

- Harness connector N30, C26
- Harness for open and short between ECM and PNP switch

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

4.CHECK PNP SWITCH

Refer to [EC-217, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 5.

NO >> Replace PNP switch.

5.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:000000004942345

1.CHECK PNP SWITCH

1. Turn ignition switch OFF.
2. Disconnect PNP switch harness connector.
3. Check the continuity between PNP switch terminal under the following conditions.

Terminal	Condition		Continuity
1 and 2	Selector lever position	Neutral	Existed
		Except above	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace PNP switch.

START SIGNAL

< COMPONENT DIAGNOSIS >

[ZD]**START SIGNAL****Description**

INFOID:000000004942347

When turning ignition switch to START position, the ignition switch transmits the start signal to the ECM. By this signal, the ECM activates the engine start control.

Component Function Check

INFOID:000000004942348

1.PERFORM COMPONENT FUNCTION CHECK**④ With CONSULT-III**

1. Turn ignition switch ON.
2. Check "START SIGNAL" in "DATA MONITOR" mode with CONSULT-III.
3. Check the "START SIGNAL" signal under the following conditions.

Condition	Indication
Ignition switch: ON	OFF
Ignition switch: START	ON

⑤ Without CONSULT-III

Check voltage between ECM harness connector and ground.

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
N98	192	202	Ignition switch: ON	Approx. 0 V
			Ignition switch: START	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END

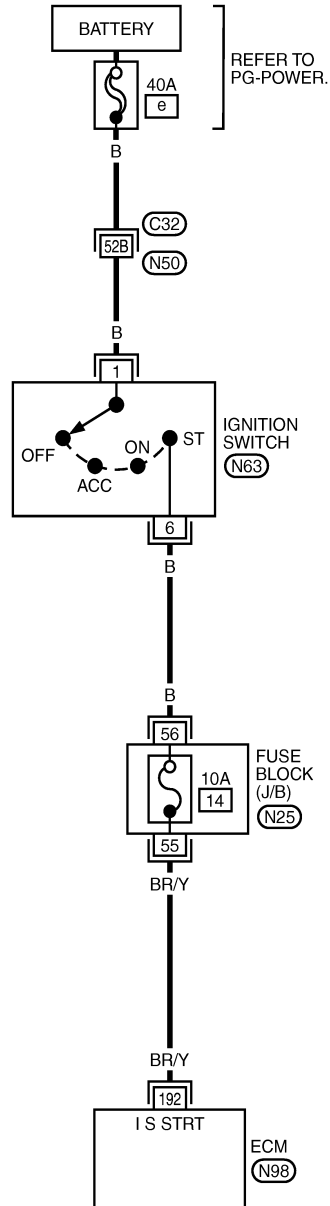
NO >> Go to [EC-219. "Diagnosis Procedure"](#).

START SIGNAL

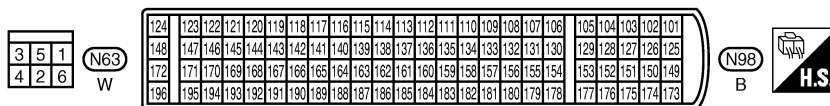
< COMPONENT DIAGNOSIS >

[ZD]**Wiring Diagram**

INFOID:000000004942349

EC-S/SIG-01

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



REFER TO THE FOLLOWING.

(N25) - FUSE BLOCK -
 JUNCTION BOX (J/B)
 (C32) - SUPER MULTIPLE
 JUNCTION (SMJ)

MBWA1749E

Diagnosis Procedure

INFOID:000000004942350

1. CHECK START SIGNAL INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

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

START SIGNAL

< COMPONENT DIAGNOSIS >

[ZD]

4. Check the continuity between ignition switch harness connector and ECM.

Ignition switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
N63	6	N98	192	Existed

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

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2.DETECT MALFUNCTIONING PART

Check the following.

- 10 A fuse (No.14)
- Fuse block (J/B)
- Harness for open and short between ECM and ignition switch

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

3.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

STOP LAMP SWITCH

Description

INFOID:000000004942351

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

Component Function Check

INFOID:000000004942352

1.PERFORM COMPONENT FUNCTION CHECK

With CONSULT-III

1. Turn ignition switch ON.
2. Select "BRAKE SW" in "DATA MONITOR" mode with CONSULT-III.
3. Check "BRAKE SW" signal under the following conditions.

Monitor item	Condition		Indication
BRAKE SW	Brake pedal	Slightly depressed	ON
		Fully released	OFF

Without CONSULT-III

1. Turn ignition switch ON.
2. Check the continuity between ECM harness connector terminals under the following conditions.

ECM			Condition	Voltage
Connector	+	-		
	Terminal	Terminal		
N99	221	202	Brake pedal	Battery voltage
			Fully released	Approx. 0 V

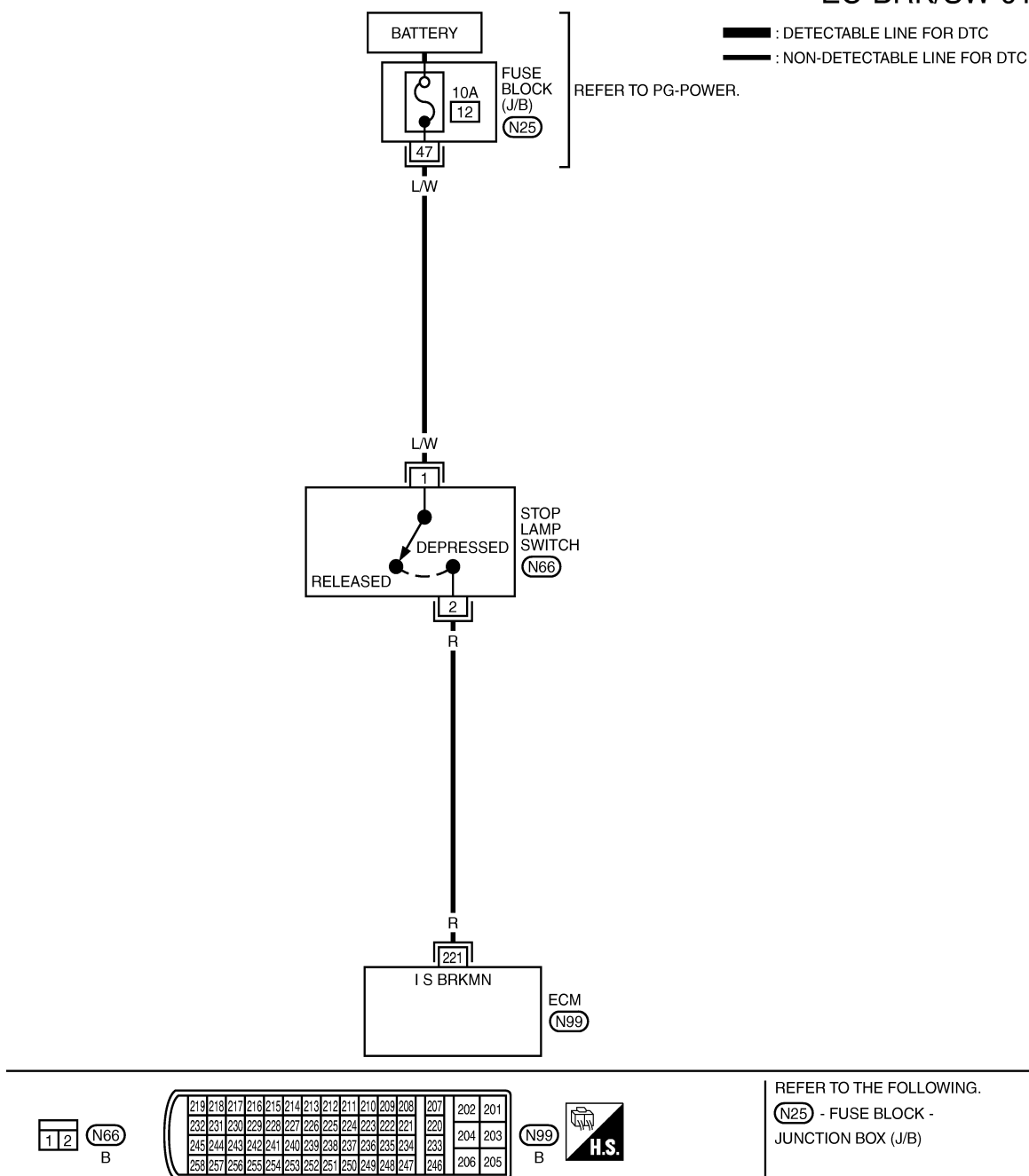
Is the inspection result normal?

- YES >> INSPECTION END
NO >> Go to [EC-222, "Diagnosis Procedure"](#).

Wiring Diagram

INFOID:000000004942353

EC-BRK/SW-01



MBWA1741E

Diagnosis Procedure

INFOID:000000004942354

1. CHECK STOP LAMP SWITCH CIRCUIT

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

Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch harness connector.
2. Check the voltage between stop lamp switch harness connector and ground.

Stop lamp switch		Ground	Voltage
Connector	Terminal		
N66	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.

NO >> GO TO 3.

3.DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse (No.12)
- Fuse block (J/B)
- Harness for open and short between stop lamp switch and battery

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

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

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

Stop lamp switch		ECM		Continuity
Connector	Terminal	Connector	Terminal	
N66	2	N99	221	Existed

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

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair open circuit, short to ground or short to power in harness or connectors.

5.CHECK STOP LAMP SWITCH

Refer to [EC-224, "Component Inspection"](#).

Is the inspection result normal?

YES >> GO TO 6.

NO >> Replace stop lamp switch.

6.CHECK INTERMITTENT INCIDENT

Refer to [EC-54, "Description"](#).

>> INSPECTION END

Component Inspection

INFOID:000000004942355

1.CHECK STOP LAMP SWITCH-I

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

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 2.

2.CHECK STOP LAMP SWITCH-II

1. Adjust stop lamp switch installation. Refer to [BR-6, "Inspection and Adjustment"](#).
2. Check the continuity between stop lamp switch terminal under the following conditions.

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

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace stop lamp switch.

< COMPONENT DIAGNOSIS >

[ZD]

VSS

Description

INFOID:000000004942361

The vehicle speed signal is sent to the combination meter from the "ABS actuator and electric unit (control unit)" through CAN communication line. The combination meter then sends a signal to the ECM through CAN communication line.

Component Function Check

INFOID:000000004942362

1. INSPECTION START

Inspection start.

Do you have CONSULT-III?

YES >> GO TO 2.

NO >> GO TO 3.

2. CHECK VEHICLE SPEED SENSOR FUNCTION

NOTE:

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

 With CONSULT-III

1. Start engine.
2. Read "VHCL SPEED SE" in "DATA MONITOR" mode with CONSULT-III. The vehicle speed on CONSULT-III should be more than 10 km/h (6 MPH) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to [EC-163, "Diagnosis Procedure"](#).

3. PERFORM COMPONENT FUNCTION CHECK

NOTE:

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

 Without CONSULT-III

1. Start engine.
2. Check vehicle speed of speedometer.
The vehicle speed should be able to travel more than 10 km/h (6 MPH) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Go to [EC-163, "Diagnosis Procedure"](#).

Diagnosis Procedure

INFOID:000000004942363

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

Refer to [BRC-8, "How to Perform Trouble Diagnosis for Quick and Accurate Repair"](#).

Is the inspection result normal?

YES >> GO TO 2.

NO >> Repair or replace malfunctioning part.

2. CHECK DTC WITH "COMBINATION METER"

Refer to [DI-15, "Trouble Diagnosis"](#).

>> INSPECTION END

ECU DIAGNOSIS

ECM

Reference Value

INFOID:000000004942364

VALUES ON THE DIAGNOSIS TOOL

NOTE:

- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
- * Specification data may not be directly related to their components signals/values/operations.

MONITOR ITEM	CONDITION		SPECIFICATION
COOLANT TEMP/S	• Engine: After warming up		More than 70°C (158°F)
VHCL SPEED SE	• Turn drive wheels and compare CONSULT-III value with the speedometer indication		Almost the same speed as the speedometer indication
ACCEL POS SEN	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 – 0.9 V
		Accelerator pedal: Fully depressed	4.0 – 4.8 V
BATTERY VOLT	• Ignition switch: ON (Engine stopped)		11 - 14 V
BARO SEN	• Ignition switch: ON	Altitude: Approx. 0m	Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm ² , 14.59 psi)
		Altitude: Approx. 1,000 m	Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm ² , 12.90 psi)
		Altitude: Approx. 1,500 m	Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm ² , 12.06 psi)
		Altitude: Approx. 2,000 m	Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm ² , 11.36 psi)
TURBO BST SEN	• Engine: After warming up • Shift lever: Neutral	Idle speed	Approx. Atmospheric pressure
		Engine speed: 2,000 rpm	100 – 110 kPa
I/C INT/A T/S	• Ignition switch: ON		Indicates intake air temperature
ACCEL SEN 2	• Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.3 – 0.45 V
		Accelerator pedal: Fully depressed	2.0 – 2.4 V
EGR/V ANGLE	• Engine: After warming up, idle the engine* ¹ • Air conditioner switch: OFF • Shift lever: Neutral • No load		50 – 100% (EGR V/POS SEN: 2,500 - 4,200 mV)
ACT CR PRESS	• Engine: After warming up • Air conditioner switch: OFF • Shift lever: Neutral • No load	Idle	30 – 40 MPa
		2,000 rpm	70 – 110 MPa
EGR V/POS SEN	• Engine: After warming up, idle the engine* ¹ • Air conditioner switch: OFF • Shift lever: Neutral • No load		2,500 – 4,200 mV (EGR/V ANGLE: 50 – 100%)
INT/A VOLUME	• Engine: After warming up, idle the engine		200 – 600 mg/st
TRG INJ QTY	• Engine: After warming up, idle the engine • Air conditioner switch: OFF • Shift lever: Neutral • No load		5 – 10 mg/st
CKPS-RPM (TDC)	• Run engine and compare CONSULT-III value with the tachometer indication.		Almost the same speed as the tachometer indication
CMPS-RPM	• Run engine and compare CONSULT-III value with the tachometer indication.		Almost the same as half of the tachometer indication

< ECU DIAGNOSIS >

[ZD]

MONITOR ITEM	CONDITION		SPECIFICATION
IGN SW	• Ignition switch: ON → OFF → ON		ON → OFF → ON
START SIGNAL	• Ignition switch: ON → START → ON		OFF → ON → OFF
P/N POSI SW	• Ignition switch: ON	Shift lever: Neutral	ON
		Except above	OFF
AIR COND SIG	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
BRAKE SW	• Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
CLUTCH SW	• Ignition switch: ON	Clutch pedal: Fully released	OFF
		Clutch pedal: Slightly depressed	ON
AIR COND RLY	• Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
GLOW RLY	• Ignition switch: ON	Glow relay: Not operating	OFF
		Glow relay: Operating	ON

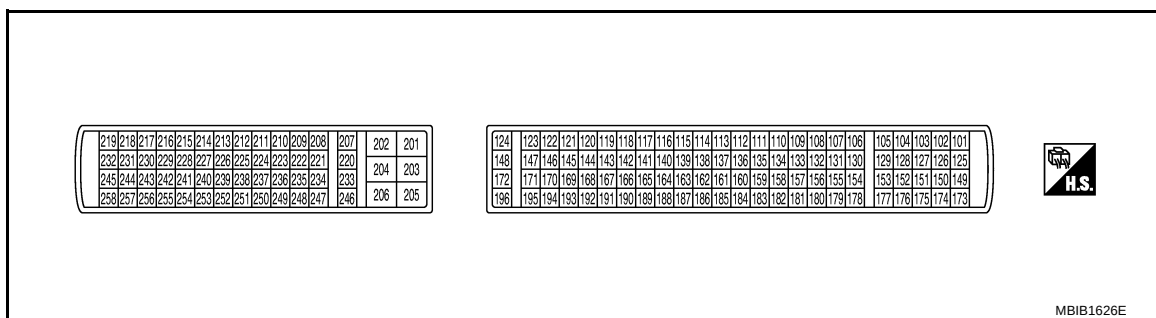
NOTE:

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

*1: If the engine continues idle for more than 40 seconds (except for Russia/Ukraine) or 10 minutes (for Russia/Ukraine), EGR volume control valve is OFF. So please depress the accelerator pedal slightly before measurement.

*2: If the engine continues idle for more than 40 seconds, "SWRL CON S/V1" is OFF.

TERMINAL LAYOUT



PHYSICAL VALUES

NOTE:

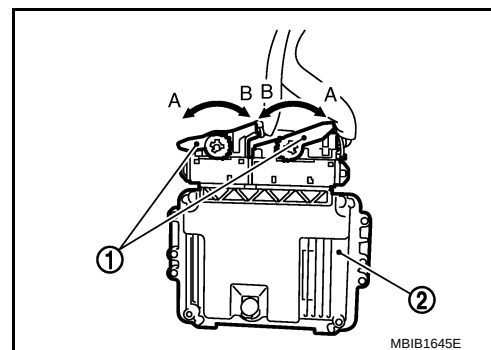
- ECM is located behind the glove box.
- When disconnecting ECM harness connector, loosen it with levers (1) as far as they go as shown in the figure.

2: ECM

A: Fasten

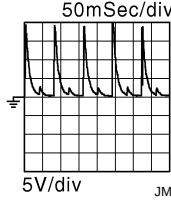
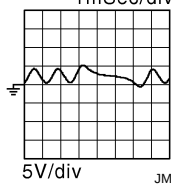
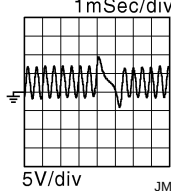
B: Loosen

- Connect a Y-cable adapter between the ECM and ECM harness connector.
- Use extreme care not to touch 2 pins at one time.
- Data is for comparison and may not be exact.
- Specification data are reference values and are measured between each terminals.
- Pulse signal is measured by CONSULT-III.



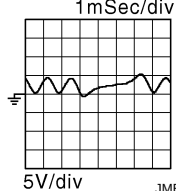
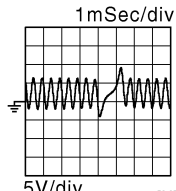
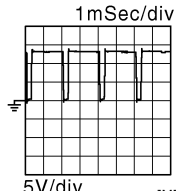
< ECU DIAGNOSIS >

[ZD]

TERMINAL NO.		ITEM		CONDITION	Value (Approx.)
+	-	Signal name	Input/ Output		
101 (W)	202 (B)	Fuel injector No. 3	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	0 – 14 V ★ 
102 (W)		Fuel injector No. 2			
125 (W)		Fuel injector No. 1			
126 (W)		Fuel injector No. 4			
108 (R)	—	Sensor ground (Fuel rail pressure sensor)	—	—	—
111 (L)	140 (L/R)	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch ON]	5 V
112 (BR)	202 (B)	Crankshaft position sensor (-)	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	0 – 14 V ★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 – 14 V ★ 
113 (B)	132 (R)	Sensor power supply (Turbocharger boost sensor)	—	[Ignition switch ON]	5 V
115 (L/O)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
129 (B)	—	Sensor ground (Camshaft position sensor)	—	—	—
131 (G/Y)	—	Sensor ground (Sensor shield circuit)	—	—	—
132 (R)	—	Sensor ground (Turbocharger boost sensor)	—	—	—

< ECU DIAGNOSIS >

[ZD]

TERMINAL NO.		ITEM		CONDITION	Value (Approx.)
+	-	Signal name	Input/ Output		
135 (W/L)	115 (L/O)	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch ON]	5 V
136 (Y)	202 (B)	Crankshaft position sensor (+)	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	0 – 14 V ★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 – 14 V ★ 
137 (W)	108 (R)	Sensor power supply (Fuel rail pressure sensor)	—	[Ignition switch ON]	5 V
138 (W)	178 (R)	Sensor power supply (EGR volume control valve control position sensor)	—	[Ignition switch ON]	5 V
139 (BR)	202 (B)	EGR volume control valve motor (-)	Output	[Ignition switch OFF] • For a few seconds after the following conditions are met and ignition switch is turned OFF. - Warm-up condition - Start engine and let it idle for 3 minutes. NOTE: The duty cycle changes depending on EGR volume control valve operation.	1 – 14 V ★ 
140 (L/R)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—
147 (LG/B)	—	Sensor ground (Intake air temperature sensor)	—	—	—

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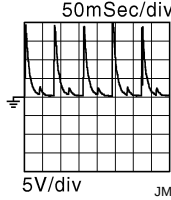
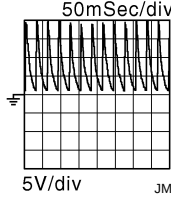
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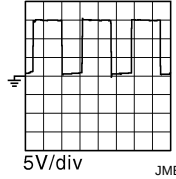
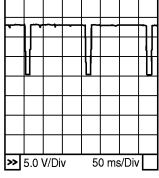
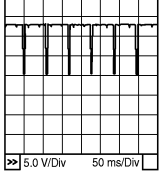
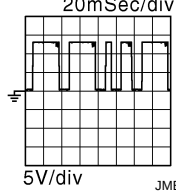
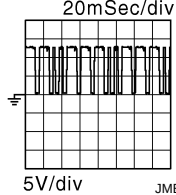
< ECU DIAGNOSIS >

[ZD]

TERMINAL NO.		ITEM		CONDITION	Value (Approx.)
+	-	Signal name	Input/ Output		
149 (R)	202 (B)	Fuel injector No. 2	Output	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	0 – 14 V ★ 
151 (B)		Fuel injector No. 4			
173 (R)		Fuel injector No. 3			
174 (B)		Fuel injector No. 1		[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 – 14 V ★ 
155 (B)	182 (W)	Mass air flow sensor	Input	[Ignition switch ON]	0.4 V
				[Engine is running] • Warm-up condition • Idle speed	1.3 – 2.3 V
				[Engine is running] • Warm-up condition • Engine is revving from idle to about 4,000 rpm.	1.3 – 2.3 V to 4.0 V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm)
158 (W)	132 (R)	Turbocharger boost sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.7 – 2.3 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	1.7 – 2.6 V
159 (L/R)	—	Sensor ground (Engine coolant temperature sensor)	—	—	—
160 (W/G)	147 (LG/B)	Intake air temperature sensor	Input	[Engine is running]	0.2 – 4.8 V Output voltage varies with intake air temperature
161 (B)	108 (R)	Fuel rail pressure sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.0 – 1.6 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	2.0 – 2.9 V
164 (L/W)	140 (L/R)	Accelerator pedal position sensor 1	Input	[Ignition switch ON] • Engine stopped • Accelerator pedal: Fully released	0.6 – 0.9 V
				[Ignition switch ON] • Engine stopped • Accelerator pedal: Fully depressed	3.9 – 4.7 V

< ECU DIAGNOSIS >

[ZD]

TERMINAL NO.		ITEM		CONDITION	Value (Approx.)
+	-	Signal name	Input/ Output		
176 (Y)	202 (B)	Fuel pump	Output	[Engine is running] • Warm-up condition • Idle speed	0 – 14 V ★ 
177 (G)	129 (B)	Camshaft position sensor (Except for Russia/ Ukraine)	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	0 – 14 V ★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 – 14 V ★ 
177 (G)	129 (B)	Camshaft position sensor	Input	[Engine is running] • Warm-up condition • Idle speed NOTE: The pulse cycle changes depending on rpm at idle.	0 – 14 V ★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 – 14 V ★ 
178 (R)	—	Sensor ground (EGR volume control valve control position sensor)	—	—	—
182 (W)	—	Sensor ground (Mass air flow sensor)	—	—	—
184 (B)	178 (R)	EGR volume control valve (EGR volume control valve control position sensor)	Input	[Ignition switch ON] • Warm-up condition • Idle speed	1.0 – 4.2 V
185 (B)	159 (L/R)	Engine coolant temperature sensor	Input	[Engine is running]	0.2 – 4.8 V Output voltage varies with engine coolant temperature

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TERMINAL NO.		ITEM		CONDITION	Value (Approx.)
+	-	Signal name	Input/ Output		
189 (L/Y)	115 (L/O)	Accelerator pedal position sensor 2	Input	[Ignition switch ON] • Engine stopped • Accelerator pedal: Fully released	0.3 – 0.6 V
				[Ignition switch ON] • Engine stopped • Accelerator pedal: Fully depressed	1.95 – 2.40 V
192 (BR/Y)	202 (B)	Start signal	Input	[Ignition switch ON]	0 V
				[Ignition switch START]	BATTERY VOLTAGE (11 – 14 V)
193 (L)	202 (B)	Vehicle speed limit switch	Input	[Ignition switch ON] • Vehicle speed limit switch: OFF	0 V
				[Ignition switch ON] • Vehicle speed limit switch: ON	BATTERY VOLTAGE (11 – 14 V)
196 (W)	202 (B)	EGR volume control valve motor (+)	Output	[Ignition switch OFF] • For a few seconds after the following conditions are met and ignition switch is turned OFF. - Warm-up condition - Start engine and let it idle for 3 minutes.	0 V or Battery voltage (11 – 14 V)
201 (G/Y)	202 (B)	Power supply for ECM	Input	[Ignition switch ON]	BATTERY VOLTAGE (11 – 14 V)
202 (B)	—	ECM ground	—	—	—
203 (R)	202 (B)	Power supply for ECM	Input	[Ignition switch ON]	BATTERY VOLTAGE (11 – 14 V)
204 (B)	—	ECM ground	—	—	—
205 (R)	202 (B)	Power supply for ECM	Input	[Ignition switch ON]	BATTERY VOLTAGE (11 – 14 V)
206 (B)	—	ECM ground	—	—	—
207 (R/Y)	202 (B)	Clutch pedal position switch	Input	[Ignition switch ON] • Clutch pedal: Fully released	0 V
				[Ignition switch ON] • Clutch pedal: Slightly depressed	BATTERY VOLTAGE (11– 14 V)
209 (G)	202 (B)	Park/Neutral position switch	Input	[Ignition switch ON] • Shift lever: Neutral	0 V
				[Ignition switch ON] • Shift lever: Except above	BATTERY VOLTAGE (11– 14 V)
211 (O)	202 (B)	Emergency stop switch	Input	[Ignition switch ON] • Emergency stop switch: OFF	0 V
				[Ignition switch ON] • Emergency stop switch: ON	BATTERY VOLTAGE (11 – 14 V)
219 (L)	202 (B)	Ignition switch	Input	[Ignition switch OFF]	0 V
				[Ignition switch ON]	BATTERY VOLTAGE (11 – 14 V)
221 (R)	202 (B)	Stop lamp switch	Input	[Ignition switch OFF] • Brake pedal: Fully released	0 V
				[Ignition switch OFF] • Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 – 14 V)
235 (P)	—	CAN communication line	Input/ Output	—	—

ECM

< ECU DIAGNOSIS >

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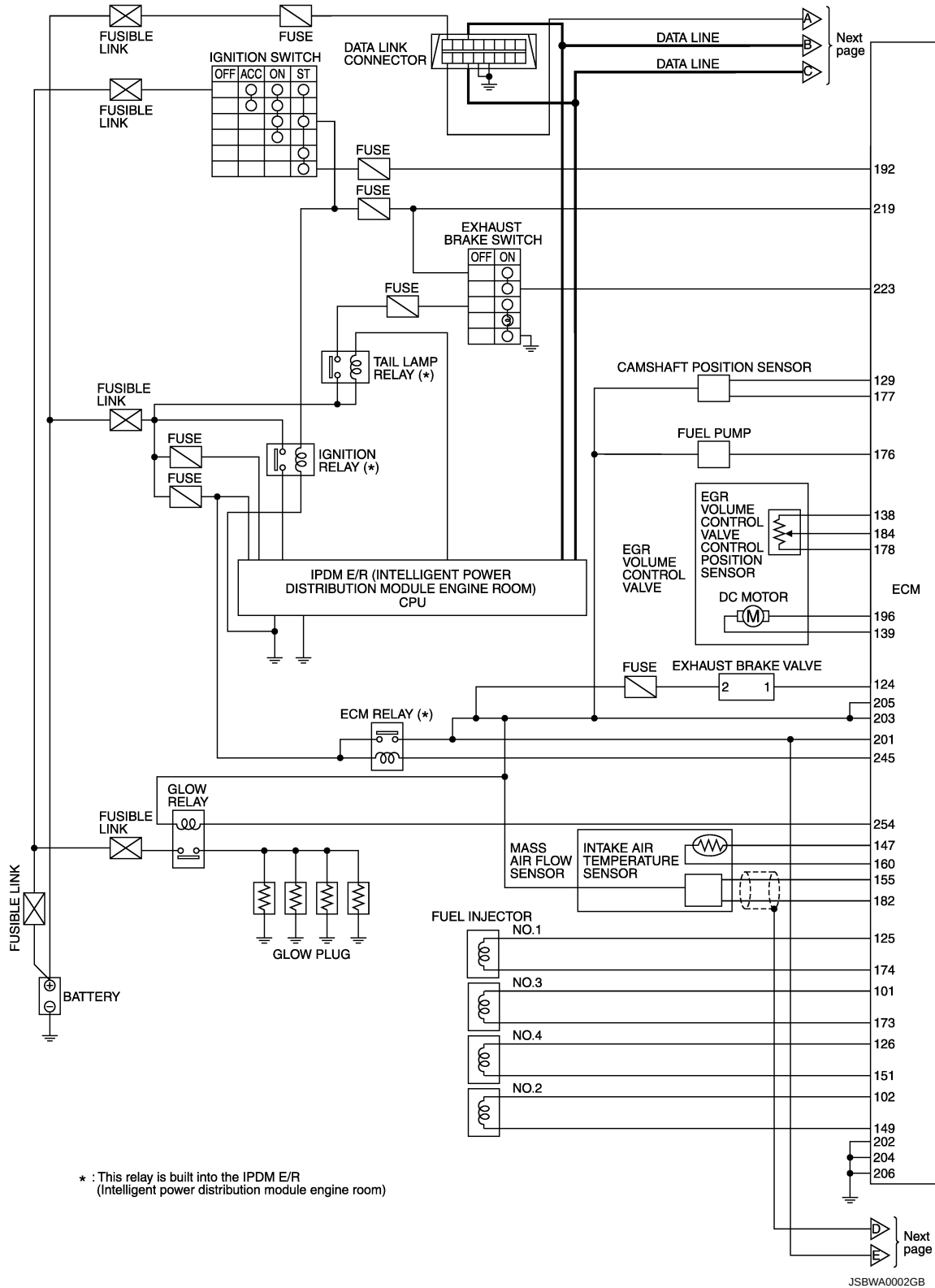
TERMINAL NO.		ITEM		CONDITION	Value (Approx.)	
+	-	Signal name	Input/ Output			
236 (L)	—	CAN communication line	Input/ Output	—	—	EC
245 (P/B)	202 (B)	ECM relay (self-shutoff)	Output	[Ignition switch ON]	0 – 1.0 V	C
				[Ignition switch OFF] • For a certain seconds after turning ignition switch OFF		
				[Ignition switch OFF] • More than a certain seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 – 14 V)	D
254 (L)	202 (B)	Glow relay	Output	[Ignition switch ON] • Glow relay: Operating	0 V	E
				[Ignition switch ON] • Glow relay: Not operating	BATTERY VOLTAGE (11 – 14 V)	

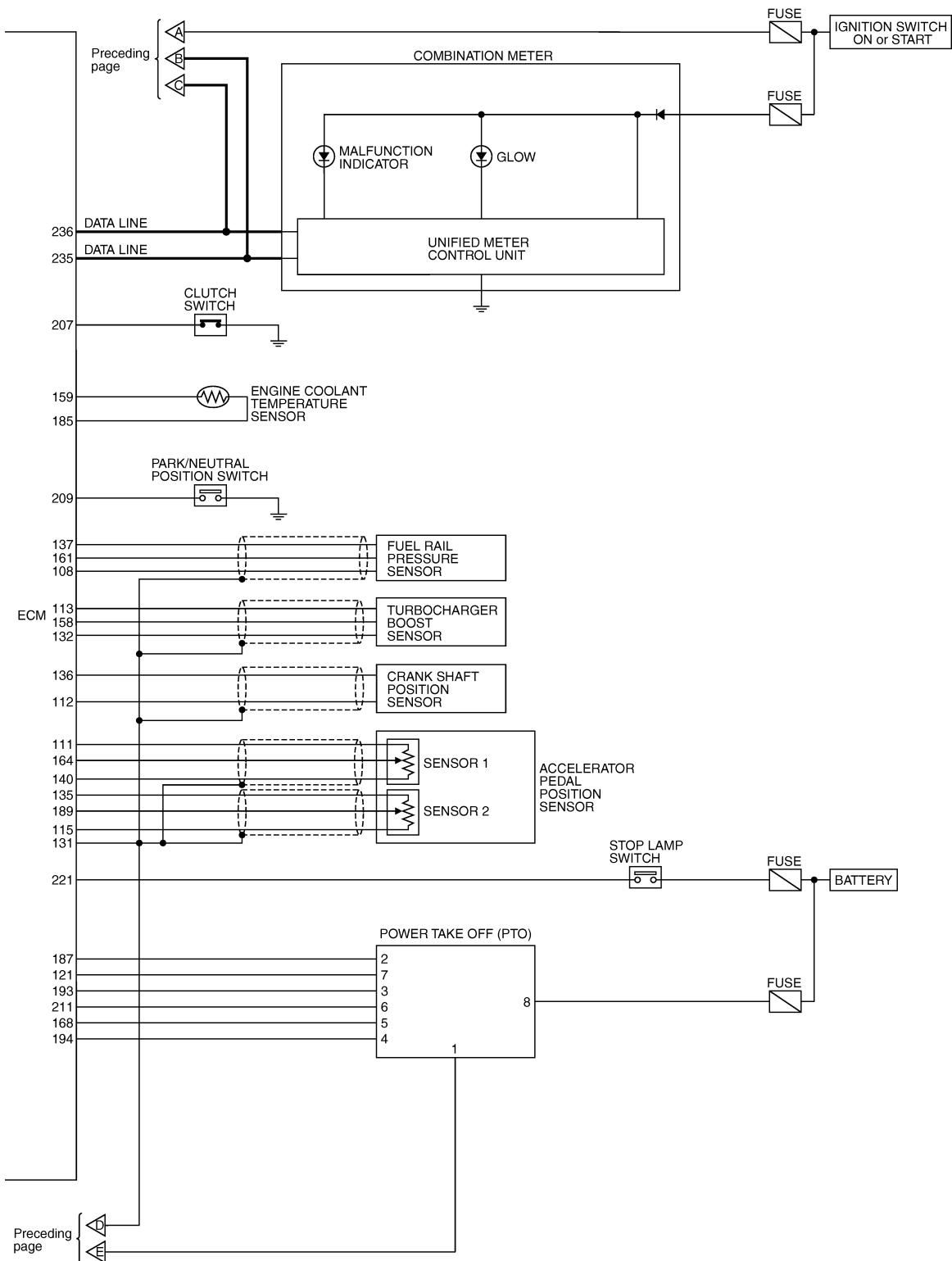
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

< ECU DIAGNOSIS >

Wiring Diagram - ENGINE CONTROL SYSTEM -

INFOID:000000004942365





MBWA1719E

INFOID:000000004942366

DTC Inspection Priority Chart

If some DTCs are displayed at the same time, perform inspection one by one based on the following priority chart.

< ECU DIAGNOSIS >

[ZD]

Priority	Detected items (DTC)
1	• U1001 CAN communication line • U1010 CAN communication • P0008 P0335 Crankshaft position sensor • P0016 Crankshaft position - camshaft position correlation • P0100 Mass air flow sensor • P0110 Intake air temperature sensor • P0115 Engine coolant temperature sensor • P0120 P0220 P2135 Accelerator pedal position sensor • P0190 Fuel rail pressure sensor • P0235 Turbocharger boost sensor • P0340 Camshaft position sensor • P0409 EGR volume control valve position sensor • P0500 Vehicle speed sensor • P0606 P0607 P0611 P1603 ECM • P0641 P0651 P0697 Sensor power supply • P1625 Injector adjustment valve • P2226 Barometric pressure sensor
2	• P0045 Turbocharger boost control solenoid valve • P0090 P0091 P0092 P1089 P1090 Fuel pump • P0201 P0202 P0203 P0204 P0262 P0265 P0268 P0271 P1276 P1277 P2146 P2149 Fuel injector • P0380 Glow relay • P0403 P0404 EGR volume control valve • P0660 P0661 P0662 Swirl control solenoid valve
3	• P0087 P0088 P0093 Fuel system • P0217 Engine over temperature (OVERHEAT) • P0234 P0299 Turbocharger system • P0400 P0401 P1409 EGR function

DTC Index

INFOID:000000004942367

X: Applicable —: Not applicable

DTC			Items (CONSULT-III screen item)	Trip	MI lighting up	Reference page
CONSULT-III		GST*1				
	ID FLAG*3					
U1001*2	4	U1001	CAN COMM CIRCUIT	1	—	EC-59
U1010	4	U1010	CONTROL UNIT(CAN)	1	—	EC-61
P0000	—	P0000	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—	—	—
P0008	1	P0008	CMP BACKUP MODE	3	×	EC-62
P0016	1	P0016	CMP/CKP RELATION	3	×	EC-66
P0045	1	P0048	TC BOOST SOL/CIRC	3	×	—
	2	P0047				
	4	P0045				
	8	P0046				
P0087	1	P0087	LOW FUEL PRES	3	×	EC-68
P0088	1	P0088	HIGH FUEL PRES	3	×	EC-70
P0090	4	P0090	FUEL PUMP	3	×	EC-72
	8					
P0091	2	P0091	FUEL PUMP	3	×	EC-76
P0092	1	P0092	FUEL PUMP	3	×	EC-76
P0093	1	P0093	FUEL LEAK	3	×	EC-80

< ECU DIAGNOSIS >

[ZD]

DTC			Items (CONSULT-III screen item)	Trip	MI lighting up	Reference page
CONSULT-III		GST*1				
	ID FLAG*3					
P0100	1	P0103	MAS AIR FLOW SEN	3	×	EC-83
	2	P0102				
P0110	1	P0113	INTAIR TEMP SEN	3	×	EC-89
	2	P0112				
P0115	1	P0118	COOLANT TEMP SEN	3	×	EC-93
	2	P0117				
P0120	1	P0123	ACCEL POS SENSOR	3	×	EC-97
	2	P0122				
P0190	1	P0193	CR PRES SEN	3	×	EC-101
	2	P0192				
P0201	4	P0201	CYL1 INJECTOR	3	×	EC-106
P0202	4	P0202	CYL2 INJECTOR	3	×	EC-106
P0203	4	P0203	CYL3 INJECTOR	3	×	EC-106
P0204	4	P0204	CYL4 INJECTOR	3	×	EC-106
P0217	1	P0217	ENG OVER TEMP	1	×	EC-110
P0220	1	P0223	ACCEL POS SENSOR	3	×	EC-113
	2	P0222				
P0234	2	P0234	TC SYSTEM	1	—	— EC-117
P0235	1	P0238	TC BOOST SEN/CIRC	3	×	EC-119
	2	P0237				
P0262	1	P0262	CYL1 INJECTOR	3	×	EC-124
	4					
P0265	1	P0265	CYL2 INJECTOR	3	×	EC-124
	4					
P0268	1	P0268	CYL3 INJECTOR	3	×	EC-124
	4					
P0271	1	P0271	CYL4 INJECTOR	3	×	EC-124
	4					
P0299	1	P0299	TC SYSTEM	1	—	—
P0335	1	P0335	CKP SEN/CIRCUIT	3	×	EC-128
	2	P0336				
P0340	1	P0340	CMP SEN/CIRCUIT	3	×	EC-132
	2	P0341				
P0380	1	P0380	GLOW RELAY	3	×	EC-137
	2					
	4					
	8					
P0400	1	P0400	EGR VOL CON/V MOT	3	×	EC-141
P0401	1	P0401	EGR SYSTEM	3	×	EC-145
P0403	8	P0403	EGR SYSTEM	3	×	EC-150

< ECU DIAGNOSIS >

[ZD]

DTC			Items (CONSULT-III screen item)	Trip	MI lighting up	Reference page
CONSULT-III		GST*1				
	ID FLAG*3					
P0404	1	P0490	EGR VALVE	3	×	EC-154
	2	P0489				
	4	P0404				
P0409	1	P0406	EGR V/POS SENSOR	3	×	EC-158
	2	P0405				
P0500	8	P0500	VEHICLE SPEED	1	—	EC-162
P0606	—	P0606	ECM	3	×	EC-164
P0607	—	P0607	ECM	1	—	EC-165
P0611	1	P0611	ECM	3	×	EC-166
	2					
	4					
	8					
P0641	1	P0643	SENSOR PWR/CIRC1	3	×	EC-168
	2	P0642				
P0651	1	P0653	SENSOR PWR/CIRC2	3	×	EC-171
	2	P0652				
P0697	1	P0699	SENSOR PWR/CIRC3	3	×	EC-175
	2	P0698				
P1089	1	P0089	FUEL PUMP	3	×	EC-178
P1090	1	P0089	FUEL PUMP	3	×	EC-180
P1276	1	P1276	CYL1 CYL4 INJECTOR	3	×	EC-182
P1277	1	P1277	CYL 2 CYL3 INJECTOR	3	×	EC-182
P1409	1	P1409	EGR V/POS SENSOR	3	×	EC-186
P1603	2	P0603	ECM	3	×	EC-188
	4					
P1610	1	P1610	LOCK MODE	1	—	BL-33
P1611	4	P1611	ID DISCORD,IMMU-ECM	1	—	BL-33
P1612	1	P1612	CHAIN OF ECM-IMMU	1	—	BL-33
P1613	1	P1613	ECM INT CIRC-IMMU	1	—	BL-33
P1614	2	P1614	CHAIN OF IMMU-KEY	1	—	BL-33
P1615	1	P1615	DIFFERENCE OF KEY	1	—	BL-33
P1616	1	P1616	ECM	1	—	BL-33
	2					
P1625	4	P1625	INJ ADJ VAL	3	×	EC-190
P2135	8	P2135	APP SENSOR	3	×	EC-191
P2146	1	P2146	INJ PWR/CIRC	3	×	EC-195
	8	P0200				
P2149	1	P2149	INJ PWR/CIRC	3	×	EC-195
	8	P0200				
P2226	1	P2229	BARO SENSOR	3	×	EC-199
	2	P2228				

*1: This number is prescribed by ISO 15031-6.

< ECU DIAGNOSIS >

[ZD]

*2: The troubleshooting for this DTC needs CONSULT-III.

*3: This item is displayed in Freeze Frame Data of CONSULT-III.

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SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM

Symptom Table

INFOID:000000004942368

SYSTEM — BASIC ENGINE CONTROL SYSTEM

Warranty symptom code	SYMPTOM															
	NO START (with first firing)				ENGINE STALL											
NO START (with first firing)				ENGINE STALL												
NO START (without first firing)				DURING DRIVING												
HARD TO START WHEN ENGINE IS COLD				WHEN DECELERATING												
HARD TO START WHEN ENGINE IS HOT																
AT IDLE																

	SYMPTOM																																																																																										
	NO START (with first firing)				ENGINE STALL				NO START (with first firing)											ENGINE STALL																																																																							
NO START (with first firing)				NO START (without first firing)				HARD TO START WHEN ENGINE IS COLD				HARD TO START WHEN ENGINE IS HOT				AT IDLE				DURING DRIVING				WHEN DECELERATING				HESITATION/SURGING/FLAT SPOT				KNOCK/DETONATION				LACK OF POWER				POOR ACCELERATION				HI IDLE				LOW IDLE				ROUGH IDLE/HUNTING				IDLING VIBRATION				SLOW/NO RETURN TO IDLE				OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE				EXCESSIVE FUEL CONSUMPTION				EXCESSIVE OIL CONSUMPTION				BLACK SMOKE				WHITE SMOKE				ABNORMAL SMOKE COLOR				DEAD BATTERY (UNDER CHARGE)			
NO START (with first firing)				NO START (without first firing)				HARD TO START WHEN ENGINE IS COLD				HARD TO START WHEN ENGINE IS HOT				AT IDLE				DURING DRIVING				WHEN DECELERATING				HESITATION/SURGING/FLAT SPOT				KNOCK/DETONATION				LACK OF POWER				POOR ACCELERATION				HI IDLE				LOW IDLE				ROUGH IDLE/HUNTING				IDLING VIBRATION				SLOW/NO RETURN TO IDLE				OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE				EXCESSIVE FUEL CONSUMPTION				EXCESSIVE OIL CONSUMPTION				BLACK SMOKE				WHITE SMOKE				ABNORMAL SMOKE COLOR				DEAD BATTERY (UNDER CHARGE)			
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1 - 5: The numbers refer to the order of inspection.

SYSTEM — ENGINE MECHANICAL & OTHER

	SYMPTOM																									
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NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING	HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BLACK SMOKE	WHITE SMOKE	DEAD BATTERY (UNDER CHARGE)					
Warranty symptom code				AA				AB			AC	AD	AE		AF		AG	AH	AJ	AK	AL	AM	AP		HA	
Fuel pump EC-72	5	5	5	5	5	5	5	5		5	5		5	5	5		5									
Fuel injector EC-106	3	3	3	3	3	3	3	3	3	4	4	3	3	3	3		4		3	3						
Fuel rail pressure relief valve EC-80	3	3	3	3	3	3	3	3		3	3		3	3	3		3									
Glow control system EC-207	1	1	1	1					1																1	
Air cleaner and duct EM-15										3	3									3						
Electric throttle control actuator	2	2	2	2	1	1	1			1	1															
EGR system EC-141 , EC-145 , EC-186										3	3									3						
Engine body EM-84 EM-86	3	3	3	3	3	3	3		3	4	4		3		3	3	3	3	1		3					

1 - 5: The numbers refer to the order of inspection.

NORMAL OPERATING CONDITION

< SYMPTOM DIAGNOSIS >

[ZD]

NORMAL OPERATING CONDITION

Description

INFOID:000000004942369

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

- A
- EC
- C
- D
- E
- F
- G
- H
- I
- J
- K
- L
- M
- N
- O
- P

If the engine speed is above 2,800 rpm under no load (for example, the shift position is park or neutral engine speed is over 2,800 rpm) fuel is cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut is operated until the engine speed reaches 1,500 rpm, then fuel cut is cancelled.

NOTE:

This function is different from deceleration control listed under [EC-19, "System Description"](#).

PRECAUTION**PRECAUTIONS****Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"**

INFOID:000000005198450

The Supplemental Restraint System such as "AIR BAG" and "SEAT BELT PRE-TENSIONER", used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the "SUPPLEMENTAL RESTRAINT SYSTEM" and "SEAT BELTS" of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the "SUPPLEMENTAL RESTRAINT SYSTEM".
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.

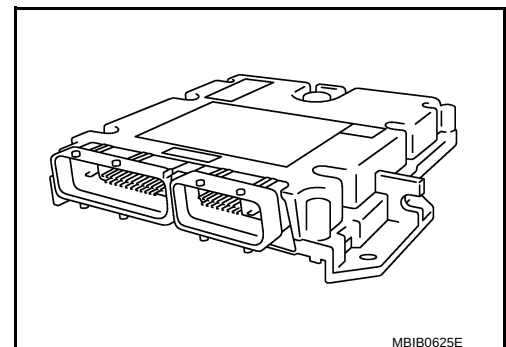
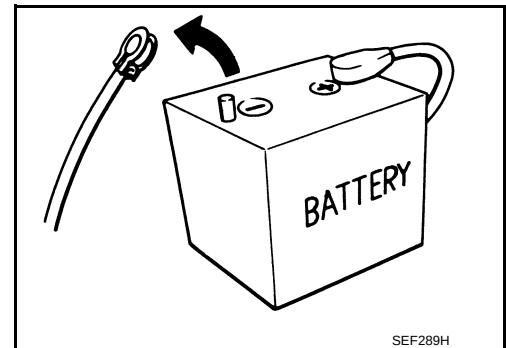
PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS**WARNING:**

- When working near the 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

INFOID:000000004942372

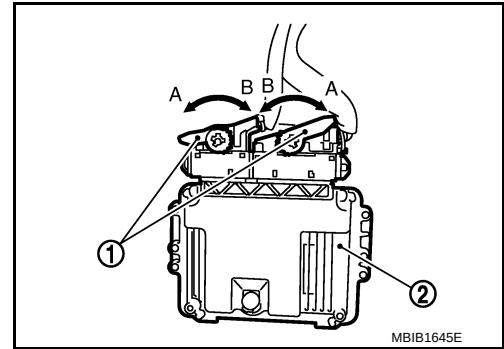
- Always use a 12 volt battery as power source.
- Never attempt to disconnect battery cables while engine is running.
- Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect battery negative cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned off.
- Before removing parts, turn ignition switch OFF and then disconnect battery negative cable.
- Never disassemble ECM.



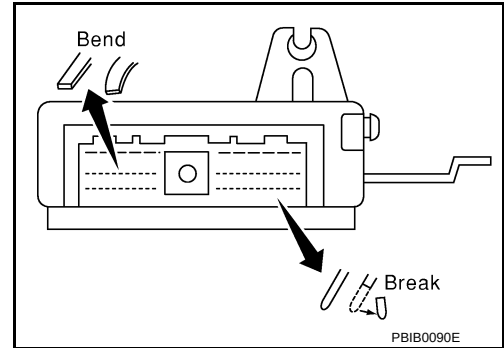
PRECAUTIONS**[ZD]**

< PRECAUTION >

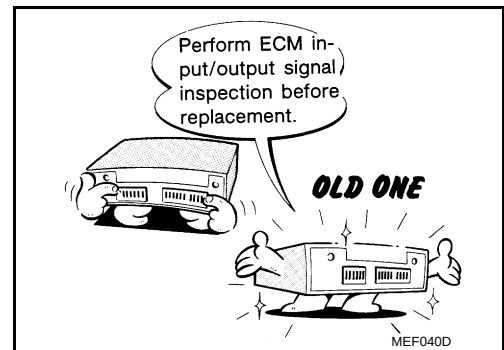
- When connecting ECM harness connector, fasten it securely with levers as far as they go as shown in the figure.
- Levers (1)
- ECM (2)
- Fasten (A)
- Loosen (B)



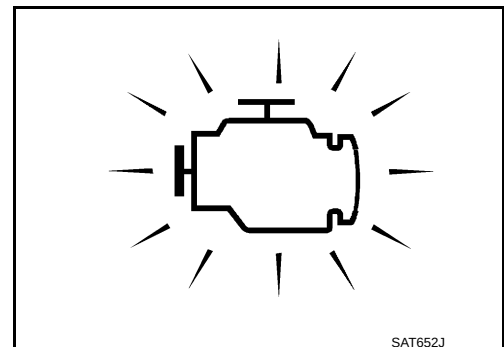
- When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).
Check that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- Securely connect ECM harness connectors.
A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to IC's.
- Keep engine control system harness at least 10cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of IC's, etc.
- Keep engine control system parts and harness dry.



- Before replacing ECM, perform ECM Terminals and Reference Value inspection and check that ECM functions normally. Refer to [EC-226, "Reference Value"](#).
- Handle mass air flow sensor carefully to avoid damage.
- Never disassemble mass air flow sensor.
- Never clean mass air flow sensor with any type of detergent.
- Even a slight leakage in the air intake system can cause serious incidents.
- Never shock or jar the camshaft position sensor, crankshaft position sensor.



- After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check.
The DTC should not be displayed in the DTC CONFIRMATION PROCEDURE if the repair is completed. The Component Function Check should be a good result if the repair is completed.

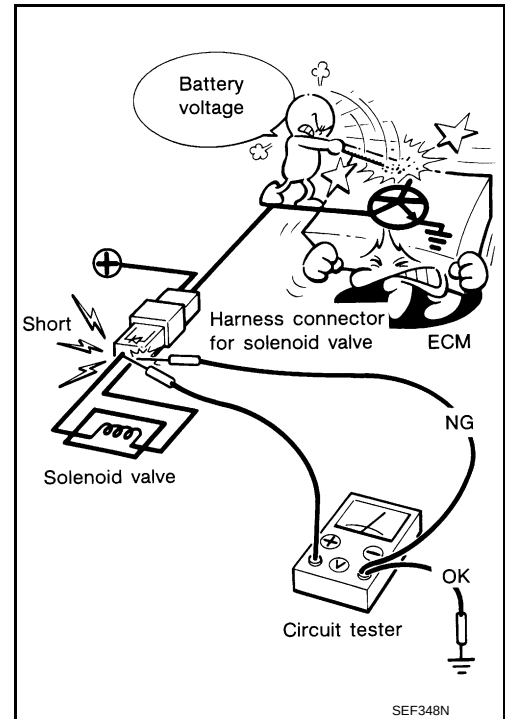


PRECAUTIONS

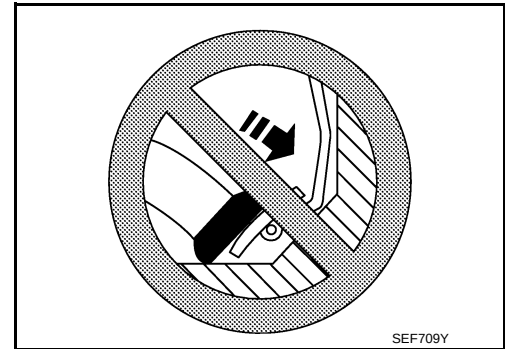
[ZD]

< PRECAUTION >

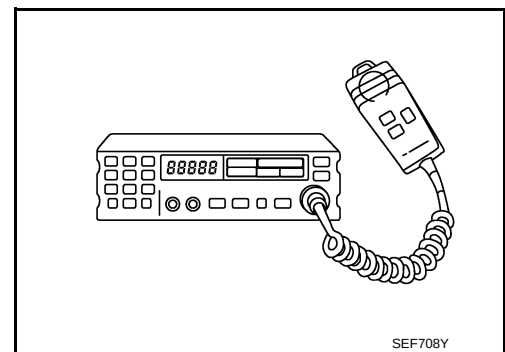
- When measuring ECM signals with a circuit tester, never allow the two tester probes to contact. Accidental contact of probes cause a short circuit and damage the ECM power transistor.
- Never disassemble fuel pump. If NG, take proper action.
- Never disassemble fuel injector. If NG, replace fuel injector.



- 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 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 standingwave ratio can be kept smaller.
 - Always ground the radio to vehicle body.



SERVICE DATA AND SPECIFICATIONS (SDS)

< SERVICE DATA AND SPECIFICATIONS (SDS)

[ZD]

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:000000004942373

EC

Idle speed*	750 ± 50 rpm
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- *: Under the following conditions
 - In neutral position.
 - Electric load: OFF (Lights, heater fan & rear window defogger)
 - Steering wheel: kept in straight-ahead position
 - Warm-up condition

A

C

D

E

F

G

H

I

J

K

L

M

N

O

P