SECTION EC
ENGINE CONTROL SYSTEM

CONTENTS

MR FOR NISMO RS MODELS

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000012197617

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the “SRS AIR BAG” and “SEAT BELT” of this Service Manual.

WARNING:

Always observe the following items for preventing accidental activation.

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, it is recommended that all maintenance and repair be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper repair, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see “SRS AIR BAG”.**
- **Never use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

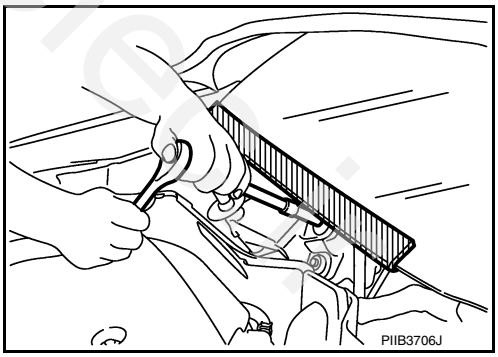
Always observe the following items for preventing accidental activation.

- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery or batteries, and wait at least 3 minutes before performing any service.**

Precaution for Procedure without Cowl Top Cover

INFOID:0000000012197618

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



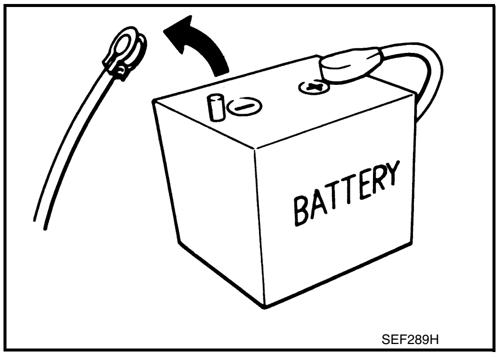
Precautions for Removing Battery Terminal

INFOID:0000000012819129

When disconnecting the battery terminal, pay attention to the following.

- Always use a 12V battery as power source.
- Never disconnect battery terminal while engine is running.

- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.
- For vehicles with the engine listed below, remove the battery terminal after a lapse of the specified time:



SEF289H

D4D engine	: 20 minutes	YS23DDT	: 4 minutes
HRA2DDT	: 12 minutes	YS23DDTT	: 4 minutes
K9K engine	: 4 minutes	ZD30DDTi	: 60 seconds
M9R engine	: 4 minutes	ZD30DDTT	: 60 seconds
R9M engine	: 4 minutes		
V9X engine	: 4 minutes		
YD25DDTi	: 2 minutes		

NOTE:
ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.

- After high-load driving, if the vehicle is equipped with the V9X engine, turn the ignition switch OFF and wait for at least 15 minutes to remove the battery terminal.
  NOTE:
  - Turbocharger cooling pump may operate in a few minutes after the ignition switch is turned OFF.
  - Example of high-load driving
  - Driving for 30 minutes or more at 140 km/h (86 MPH) or more.
  - Driving for 30 minutes or more on a steep slope.
- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.
  NOTE:
  If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.
- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.
  NOTE:
  The removal of 12V battery may cause a DTC detection error.

On Board Diagnostic (OBD) System of Engine and CVT

INFOID:0000000012197620

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

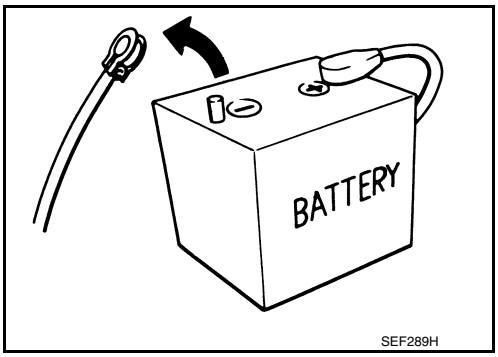
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-6, "Harness Connector".**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EVAP system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

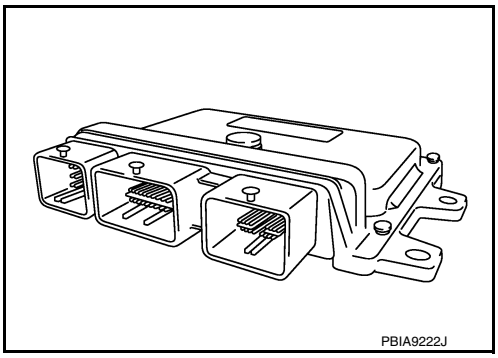
General Precautions

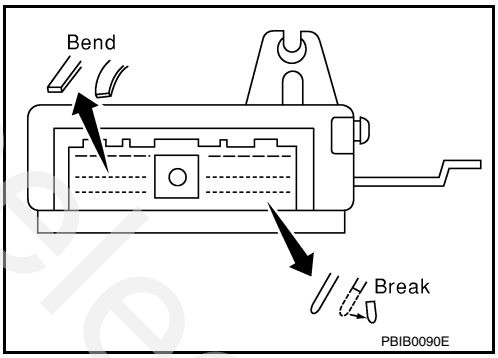
INFOID:0000000012197621

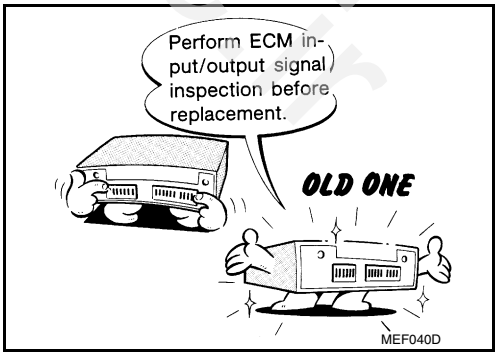
- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery ground cable.**



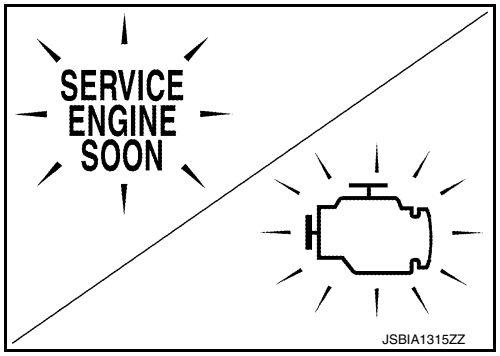
- **Do not disassemble ECM.**
- **If a battery cable is disconnected, the memory will return to the ECM value.**
  The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- **If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.**
  - **Diagnostic trouble codes**
  - **1st trip diagnostic trouble codes**
  - **Freeze frame data**
  - **1st trip freeze frame data**
  - **System readiness test (SRT) codes**
  - **Test values**
- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.**
- **Keep engine control system parts and harness dry.**
- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-96, "Reference Value".**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble electric throttle control actuator.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**



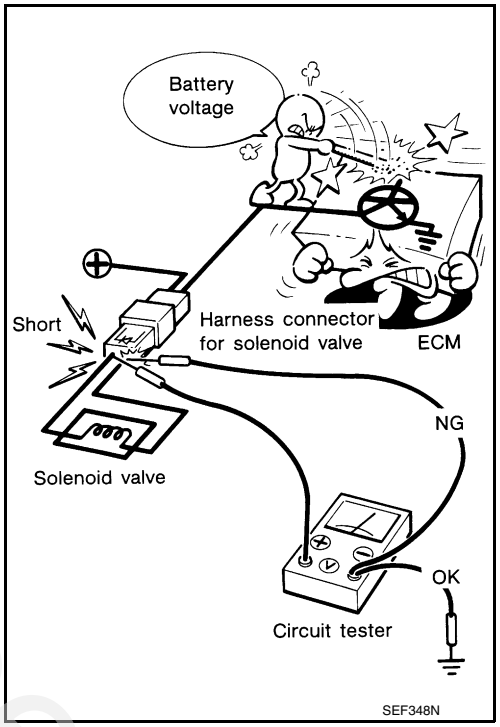




- **After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check. The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.**

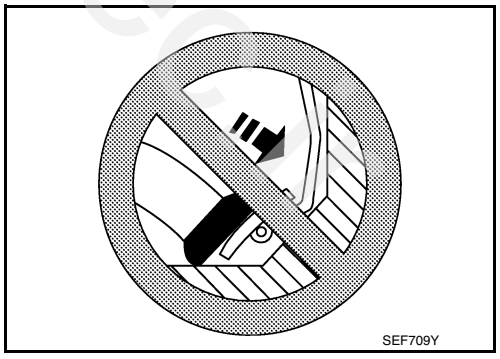


- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.

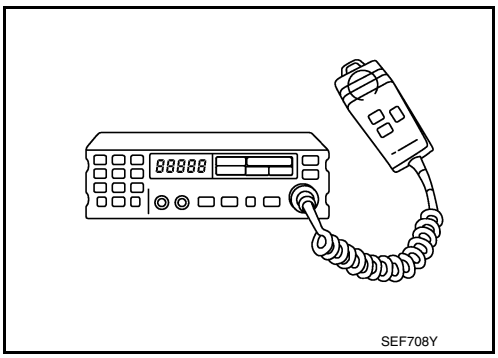


- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**

- **Do not depress accelerator pedal when starting.**
- **Immediately after starting, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**



- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
  - **Keep the antenna as far as possible from the electronic control units.**
  - **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
    Do not let them run parallel for a long distance.
  - **Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.**
  - **Be sure to ground the radio to vehicle body.**



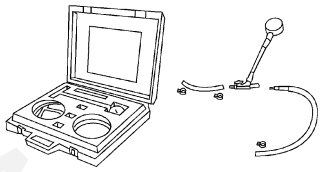
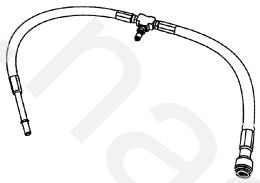
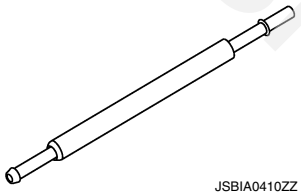
PREPARATION

PREPARATION

Special Service Tools

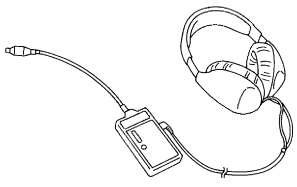
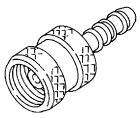
INFOID:0000000012197622

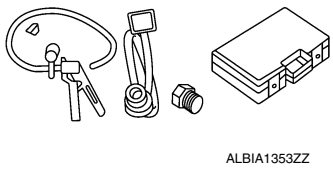
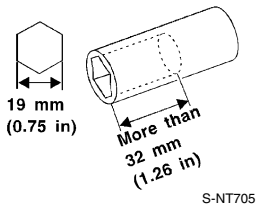
NOTE:
The actual shapes of TechMate tools may differ from those of special service tools illustrated here.

Tool number (TechMate No.) Tool name	Description
(J-44321) Fuel pressure gauge kit  LEC642	Checks fuel pressure
(J-44321-6) Fuel pressure adapter  LBIA0376E	Connects fuel pressure gauge to quick connector type fuel lines.
KV10120000 Fuel tube adapter  JSBIA0410ZZ	Measures fuel pressure

Commercial Service Tools

INFOID:0000000012197623

Tool name (TechMate No.)	Description
Leak detector i.e.: (J-41416)  S-NT703	Locates the EVAP leak
EVAP service port adapter i.e.: (J-41413-OBD)  S-NT704	Applies positive pressure through EVAP service port

Tool name (TechMate No.)	Description
Fuel filler cap adapter i.e.: (J-42909)  ALBIA1353ZZ	Checks fuel tank vacuum relief valve opening pressure
Socket wrench  S-NT705	Removes and installs engine coolant temperature sensor
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)	Reconditions the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor** **b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor**
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	Lubricates oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

SYSTEM DESCRIPTION

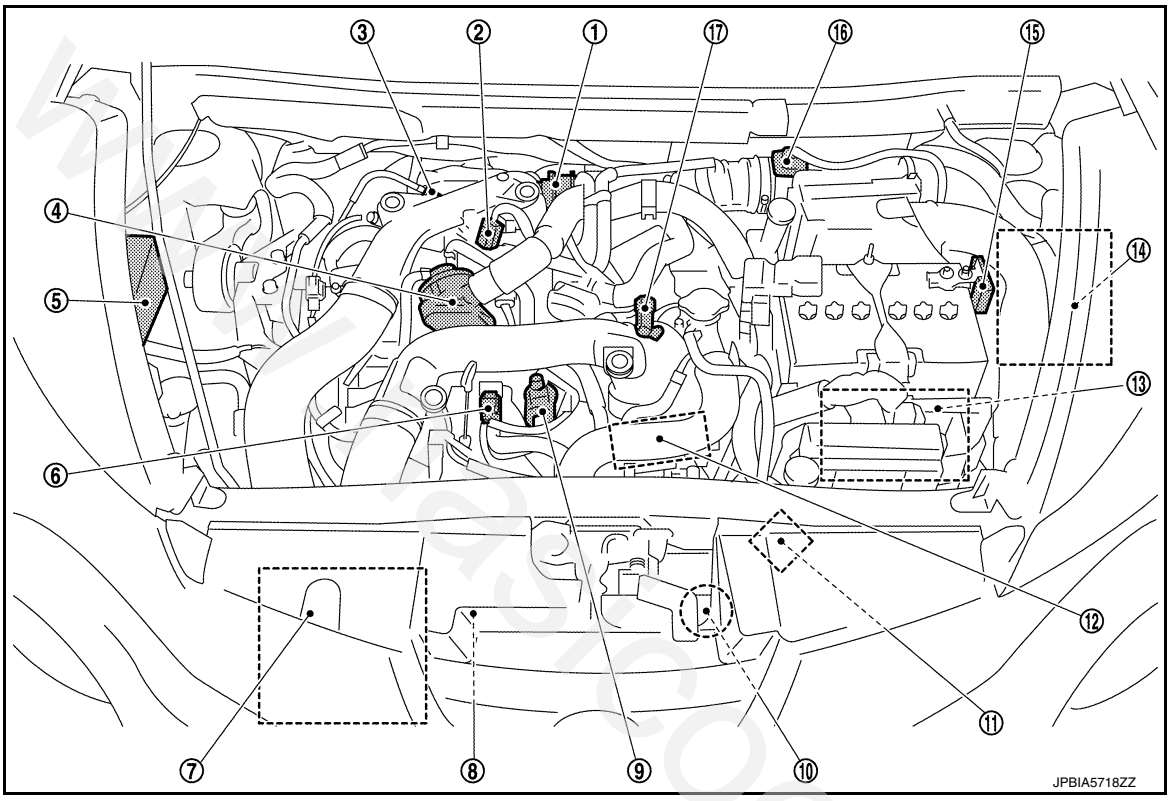
COMPONENT PARTS

ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : Component Parts Location

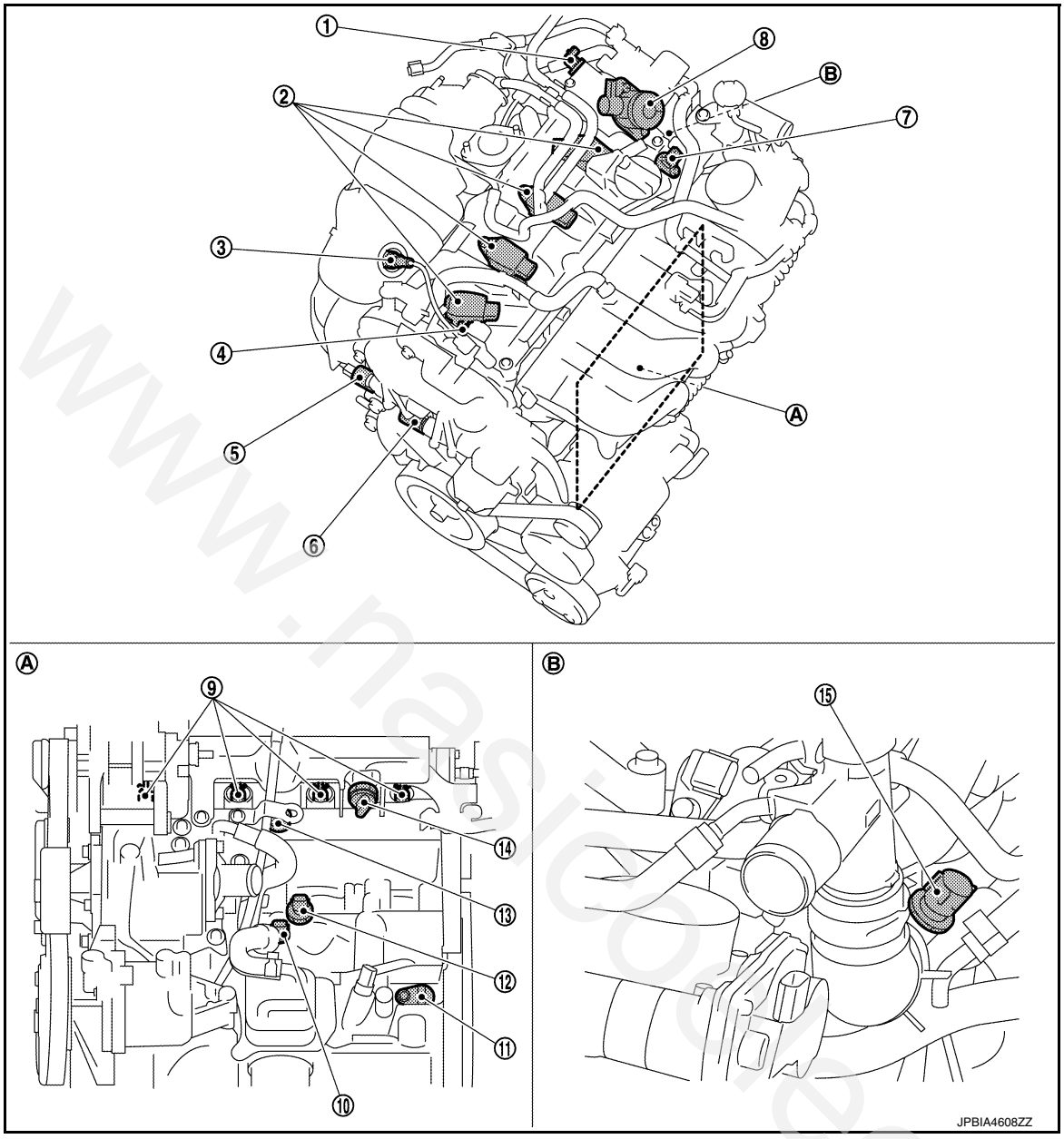
INFOID:0000000012197624

ENGINE ROOM COMPARTMENT



1. Boost control actuator	2. Turbocharger boost control solenoid valve	3. A/F sensor 1
4. Recirculation valve	5. Relay box • Fuel injector relay • Fuel pump relay	6. EVAP canister purge volume control solenoid valve
7. Inter cooler	8. Refrigerant pressure sensor Refer to HAC-7, "Component Parts Location".	9. EVAP service port
10. Cooling fan motor	11. Cooling fan control module	12. Electric throttle control actuator (with built in throttle position sensor and throttle control motor)
13. ECM	14. IPDM E/R Refer to PCS-5, "Component Parts Location".	15. Battery current sensor (with battery temperature sensor)
16. Mass air flow sensor (with intake air temperature sensor 1)	17. Turbocharger boost sensor (with intake air temperature sensor 2)	

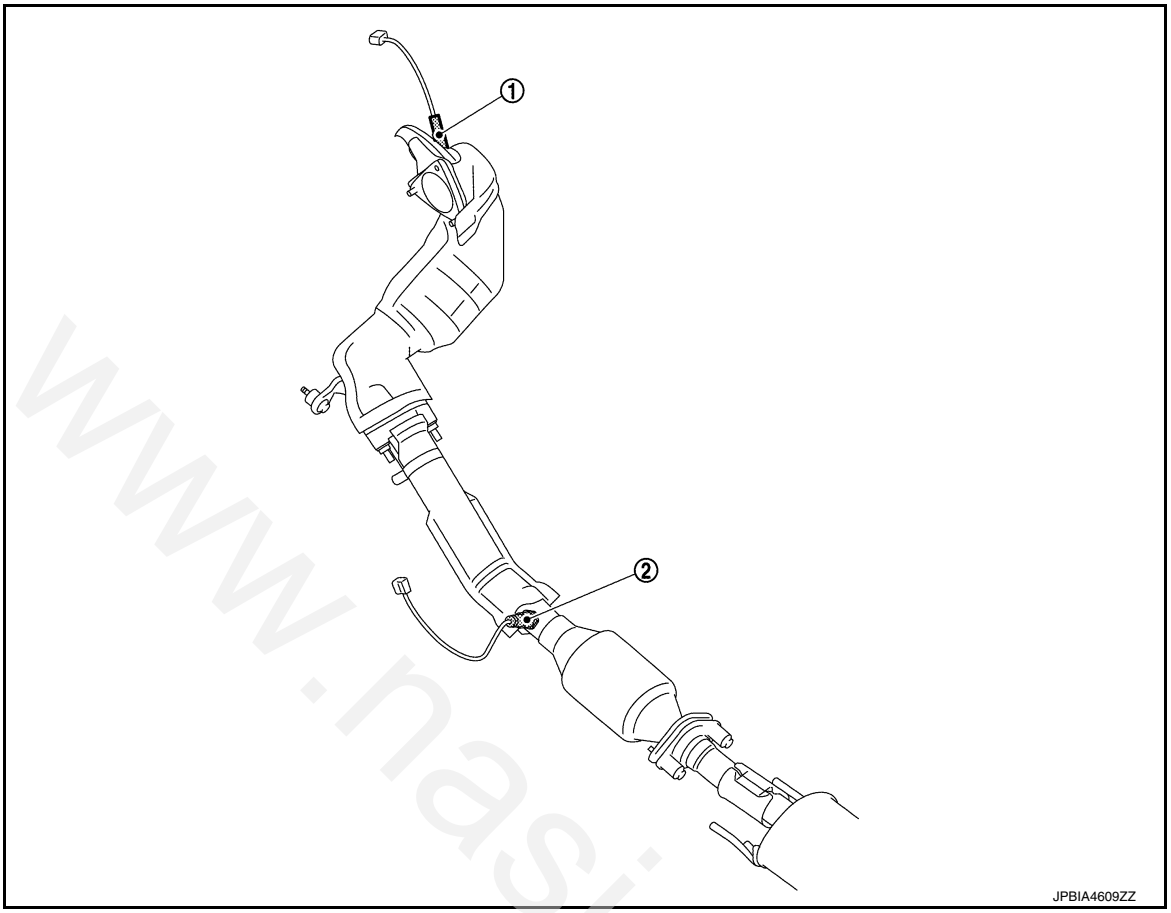
ENGINE COMPARTMENT



1. Exhaust valve timing control position sensor	2. Ignition coil (with power transistor)	3. A/F sensor 1
4. PCV valve	5. Exhaust valve timing control solenoid valve	6. Intake valve timing control solenoid valve
7. Camshaft position sensor (PHASE)	8. High pressure fuel pump	9. Fuel injector
10. Engine oil temperature sensor	11. Crankshaft position sensor (POS)	12. Engine oil pressure sensor
13. Knock sensor	14 Fuel rail pressure sensor	15. Engine coolant temperature sensor
A. Cylinder block left side	B. Engine rear end	

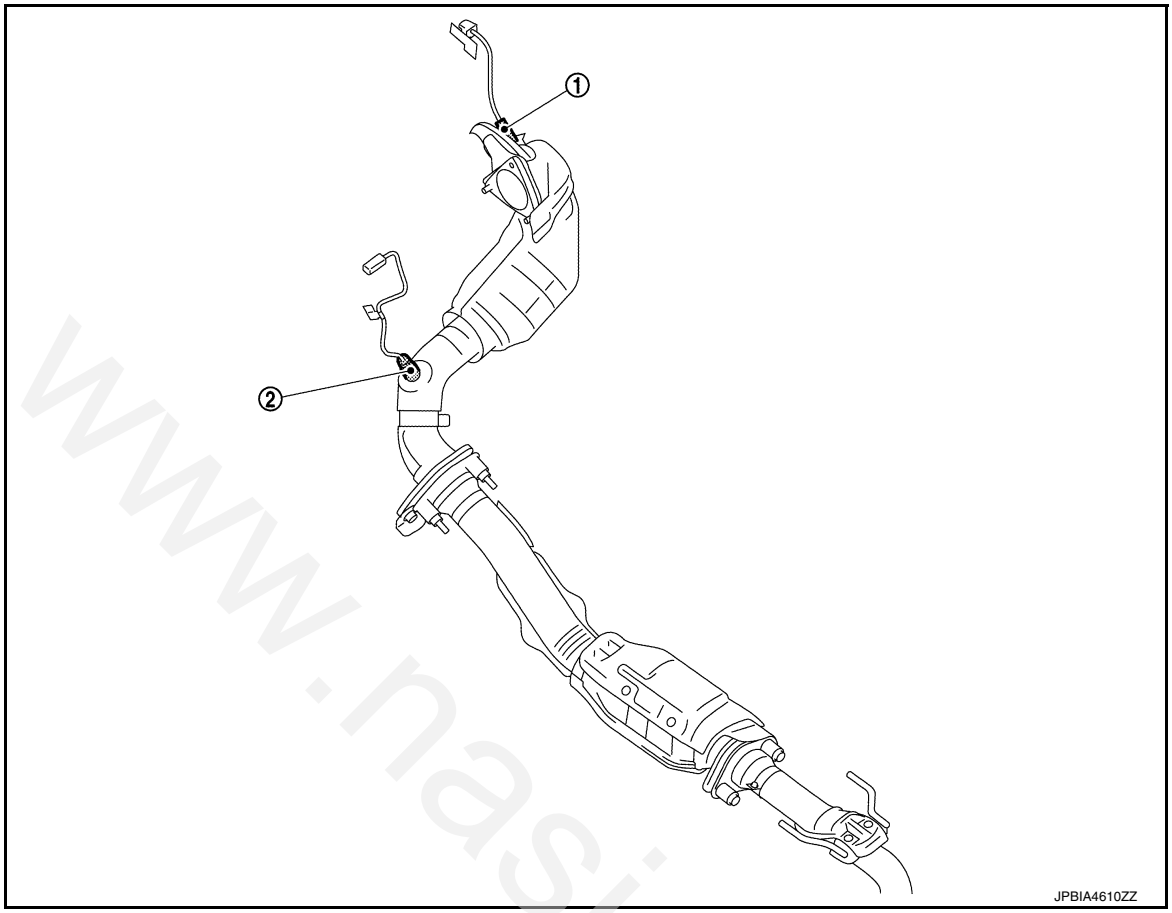
EXHAUST COMPARTMENT

2WD



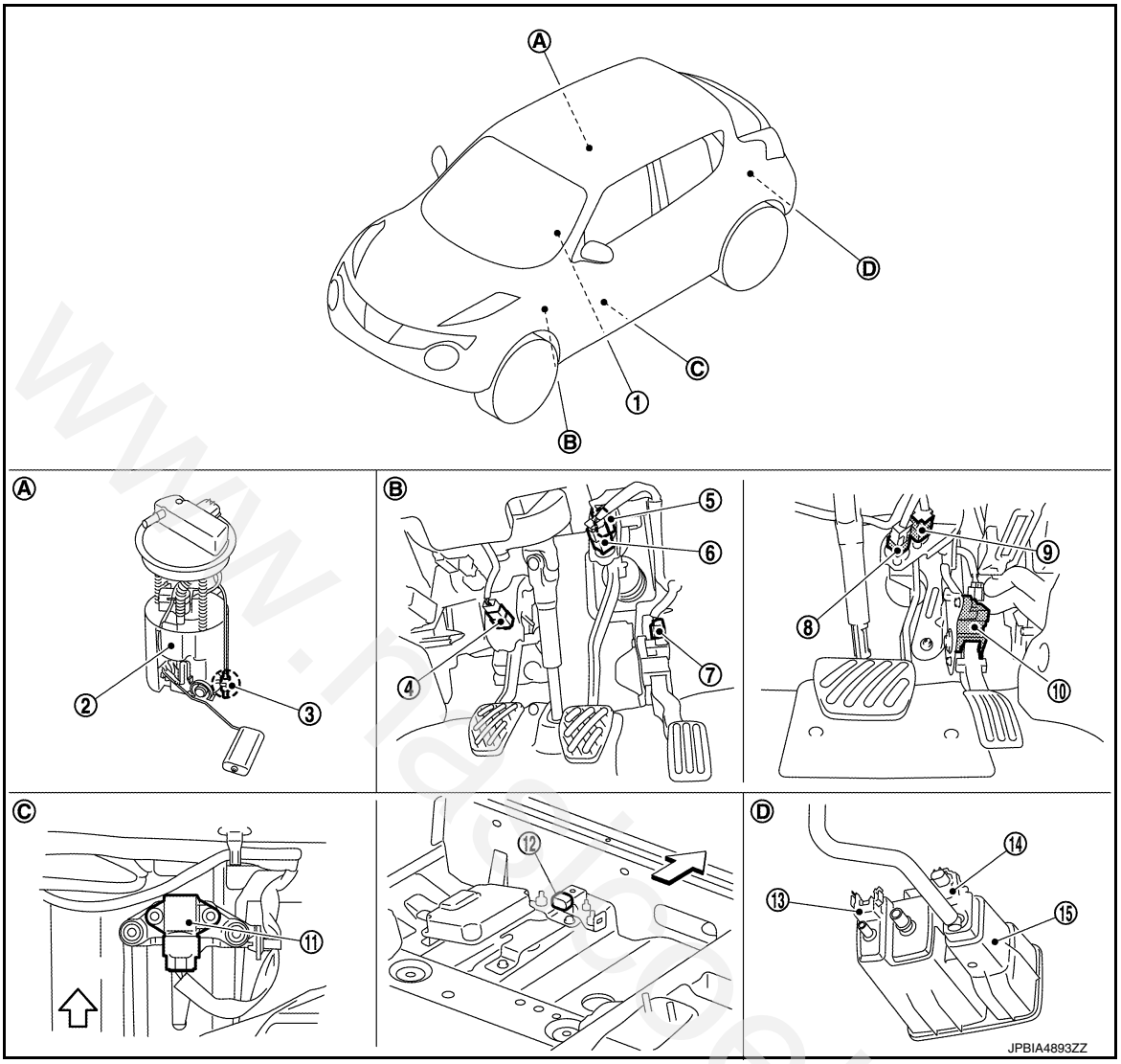
1. A/F sensor 1
2. Heated oxygen sensor 2

AWD



1. A/F sensor 1
2. Heated oxygen sensor 2

BODY COMPARTMENT



1. ASCD steering switch
2. Fuel level sensor unit, fuel filter and fuel pump assembly
3. Fuel tank temperature sensor
4. Clutch pedal position switch (with M/T models)
5. Brake pedal position switch (with M/T models)
6. Stop lamp switch (with M/T models)
7. Accelerator pedal position sensor (with M/T models)
8. Brake pedal position switch (with CVT models)
9. Stop lamp switch (with CVT models)
10. Accelerator pedal position sensor (with CVT models)
11. G sensor (with 2WD models)
12. G sensor (with AWD models)
13. EVAP control system pressure sensor
14. EVAP canister vent control valve
15. EVAP canister
- A. Under of right side second seat
- B. Periphery of pedals
- C. Under of left side front seat
- D. Fuel tank rear
- ⇦ : Vehicle front

ENGINE CONTROL SYSTEM : Component Description

INFOID:0000000012197625

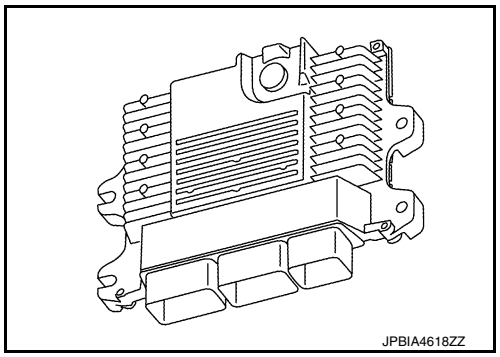
Component	Reference
ECM	EC-33, "ECM"
Accelerator pedal position sensor	EC-33, "Accelerator Pedal Position Sensor"

Component	Reference
Electric throttle control actuator	EC-33, "Electric Throttle Control Actuator"
Throttle control motor	
Throttle position sensor	
Ignition coil with power transistor	EC-34, "Ignition Coil With Power Transistor"
Fuel injector	EC-35, "Fuel Injector"
High pressure fuel pump	EC-35, "High Pressure Fuel Pump"
Fuel rail pressure sensor	EC-36, "Fuel Rail Pressure Sensor"
Low pressure fuel pump	EC-36, "Low Pressure Fuel Pump"
Fuel tank temperature sensor	EC-36, "Fuel Tank Temperature Sensor"
Fuel level sensor	EC-36, "Fuel Level Sensor"
Mass air flow sensor	EC-37, "Mass Air Flow Sensor (With Intake Air Temperature Sensor 1)"
Intake air temperature sensor 1	
Turbocharger	EC-37, "Turbocharger"
Boost control actuator	
Turbocharger boost control solenoid valve	
Turbocharger boost sensor	EC-38, "Turbocharger Boost Sensor (With Intake Air Temperature Sensor 2)"
Intake air temperature sensor 2	
Engine coolant temperature sensor	EC-39, "Engine Coolant Temperature Sensor"
Crankshaft position sensor	EC-39, "Crankshaft Position Sensor (POS)"
Camshaft position sensor	EC-40, "Camshaft Position Sensor (PHASE)"
Intake valve timing control solenoid valve	EC-40, "Intake Valve Timing Control Solenoid Valve"
Exhaust valve timing control position sensor	EC-40, "Exhaust Valve Timing Control Position Sensor"
Exhaust valve timing control solenoid valve	EC-41, "Exhaust Valve Timing Control Solenoid Valve"
Air fuel ratio (A/F) sensor 1	EC-41, "Air Fuel Ratio (A/F) Sensor 1"
Heated oxygen sensor 2	EC-41, "Heated Oxygen Sensor 2"
Knock sensor	EC-42, "Knock Sensor"
Engine oil pressure sensor	EC-42, "Engine Oil Pressure Sensor"
Engine oil temperature sensor	EC-43, "Engine Oil Temperature Sensor"
Cooling fan	EC-43, "Cooling Fan"
EVAP canister purge volume control solenoid valve	EC-43, "EVAP Canister Purge Volume Control Solenoid Valve"
EVAP canister vent control valve	EC-44, "EVAP Canister Vent Control Valve"
EVAP control system pressure sensor	EC-44, "EVAP Control System Pressure Sensor"
Battery current sensor	EC-44, "Battery Current Sensor (With Battery Temperature Sensor)"
Battery temperature sensor	
Malfunction indicator lamp (MIL)	EC-45, "Malfunction Indicator lamp (MIL)"
Oil pressure warning lamp	EC-45, "Oil Pressure Warning Lamp"
Refrigerant pressure sensor	EC-45, "Refrigerant Pressure Sensor"
Stop lamp switch	EC-45, "Stop Lamp Switch & Brake Pedal Position Switch"
Brake pedal position switch	
Clutch pedal position switch	EC-46, "Clutch Pedal Position Switch"
ASCD steering switch	EC-46, "ASCD Steering Switch"
Information display	EC-46, "Information Display"

ECM

INFOID:0000000012197626

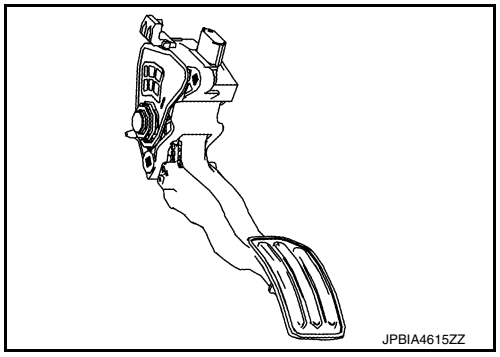
The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



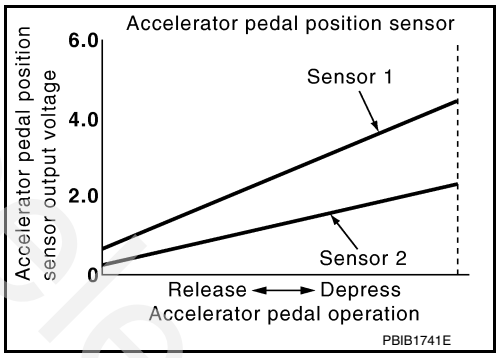
Accelerator Pedal Position Sensor

INFOID:0000000012197627

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.



Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

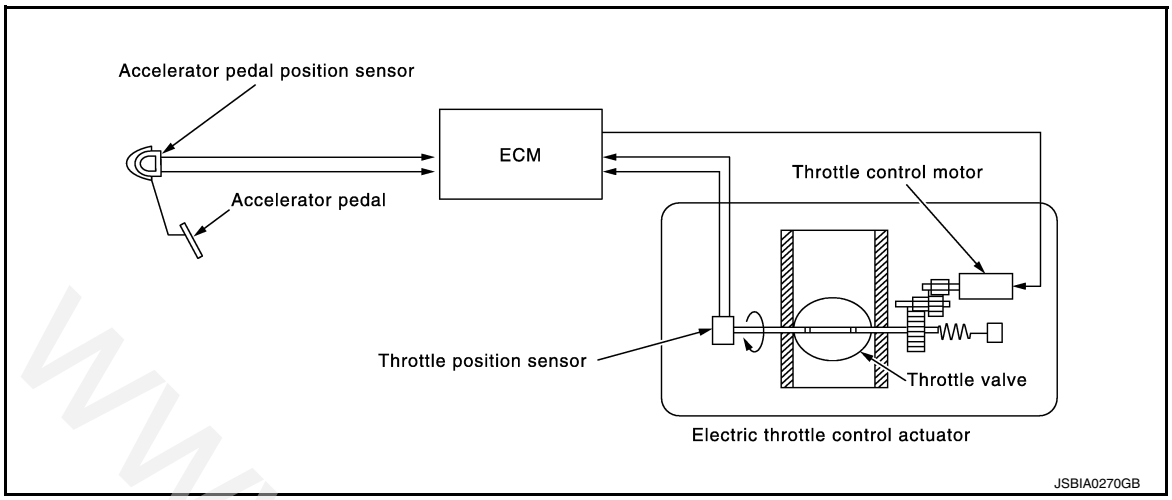


Electric Throttle Control Actuator

INFOID:0000000012197628

OUTLINE

Electric throttle control actuator consists of throttle body, throttle valve, throttle control motor and throttle position sensor.



THROTTLE CONTROL MOTOR RELAY

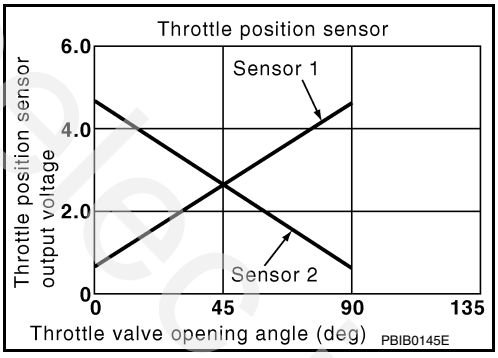
Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

THROTTLE CONTROL MOTOR

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

THROTTLE POSITION SENSOR

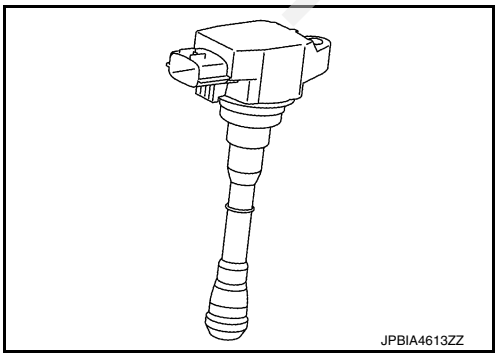
The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



Ignition Coil With Power Transistor

INFOID:0000000012197629

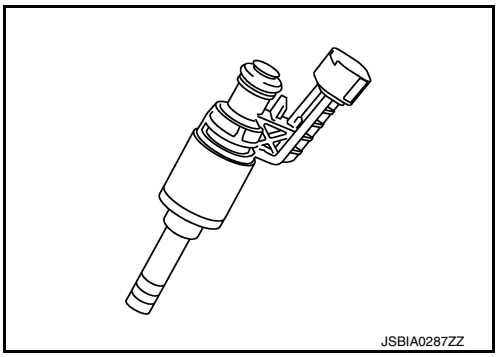
The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.



Fuel Injector

INFOID:0000000012197630

For the fuel injector, a high pressure fuel injector is used and this enables a high-pressure fuel injection at a high voltage within a short time. The ECM is equipped with an injector driver unit and actuates the fuel injector at a high voltage (approximately 65 V at the maximum).

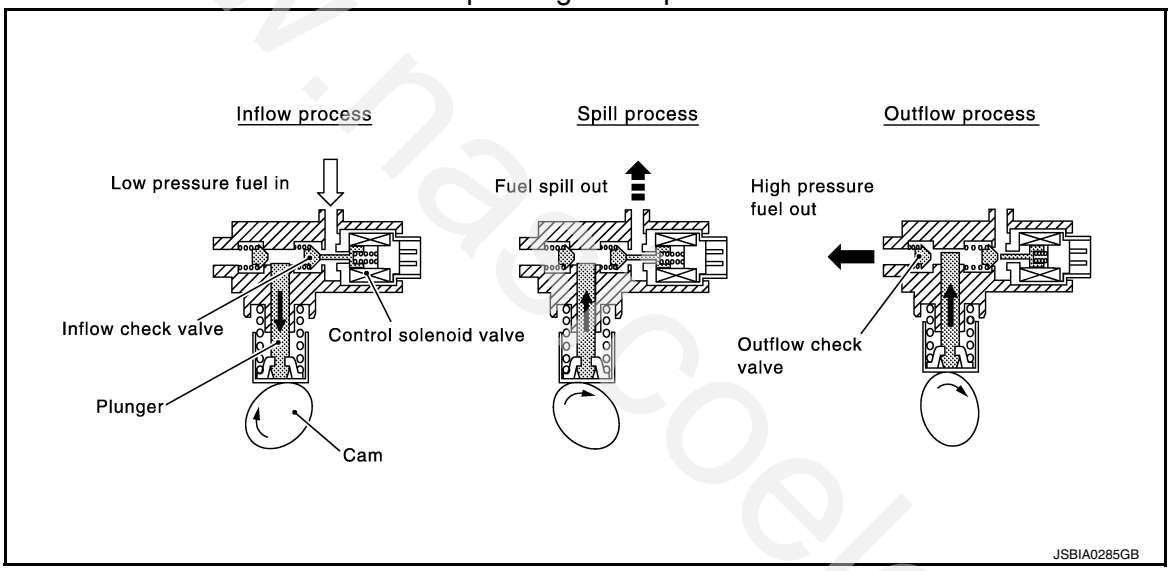


High Pressure Fuel Pump

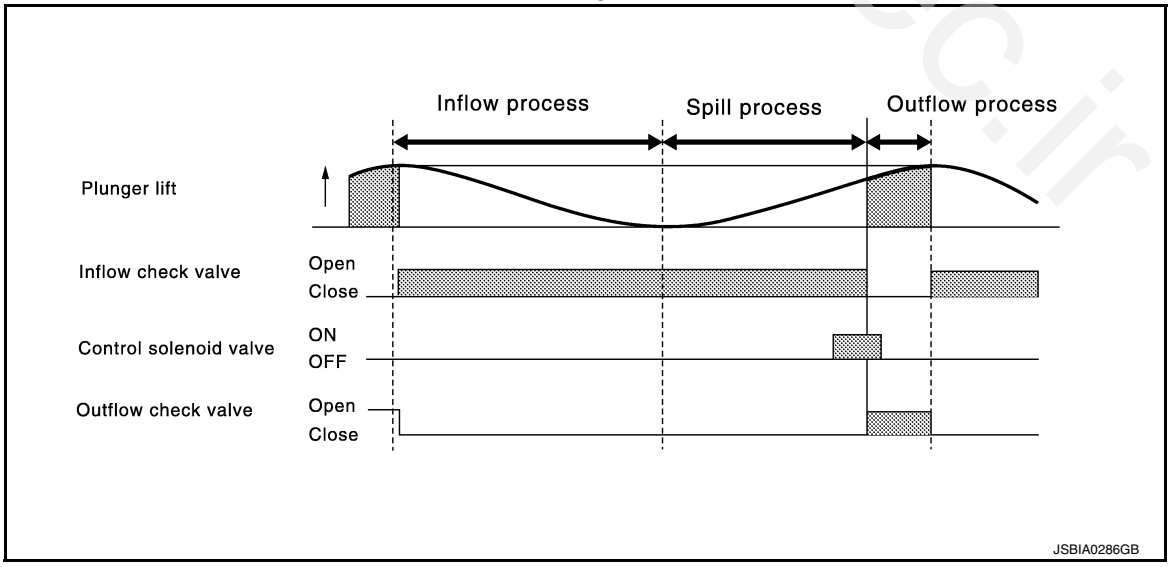
INFOID:0000000012197631

The high pressure fuel pump is activated by the exhaust camshaft.
ECM controls the high pressure fuel pump control solenoid valve built into the high pressure fuel pump and adjusts the amount of discharge by changing the suction timing of the low pressure fuel.

Operating Description



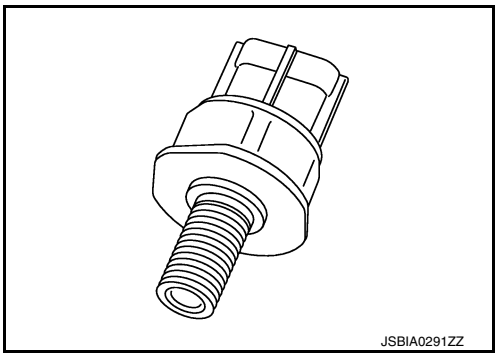
Operating Chart



Fuel Rail Pressure Sensor

INFOID:0000000012197632

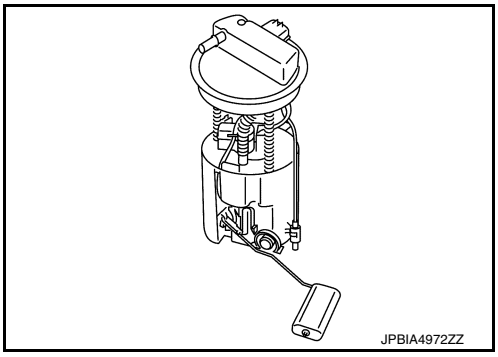
The fuel rail pressure (FRP) sensor is placed to the fuel rail and measures fuel pressure in the fuel rail. The sensor transmits voltage signal to the ECM. As the pressure increases, the voltage rises. The ECM controls the fuel pressure in the fuel rail by operating high pressure fuel pump. The ECM uses the signal from fuel rail pressure sensor as a feedback signal.



Low Pressure Fuel Pump

INFOID:0000000012197633

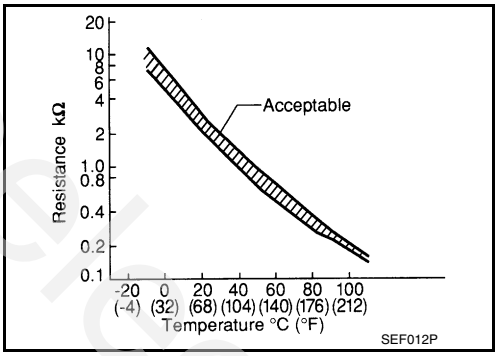
The low pressure fuel pump is integrated with a fuel pressure regulator and a fuel filter. This pump is build into the fuel tank.



Fuel Tank Temperature Sensor

INFOID:0000000012197634

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



<Reference data>

Fluid temperature [°C (°F)]	Voltage* [V]	Resistance [kΩ]
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminals.

Fuel Level Sensor

INFOID:0000000012197635

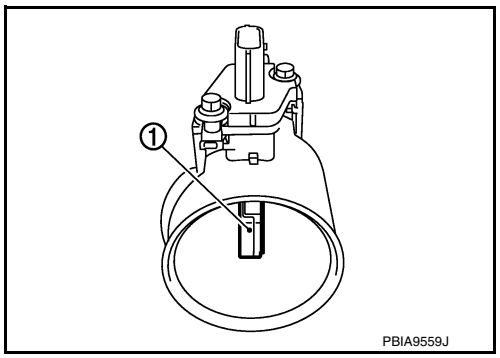
The fuel level sensor is mounted in the fuel level sensor unit.
The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM via the CAN communication line.
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.

Mass Air Flow Sensor (With Intake Air Temperature Sensor 1)

INFOID:0000000012197636

MASS AIR FLOW SENSOR

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.



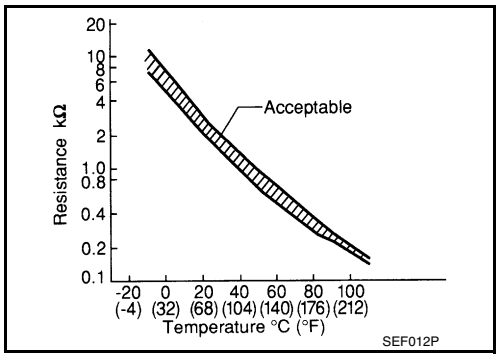
INTAKE AIR TEMPERATURE SENSOR 1

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

<Reference data>

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

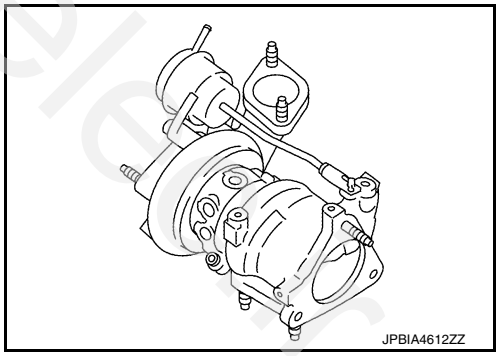
*: These data are reference values and are measured between ECM terminals.



Turbocharger

INFOID:0000000012197637

Turbocharger boost is controlled by adjusting the pressure to the diaphragm of the boost control actuator.

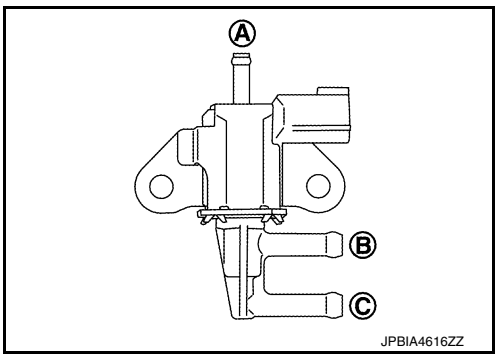


TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Turbocharger boost control solenoid valve is ON/OFF duty controlled by ECM.

And it adjusts the pressure in the diaphragm of the boost control actuator. The longer the turbocharger boost control solenoid valve is ON, the higher the boost is increased.

A. From boost pipe
B. To boost control actuator
C. To Air cleaner

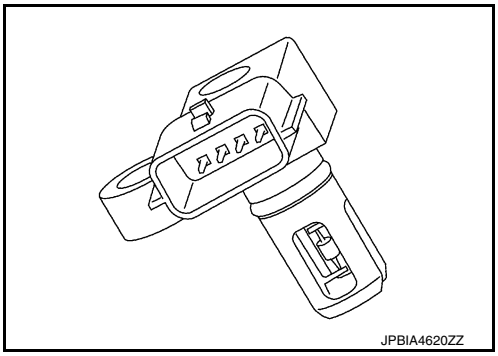


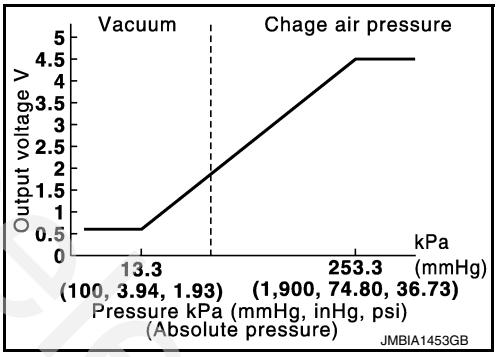
Turbocharger Boost Sensor (With Intake Air Temperature Sensor 2)

INFOID:0000000012197638

TURBOCHARGER BOOST SENSOR

The turbocharger boost sensor detects the pressure of the outlet side of the intercooler. When increasing the pressure, the output voltage of the sensor to the ECM increases.





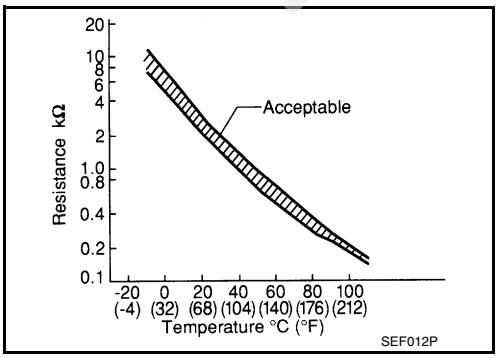
INTAKE AIR TEMPERATURE SENSOR 2

The intake air temperature sensor 2 is built-into turbocharger boost sensor. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

<Reference data>

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

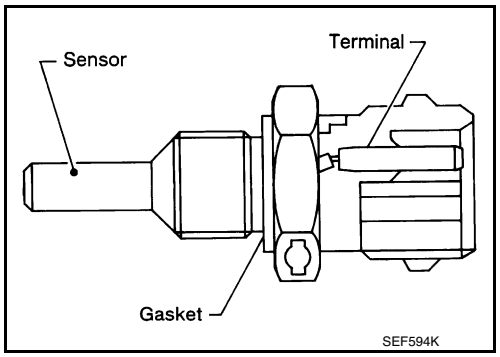
*: These data are reference values and are measured between ECM terminals.



Engine Coolant Temperature Sensor

INFOID:0000000012197639

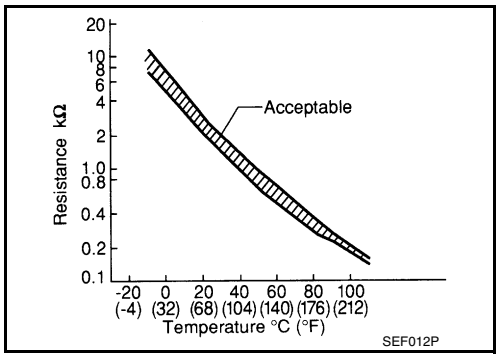
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The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



<Reference data>

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

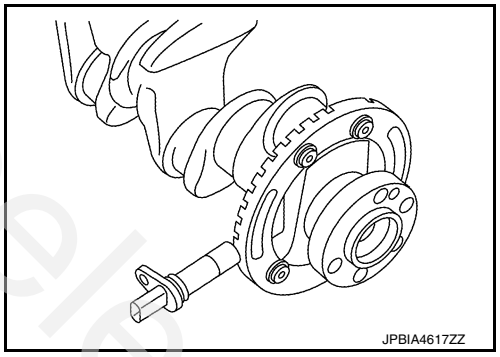
*: These data are reference values and are measured between ECM terminals.

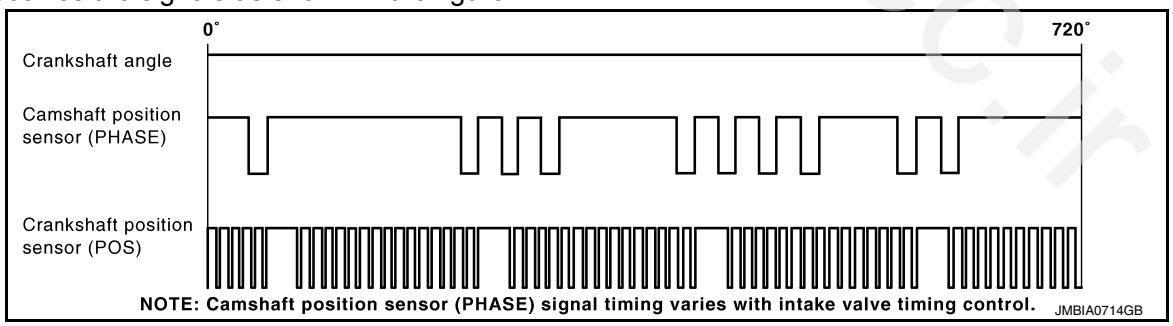


Crankshaft Position Sensor (POS)

INFOID:0000000012197640

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

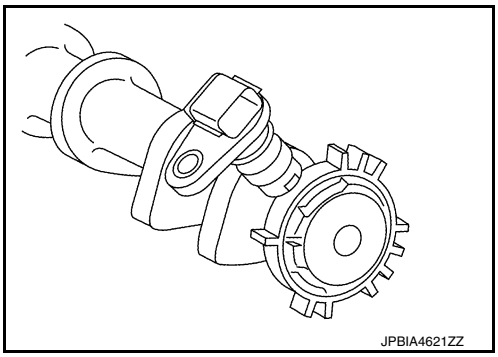


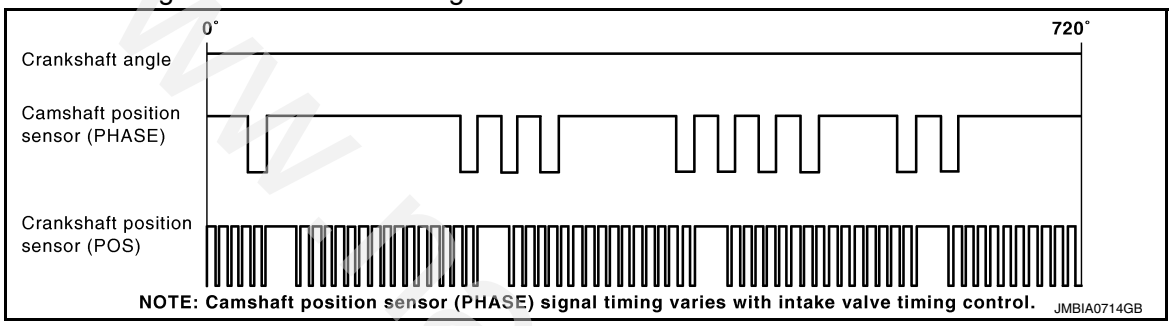


Camshaft Position Sensor (PHASE)

INFOID:0000000012197641

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


JPBIA4621ZZ

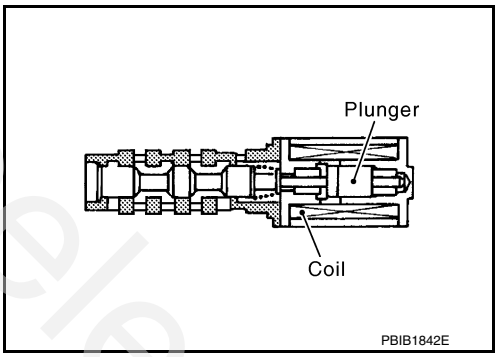


NOTE: Camshaft position sensor (PHASE) signal timing varies with intake valve timing control. JMBIA0714GB

Intake Valve Timing Control Solenoid Valve

INFOID:0000000012197642

Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.
The longer pulse width advances valve angle.
The shorter pulse width retards valve angle.
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.

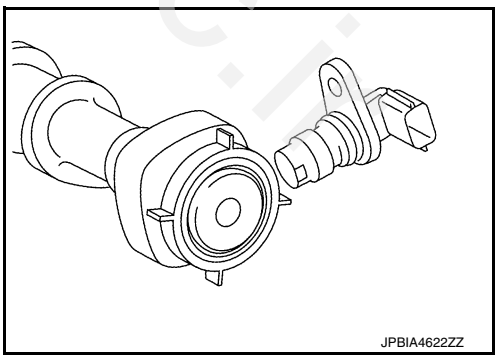


PBIB1842E

Exhaust Valve Timing Control Position Sensor

INFOID:0000000012197643

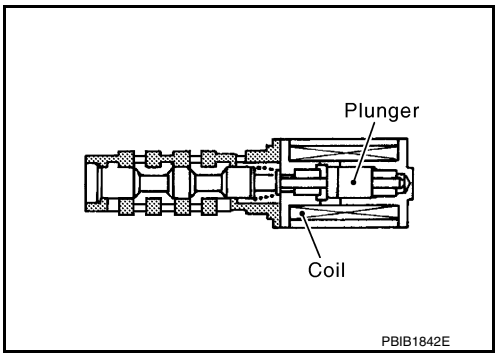
Exhaust valve timing control position sensor detects the protrusion of the signal plate installed to the exhaust camshaft front end.
This sensor signal is used for sensing a position of the exhaust camshaft.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low 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.


JPBIA4622ZZ

Exhaust Valve Timing Control Solenoid Valve

INFOID:0000000012197644

Exhaust valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The exhaust valve timing control solenoid valve changes the oil amount and direction of flow through exhaust valve timing control unit or stops oil flow.
The longer pulse width retards valve angle.
The shorter pulse width advances valve angle.
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the exhaust valve angle at the control position.

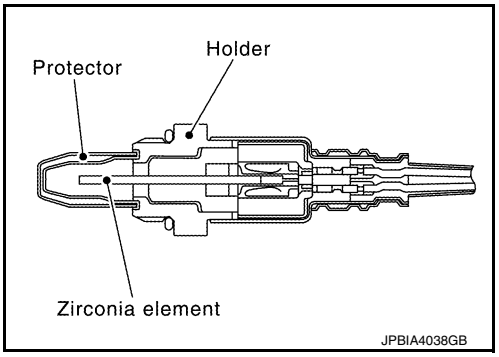


Air Fuel Ratio (A/F) Sensor 1

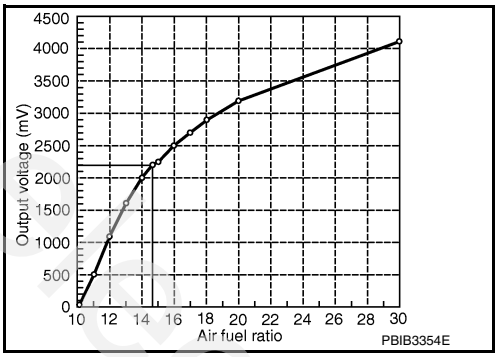
INFOID:0000000012197645

DESCRIPTION

The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.
The sensor is capable of precise measurement λ = 1, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.
The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of approximately 760°C (1,400°F).



A/F SENSOR 1 HEATER

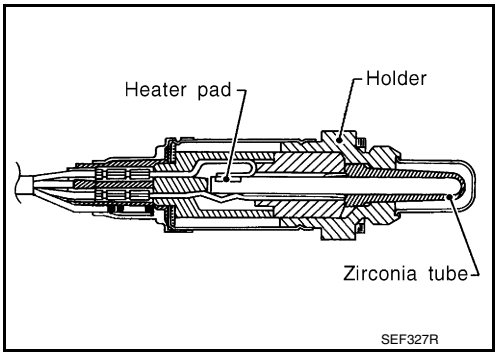
A/F sensor 1 heater is integrated in the sensor.
The ECM performs ON/OFF duty control of the A/F sensor 1 heater corresponding to the engine operating condition to keep the temperature of A/F sensor 1 element within the specified range.

Heated Oxygen Sensor 2

INFOID:0000000012197646

DESCRIPTION

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



HEATED OXYGEN SENSOR 2 HEATER

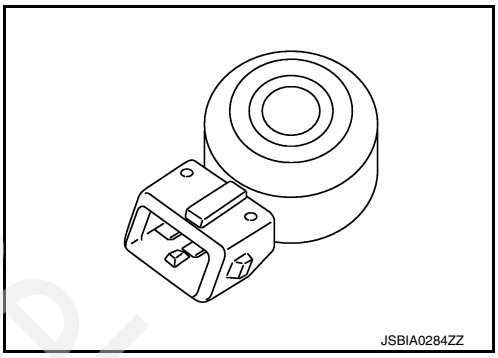
Heated oxygen sensor 2 heater is integrated in the sensor.
The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

Engine speed	Heated oxygen sensor 2 heater
Above 3,600 rpm	OFF
Below 3,600 rpm after the following conditions are met. • Engine: After warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

Knock Sensor

INFOID:0000000012197647

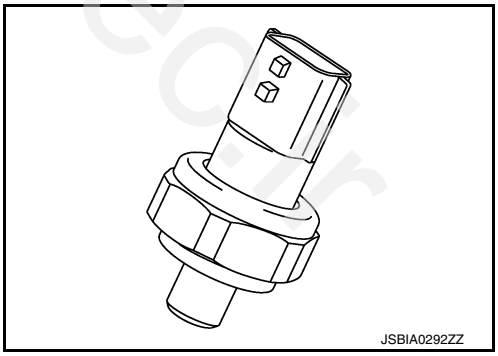
The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.



Engine Oil Pressure Sensor

INFOID:0000000012197648

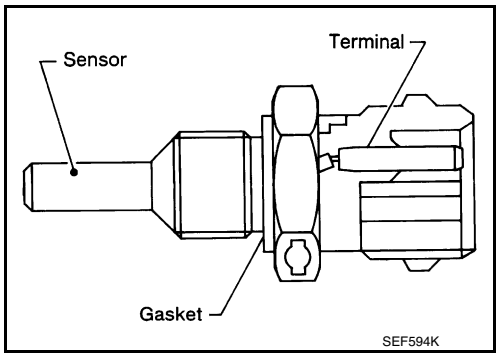
The engine oil pressure (EOP) sensor is detects engine oil pressure and transmits a voltage signal to the ECM.



Engine Oil Temperature Sensor

INFOID:0000000012197649

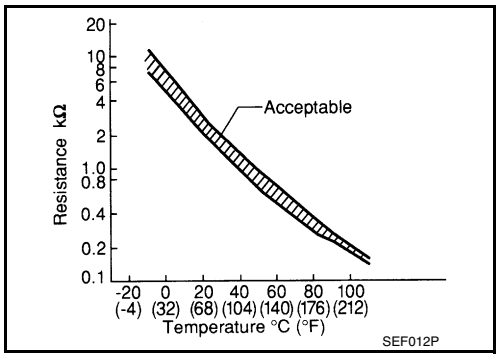
The engine oil temperature sensor is used to detect the engine oil temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine oil temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance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



<Reference data>

Engine oil temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.37 - 2.63
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260
110 (230)	0.6	0.143 - 0.153

*: These data are reference values and are measured between ECM terminals.



Cooling Fan

INFOID:0000000012197650

COOLING FAN CONTROL MODULE

Cooling fan control module receives ON/OFF pulse duty signal from IPDM E/R. Corresponding to this ON/OFF pulse duty signal, cooling fan control module sends cooling fan motor operating voltage to cooling fan motor. The revolution speed of cooling fan motor is controlled by duty cycle of the voltage.

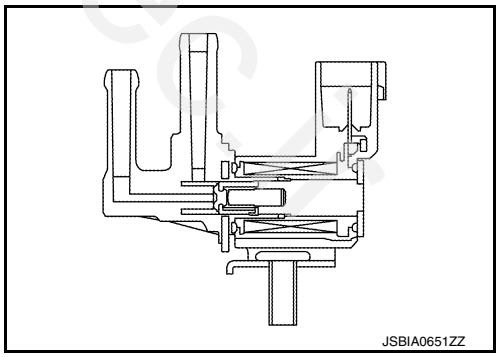
COOLING FAN MOTOR

Cooling fan motor receives cooling fan motor operating voltage from cooling fan control module. The revolution speed of cooling fan motor is controlled by duty cycle of the voltage.

EVAP Canister Purge Volume Control Solenoid Valve

INFOID:0000000012197651

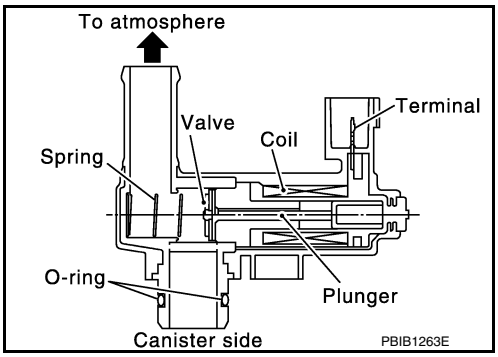
The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



EVAP Canister Vent Control Valve

INFOID:0000000012197652

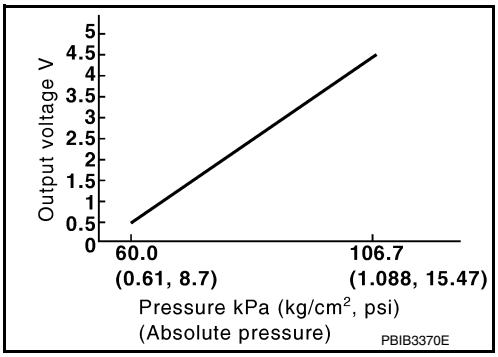
The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows “EVAP Control System” diagnosis.



EVAP Control System Pressure Sensor

INFOID:0000000012197653

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.

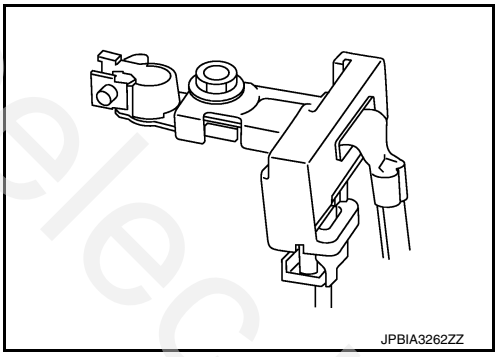


Battery Current Sensor (With Battery Temperature Sensor)

INFOID:0000000012197654

OUTLINE

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator.
Based on sensor signals, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer toCHG-8, "POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : System Description".



CAUTION:
Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then the battery discharge may occur.

BATTERY CURRENT SENSOR

The battery current sensor is installed to the battery negative cable. The sensor measures the charging/discharging current of the battery.

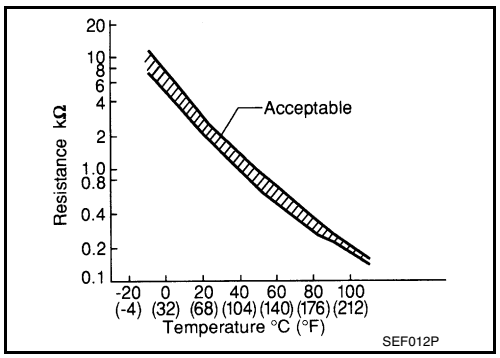
BATTERY TEMPERATURE SENSOR

Battery temperature sensor is integrated in battery current sensor.
The sensor measures temperature around the battery.
The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	3.333	1.9 - 2.1
90 (194)	0.969	0.222 - 0.258

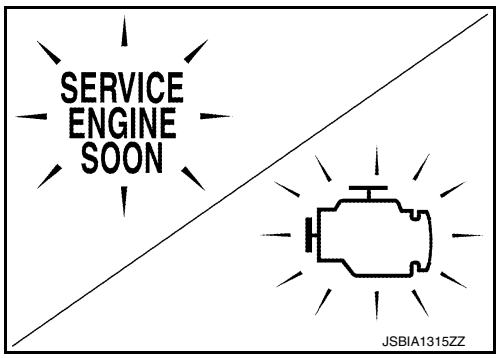
*: These data are reference values and are measured between battery temperature sensor signal terminal and sensor ground.



Malfunction Indicator lamp (MIL)

INFOID:0000000012197655

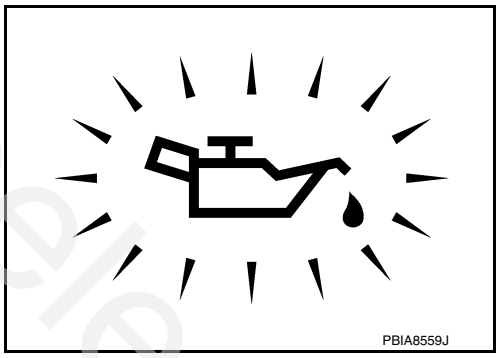
The Malfunction Indicator lamp (MIL) is located on the combination meter.
The MIL will illuminate when the ignition switch is turned ON without the engine running. This is a bulb check.
When the engine is started, the MIL should turn OFF. If the MIL remains illuminated, the on board diagnostic system has detected an engine system malfunction.
For details, refer to EC-81, "DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)".



Oil Pressure Warning Lamp

INFOID:0000000012197656

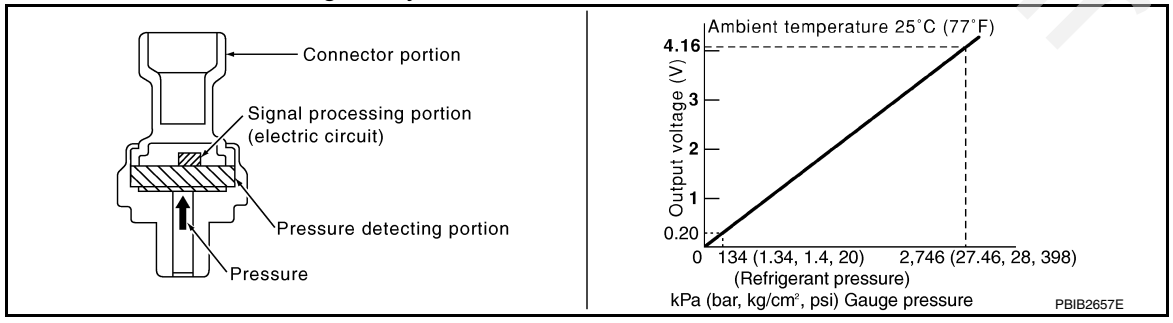
Oil pressure warning lamp is located on the combination meter.
It indicates the low pressure of the engine oil and the malfunction of the engine oil pressure system.
Combination meter turns the oil pressure warning lamp ON/OFF according to the oil pressure warning lamp signal received from ECM via CAN communication.



Refrigerant Pressure Sensor

INFOID:0000000012197657

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



Stop Lamp Switch & Brake Pedal Position Switch

INFOID:0000000012197658

Stop lamp switch and brake pedal position switch are installed to brake pedal bracket.
ECM detects the state of the brake pedal by those two types of input (ON/OFF signal).

Brake pedal	Brake pedal position switch	Stop lamp switch
Released	ON	OFF
Depressed	OFF	ON

Clutch Pedal Position Switch

INFOID:0000000012197659

When the clutch pedal is depressed, the clutch pedal position switch turns OFF and the clutch pedal position switch signal is sent to the ECM. The ECM judges the clutch pedal conditions via the signal (ON or OFF).

ASCD Steering Switch

INFOID:0000000012197660

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

Information Display

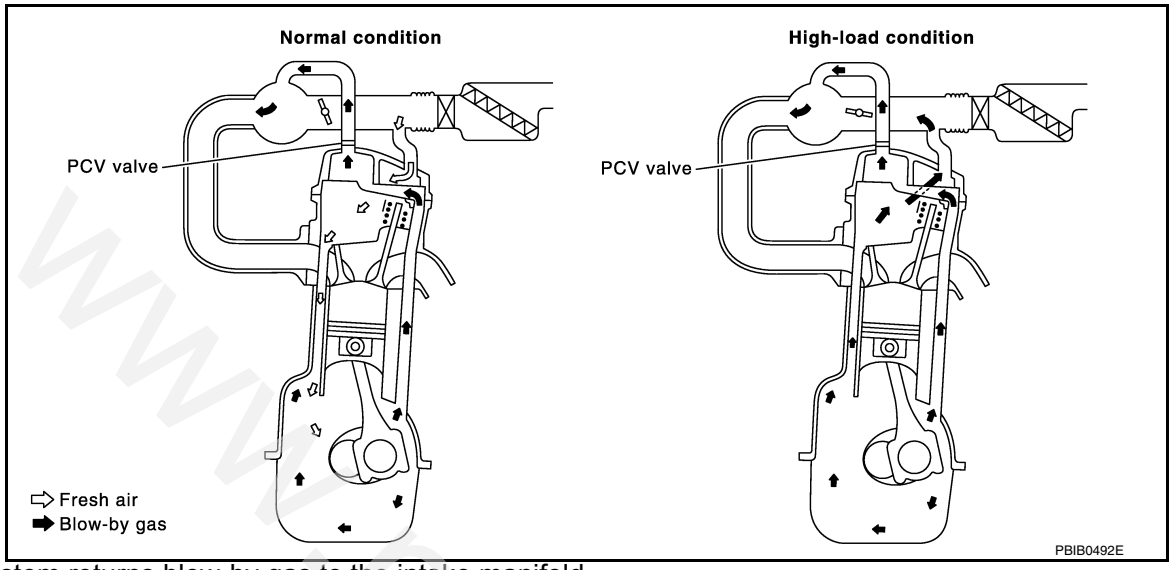
INFOID:0000000012197661

The operation mode of the ASCD is indicated on the information display in the combination meter.
ECM transmits the status signal to the combination meter via CAN communication according to ASCD operation.

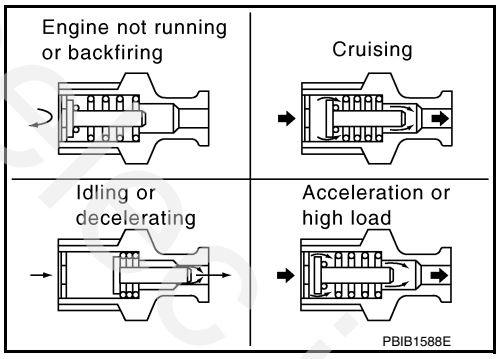
STRUCTURE AND OPERATION

Positive Crankcase Ventilation

INFOID:0000000012197662

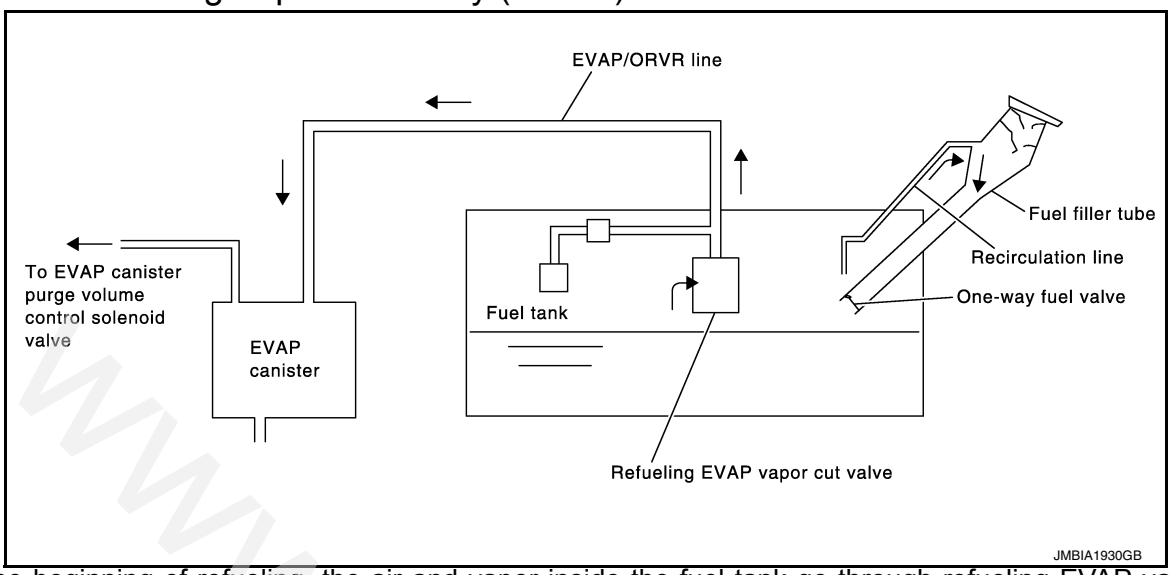


This system returns blow-by gas to the intake manifold.
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.
The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



On Board Refueling Vapor Recovery (ORVR)

INFOID:0000000012197663



From the beginning of refueling, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve and EVAP/ORVR line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

WARNING:

When conducting inspections below, be sure to observe the following:

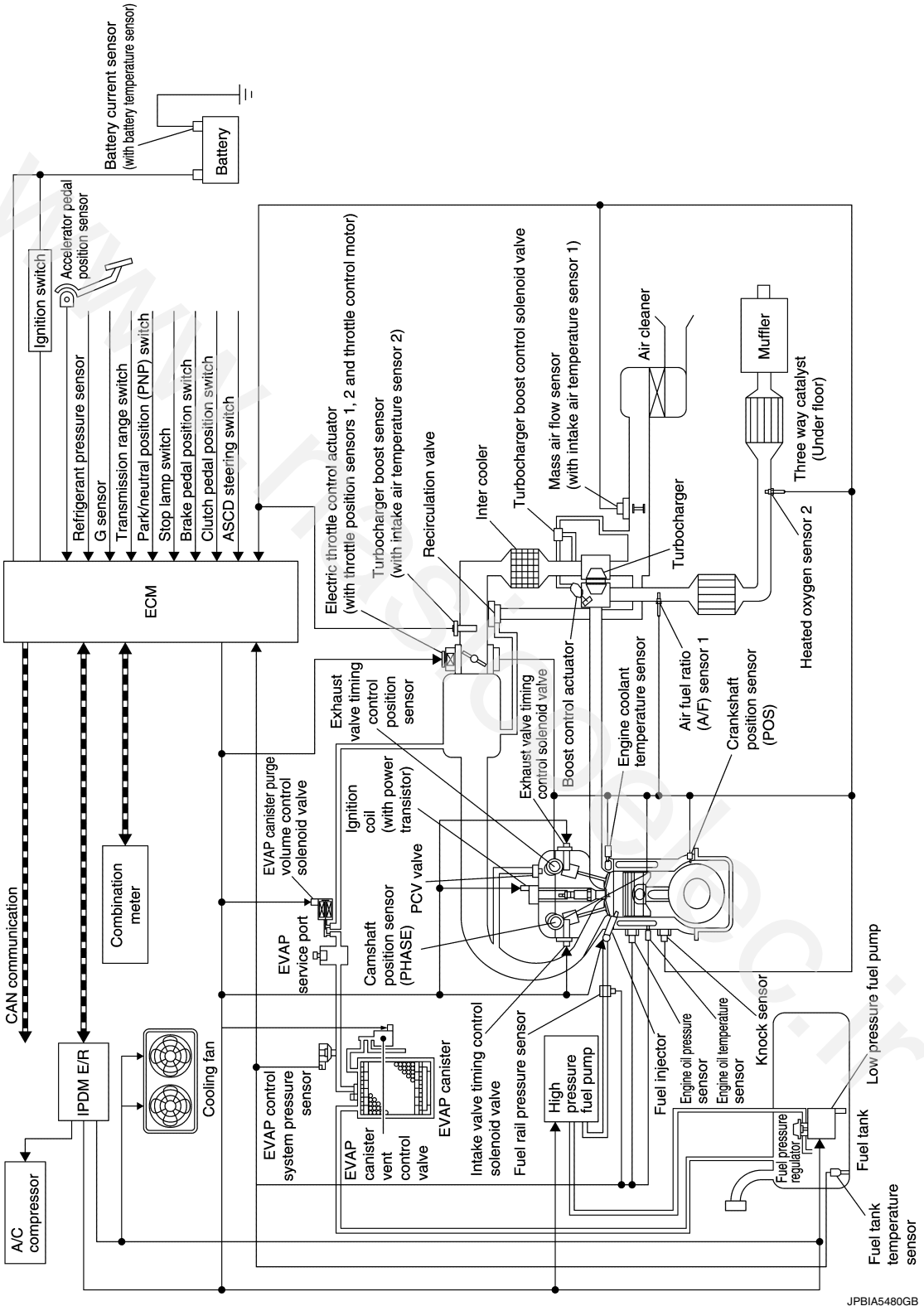
- **Put a "CAUTION: FLAMMABLE" sign in workshop.**
- **Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.**
- **Be sure to furnish the workshop with a CO_2 fire extinguisher.**

CAUTION:

- **Before removing fuel line parts, carry out the following procedures:**
  - **Put drained fuel in an explosion-proof container and put lid on securely.**
  - **Release fuel pressure from fuel line. Refer to EC-586, "Inspection".**
  - **Disconnect battery ground cable.**
- **Always replace O-ring when the fuel gauge retainer is removed.**
- **Do not kink or twist hose and tube when they are installed.**
- **Do not tighten hose and clamps excessively to avoid damaging hoses.**
- **After installation, run engine and check for fuel leaks at connection.**
- **Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.**

SYSTEM
ENGINE CONTROL SYSTEM
ENGINE CONTROL SYSTEM : System Diagram

INFOID:0000000012197664



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ENGINE CONTROL SYSTEM : System Description

INFOID:0000000012197665

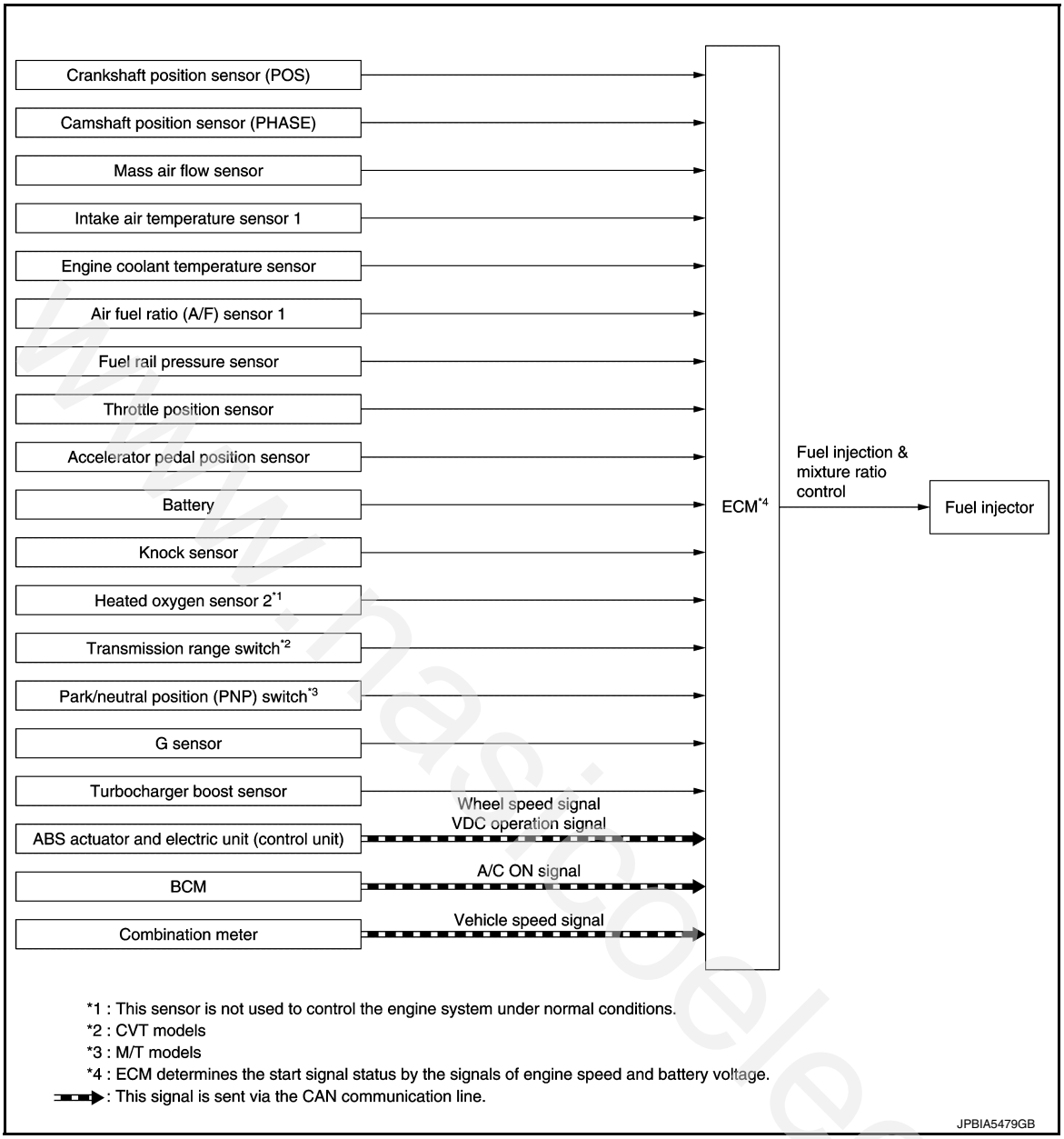
ECM controls the engine by various functions.

Function	Reference
Direct injection gasoline system	EC-51, "DIRECT INJECTION GASOLINE SYSTEM : System Description"
Fuel pressure control	EC-54, "FUEL PRESSURE CONTROL : System Description"
Electric ignition control	EC-56, "ELECTRIC IGNITION SYSTEM : System Description"
Intake valve timing control	EC-57, "INTAKE VALVE TIMING CONTROL : System Description"
Exhaust valve timing control	EC-58, "EXHAUST VALVE TIMING CONTROL : System Description"
Turbocharger boost control	EC-60, "TURBOCHARGER BOOST CONTROL : System Description"
Engine protection control (Low engine oil pressure)	EC-61, "ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description"
Fuel filler cap warning system	EC-62, "FUEL FILLER CAP WARNING SYSTEM : System Description"
Air conditioning cut control	EC-63, "AIR CONDITIONING CUT CONTROL : System Description"
Cooling fan control	EC-65, "COOLING FAN CONTROL : System Description"
Starter motor drive control	EC-65, "STARTER MOTOR DRIVE CONTROL : System Description"
Evaporative emission system	EC-66, "EVAPORATIVE EMISSION SYSTEM : System Description"
ASCD (Automatic speed control device)	EC-68, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description"
Integrated control system	EC-69, "INTEGRATED CONTROL SYSTEM : System Description"
CAN communication	EC-70, "CAN COMMUNICATION : System Description"

DIRECT INJECTION GASOLINE SYSTEM

DIRECT INJECTION GASOLINE SYSTEM : System Diagram

INFOID:0000000012197666



DIRECT INJECTION GASOLINE SYSTEM : System Description

INFOID:0000000012197667

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM		ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*4		Fuel injection & mixture ratio control	Fuel injector
Camshaft position sensor (PHASE)	Camshaft position			
Mass air flow sensor	Amount of intake air			
Intake air temperature sensor 1	Intake air temperature			
Engine coolant temperature sensor	Engine coolant temperature			
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas			
Fuel rail pressure sensor	Fuel rail pressure			
Throttle position sensor	Throttle position			
Accelerator pedal position sensor	Accelerator pedal position			
Battery	Battery voltage*4			
Knock sensor	Engine knocking condition			
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas			
Transmission range switch*2	Gear position			
Park/neutral position (PNP) switch*3				
G sensor	Inclination angle			
Turbocharger boost sensor	Turbocharger boost			
ABS actuator and electric unit (control unit)	CAN communication	• Wheel speed signal • VDC/TCS operation command		
BCM	CAN communication	A/C ON signal		
Combination meter	CAN communication	Vehicle speed signal		

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

*2: CVT models

*3: M/T models

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

SYSTEM DESCRIPTION

The adoption of the direct fuel injection method enables more accurate adjustment of fuel injection quantity by injecting atomized high-pressure fuel directly into the cylinder. This method allows high-powered engine, low fuel consumption, and emissions-reduction.

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

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

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

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

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

FUEL INJECTION CONTROL

Stratified-charge Combustion

Stratified-charge combustion is a combustion method which enables extremely lean combustion by injecting fuel in the latter half of a compression process, collecting combustible air-fuel around the spark plug, and forming fuel-free airspace around the mixture.

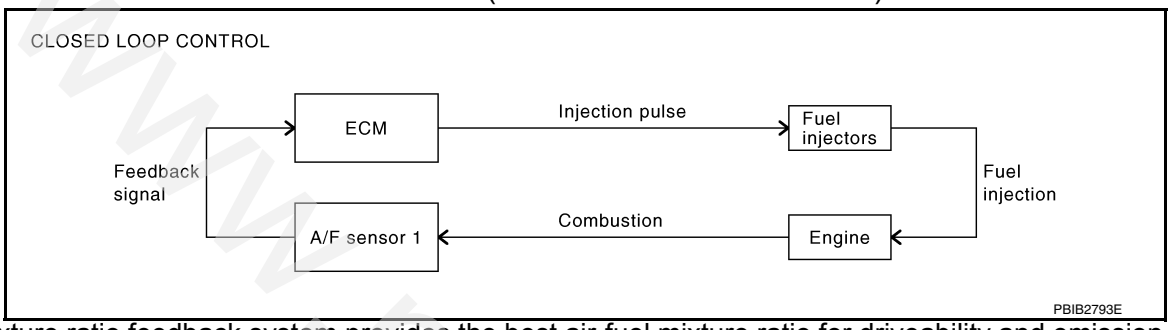
Right after a start with the engine cold, the catalyst warm-up is accelerated by stratified-charge combustion.

Homogeneous Combustion

Homogeneous combustion is a combustion method that fuel is injected during intake process so that combustion occurs in the entire combustion chamber, as is common with conventional methods.

As for a start except for starts with the engine cold, homogeneous combustion occurs.

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can better reduce CO, HC and NOx emissions. This system uses A/F sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about A/F sensor 1, refer to EC-41, "Air Fuel Ratio (A/F) Sensor 1". This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).

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

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

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

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

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from A/F sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio.

Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of “injection pulse duration” to automatically compensate for the difference between the two ratios.

“Fuel trim” refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes “short-term fuel trim” and “long-term fuel trim”.

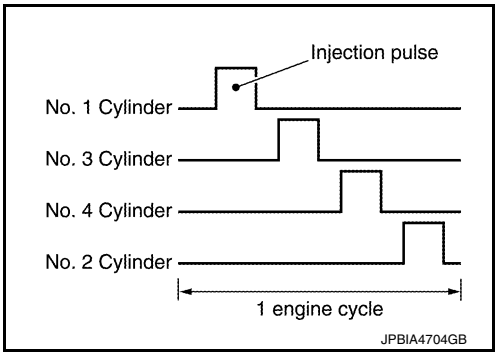
“Short term fuel trim” is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from A/F sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

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

FUEL INJECTION TIMING

Sequential Direct Injection Gasoline System

Fuel is injected into each cylinder during each engine cycle according to the ignition order.



STRATIFIED-CHARGE START CONTROL

The use of the stratified-charge combustion method enables emissions-reduction when starting the engine with engine coolant temperature between 5°C (41°F) and 40°C (104°F).

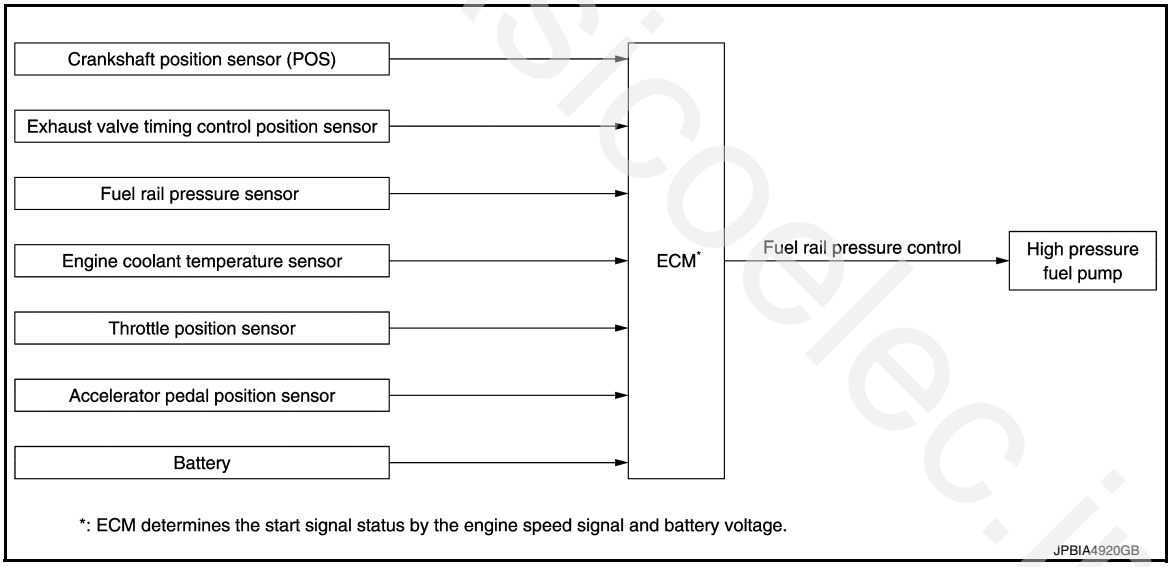
FUEL SHUT-OFF

Fuel to each cylinder is shut-off during deceleration, operation of the engine at excessively high speed or operation of the vehicle at excessively high speed.

FUEL PRESSURE CONTROL

FUEL PRESSURE CONTROL : System Diagram

INFOID:0000000012197668



FUEL PRESSURE CONTROL : System Description

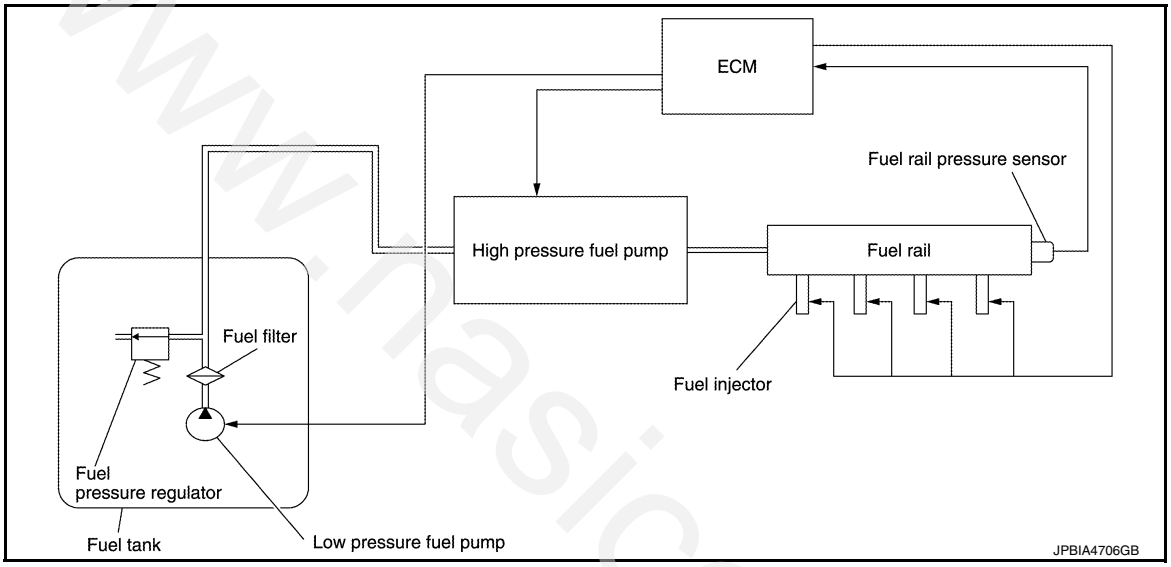
INFOID:0000000012197669

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*	Fuel rail pressure control	High pressure fuel pump
Exhaust valve timing control position sensor	Camshaft position		
Fuel rail pressure sensor	Fuel rail pressure		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*		

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

System Description



Low fuel pressure control

- The low fuel pressure pump is controlled by ECM. The pumped fuel passes through the fuel filter and is sent to the high pressure fuel pump.
- Low fuel pressure is adjusted by the fuel pressure regulator.

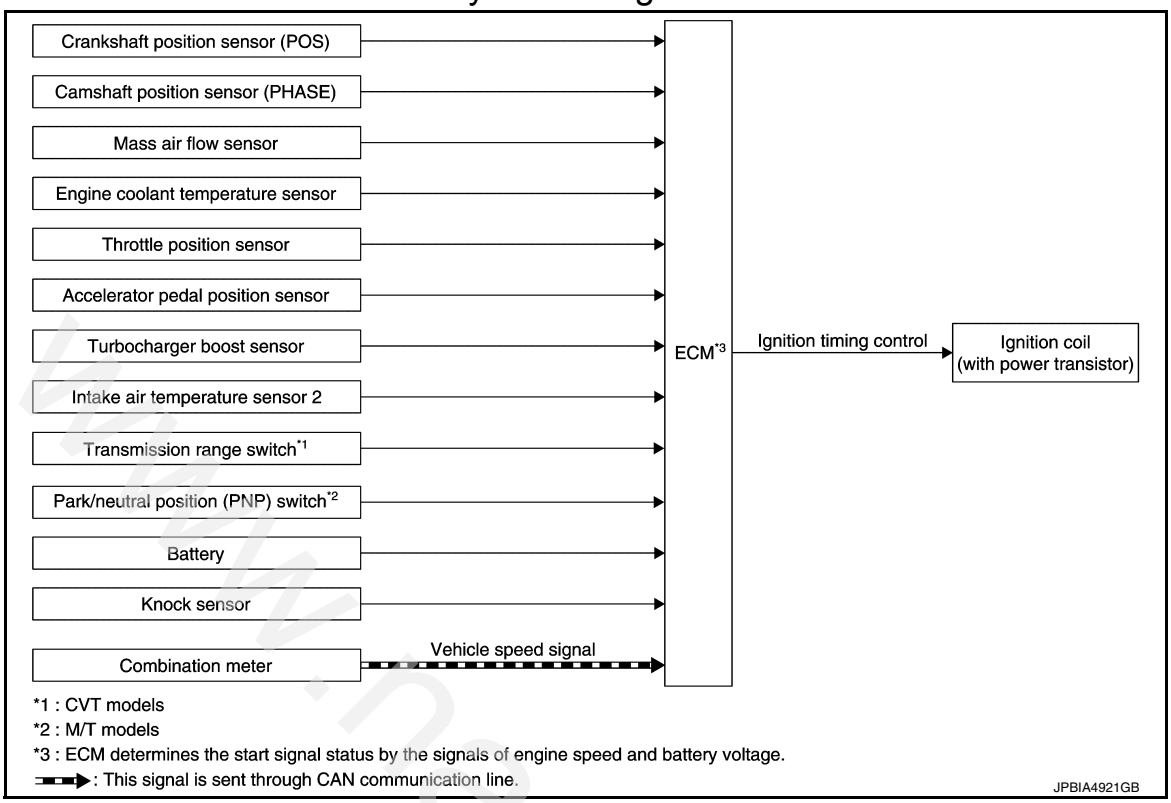
High fuel pressure control

The high pressure fuel pump raises the pressure of the fuel sent from the low pressure fuel pump. Actuated by the exhaust camshaft, the high pressure fuel pump activates the high pressure fuel pump solenoid based on a signal received from ECM, and adjusts the amount of discharge by changing the timing of closing the inlet check valve to control fuel rail pressure.

ELECTRIC IGNITION SYSTEM

ELECTRIC IGNITION SYSTEM : System Diagram

INFOID:0000000012197670



ELECTRIC IGNITION SYSTEM : System Description

INFOID:0000000012197671

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM		ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*3 Piston position		Ignition timing control	Ignition coil (with power transistor)
Camshaft position sensor (PHASE)				
Mass air flow sensor	Amount of intake air			
Engine coolant temperature sensor	Engine coolant temperature			
Throttle position sensor	Throttle position			
Accelerator pedal position sensor	Accelerator pedal position			
Turbocharger boost sensor	Turbocharger boost			
Intake air temperature sensor 2	Intake air temperature			
Transmission range switch*1	Gear position			
Park/neutral position (PNP) switch*2				
Battery	Battery voltage*			
Knock sensor	Engine knocking condition			
Combination meter	CAN communication	Vehicle speed signal		

*1: CVT models

*2: M/T models

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

SYSTEM DESCRIPTION

Firing order: 1 - 3 - 4 - 2

The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.
The ECM receives information such as the injection pulse width and camshaft position sensor (PHASE) signal. Computing this information, ignition signals are transmitted to the power transistor.
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

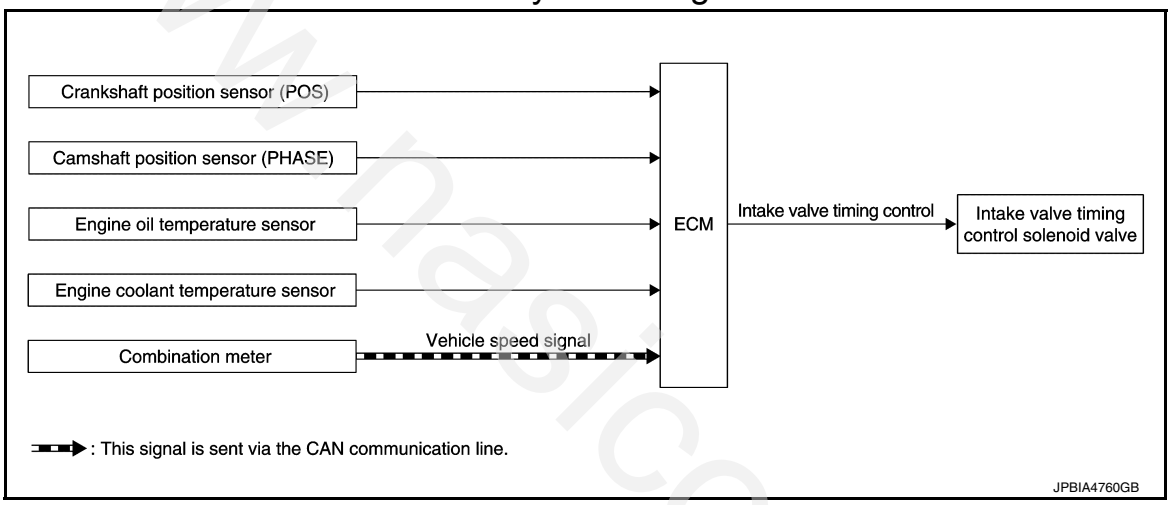
- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

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

INTAKE VALVE TIMING CONTROL

INTAKE VALVE TIMING CONTROL : System Diagram

INFOID:0000000012197672



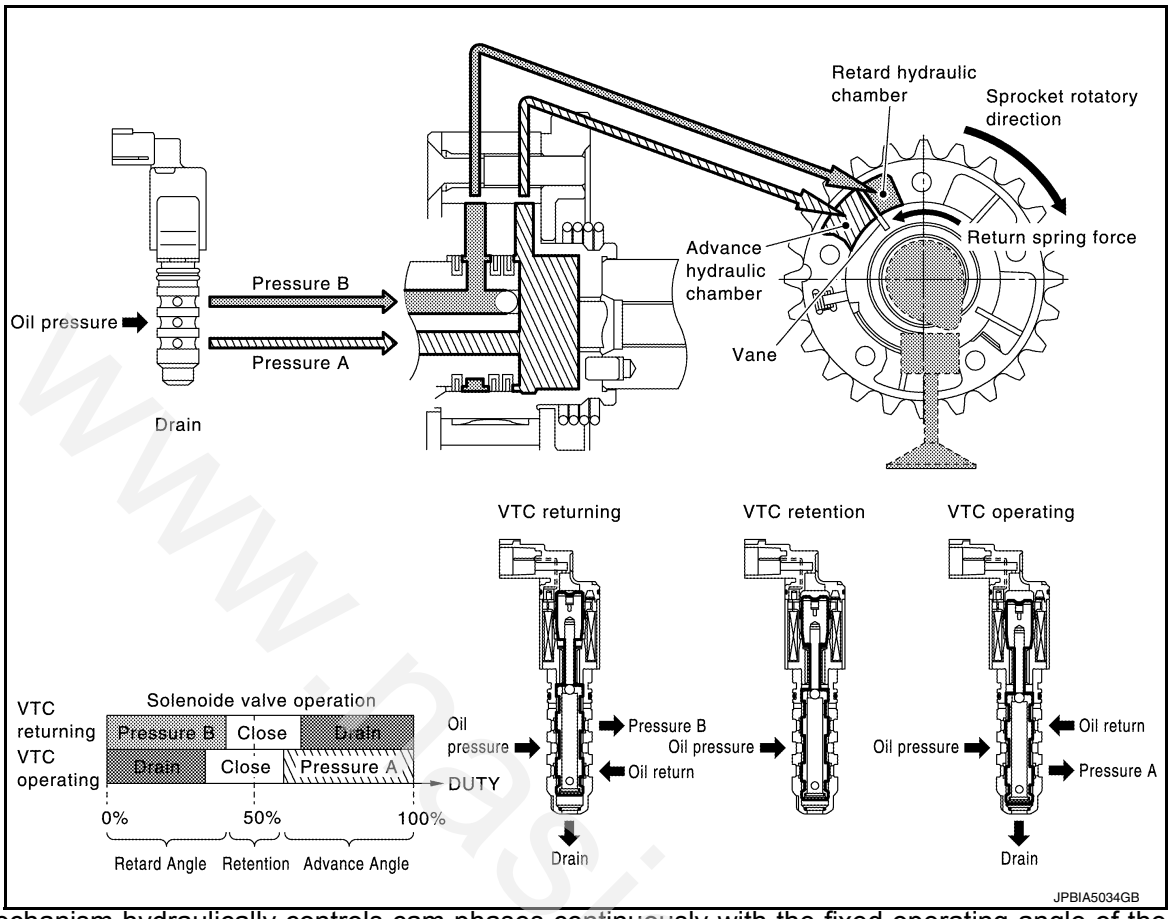
INTAKE VALVE TIMING CONTROL : System Description

INFOID:0000000012197673

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM		ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed and piston position		Intake valve timing control	Intake valve timing control solenoid valve
Camshaft position sensor (PHASE)				
Engine oil temperature sensor	Engine oil temperature			
Engine coolant temperature sensor	Engine coolant temperature			
Combination meter	CAN communication	Vehicle speed		

SYSTEM DESCRIPTION



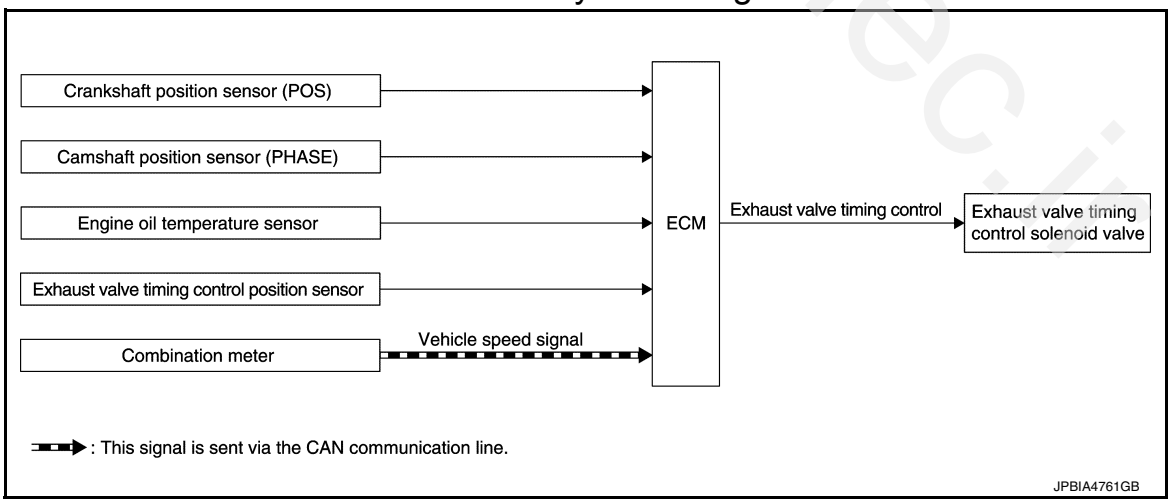
This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake-valve.

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

EXHAUST VALVE TIMING CONTROL

EXHAUST VALVE TIMING CONTROL : System Diagram

INFOID:0000000012197674



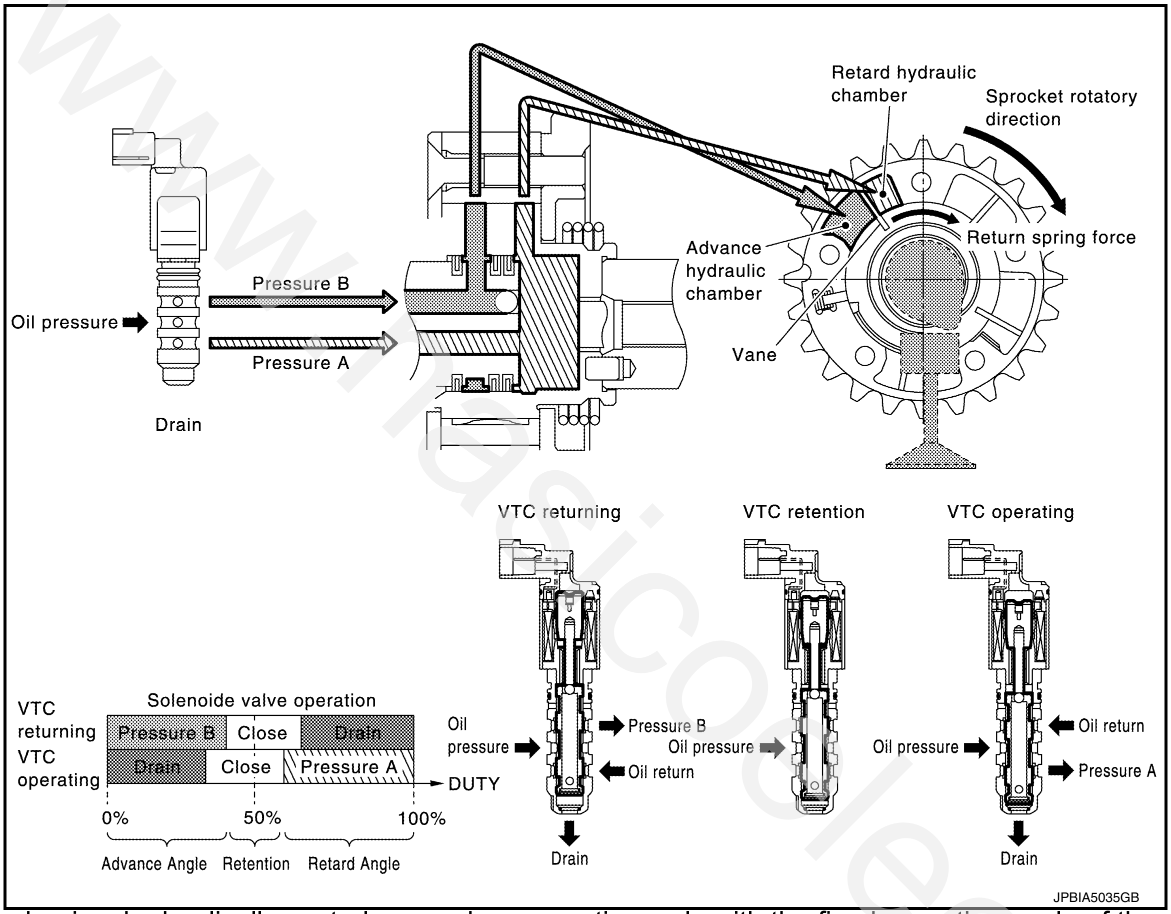
EXHAUST VALVE TIMING CONTROL : System Description

INFOID:0000000012197675

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM		ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed and piston position		Exhaust valve timing control	Exhaust valve timing control solenoid valve
Camshaft position sensor (PHASE)				
Engine oil temperature sensor	Engine oil temperature			
Exhaust valve timing control position sensor	Exhaust valve timing signal			
Combination meter	CAN communication	Vehicle speed signal		

SYSTEM DESCRIPTION

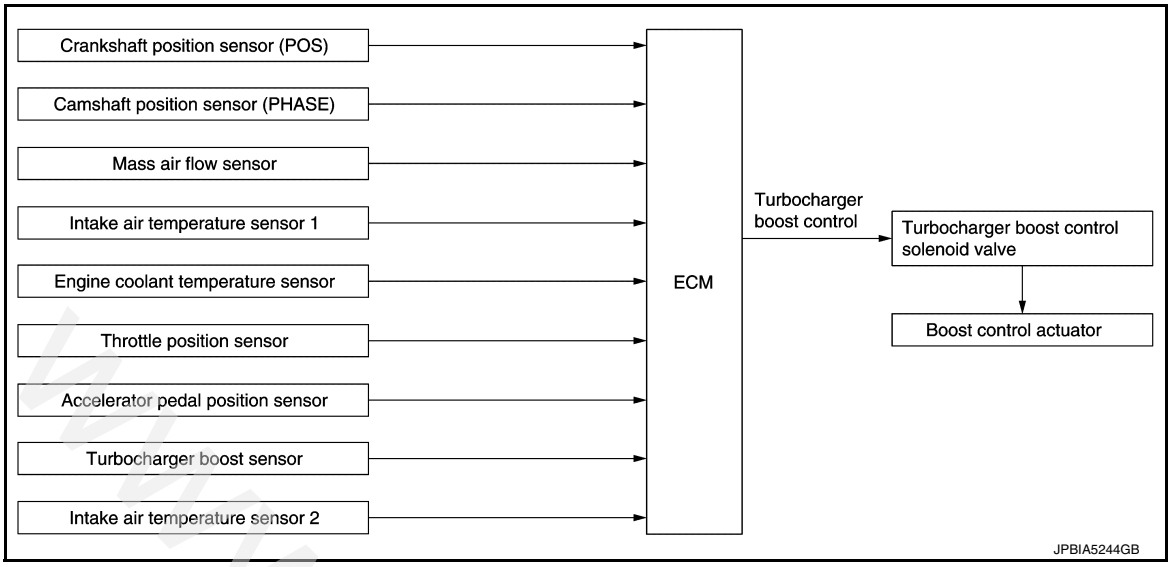


This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the exhaust valve.
The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine oil temperature. Then, the ECM sends ON/OFF pulse duty signals to the exhaust valve timing (EVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the exhaust valve to increase engine torque and output in a range of high engine speed.

TURBOCHARGER BOOST CONTROL

TURBOCHARGER BOOST CONTROL : System Diagram

INFOID:0000000012197676



TURBOCHARGER BOOST CONTROL : System Description

INFOID:0000000012197677

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Turbocharger boost control	Turbocharger boost control solenoid valve ↓ Boost control actuator
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Intake air temperature sensor 1	Intake air temperature		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Turbocharger boost sensor	Turbocharger boost		
Intake air temperature sensor 2	Intake air temperature		

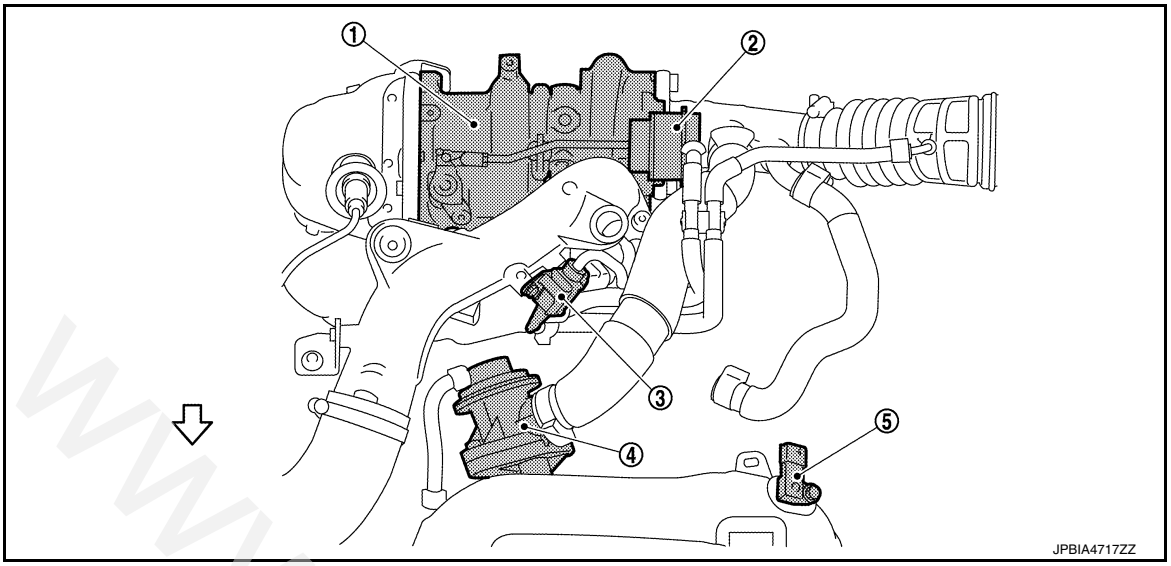
SYSTEM DESCRIPTION

Depending on driving conditions, the ECM performs ON/OFF duty control of the turbocharger boost control solenoid valve and controls the boost by adjusting the pressure to the diaphragm of the boost control actuator. When driving conditions demand an increase in boost, the ECM prolongs the ON time of the turbocharger boost control solenoid valve and moves the boost control valve towards the closing direction by reducing the pressure in the diaphragm of the boost control actuator. The emission gas to the turbine wheel is then increased. When driving conditions demand a decrease in boost, the ECM shortens the ON time of the turbocharger boost control solenoid valve and moves the boost control valve towards the opening position by increasing the pressure in the diaphragm of the boost control actuator. The emission bypassing to the turbine wheel is then increased. Thus, by performing the most optimal boost control, the ECM improves engine output and response.

NOTE:

The boost varies depending on the vehicle and driving conditions.

BOOST CONTROL ACTUATOR LINE DRAWING



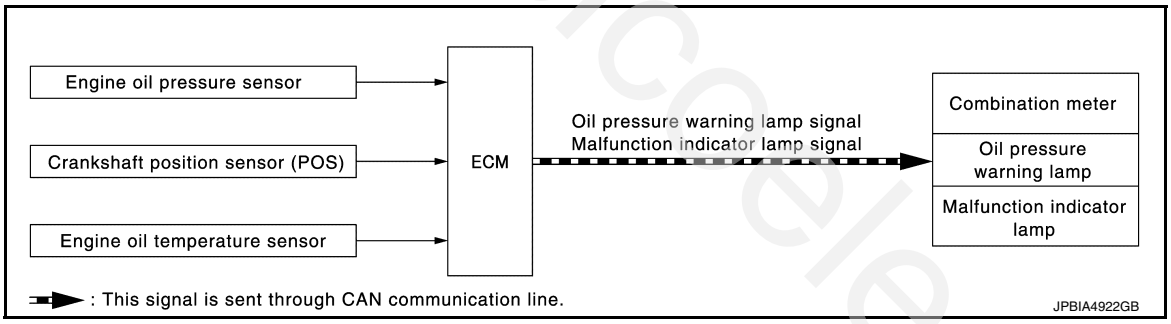
1. Turbocharger
2. Boost control actuator
3. Turbocharger boost control solenoid valve
4. Recirculation valve
5. Turbocharger boost sensor (with intake air temperature sensor 2)

⇦: Vehicle front

ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE

ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Diagram

INFOID:0000000012197678



ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description

INFOID:0000000012197679

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Engine oil pressure sensor	Engine pressure	Engine protection control • Oil pressure warning lamp signal • FUel cut control	Combination meter • Oil pressure warning lamp
Crankshaft position sensor (POS)	Engine speed		
Engine oil temperature sensor	Engine oil temperature		

SYSTEM DESCRIPTION

- The engine protection control at low engine oil pressure warns the driver of a decrease in engine oil pressure by the oil pressure warning lamp a before the engine becomes damaged.
- When detecting a decrease in engine oil pressure at an engine speed less than 1,000 rpm, ECM transmits an oil pressure warning lamp signal to the combination meter.The combination meter turns ON the oil pressure warning lamp, according to the signal.

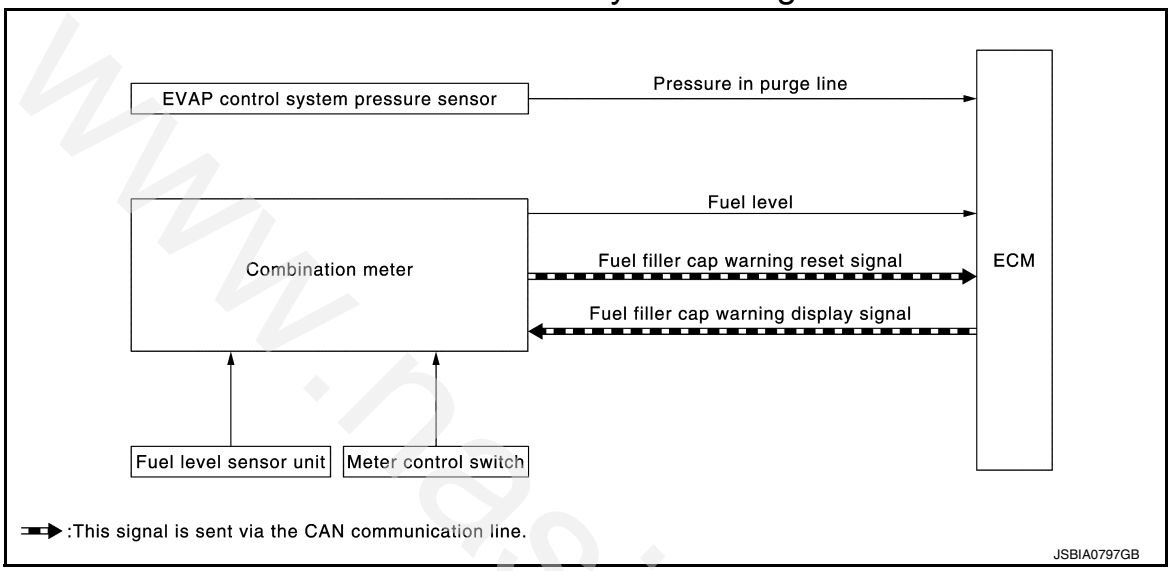
Decrease in engine oil pressure	Engine speed	Combination meter
		Oil pressure warning lamp
Detection	Less than 1,000 rpm	ON*
	1,000 rpm or more	ON

*: When detecting a normal engine oil pressure, ECM turns OFF the oil pressure warning lamp.

FUEL FILLER CAP WARNING SYSTEM

FUEL FILLER CAP WARNING SYSTEM : System Diagram

INFOID:0000000012197680



FUEL FILLER CAP WARNING SYSTEM : System Description

INFOID:0000000012197681

INPUT/OUTPUT SIGNAL CHART

Input

Unit/Sensor	Input signal to ECM	ECM function
EVAP control system pressure sensor	Pressure in purge line	Fuel filler cap warning control
Combination meter	Fuel level	
	Fuel filler cap warning reset signal*	

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

Output

Unit	Output signal	Actuator
ECM	Fuel filler cap warning display signal*	Combination meter

*: This signal is sent to the combination meter via the CAN communication line.

SYSTEM DESCRIPTION

The fuel filler cap warning system alerts the driver to the prevention of the fuel filler being left uncapped and malfunction occurrences after refueling, by turning ON the fuel filler cap warning display on the combination meter.

ECM judges a refueled state, based on a fuel level signal transmitted from the combination meter.

When a very small leak is detected through the EVAP leak diagnosis performed after judging the refueled state, ECM transmits a fuel filler cap warning display signal (request for display ON) to the combination meter via CAN communication.

When receiving the signal, the combination meter turns ON the fuel filler cap warning display.

CAUTION:

Check fuel filler cap installation condition when the fuel filler cap warning display turns ON.

Reset Operation

The fuel filler cap warning lamp tunes OFF, according to any condition listed below:

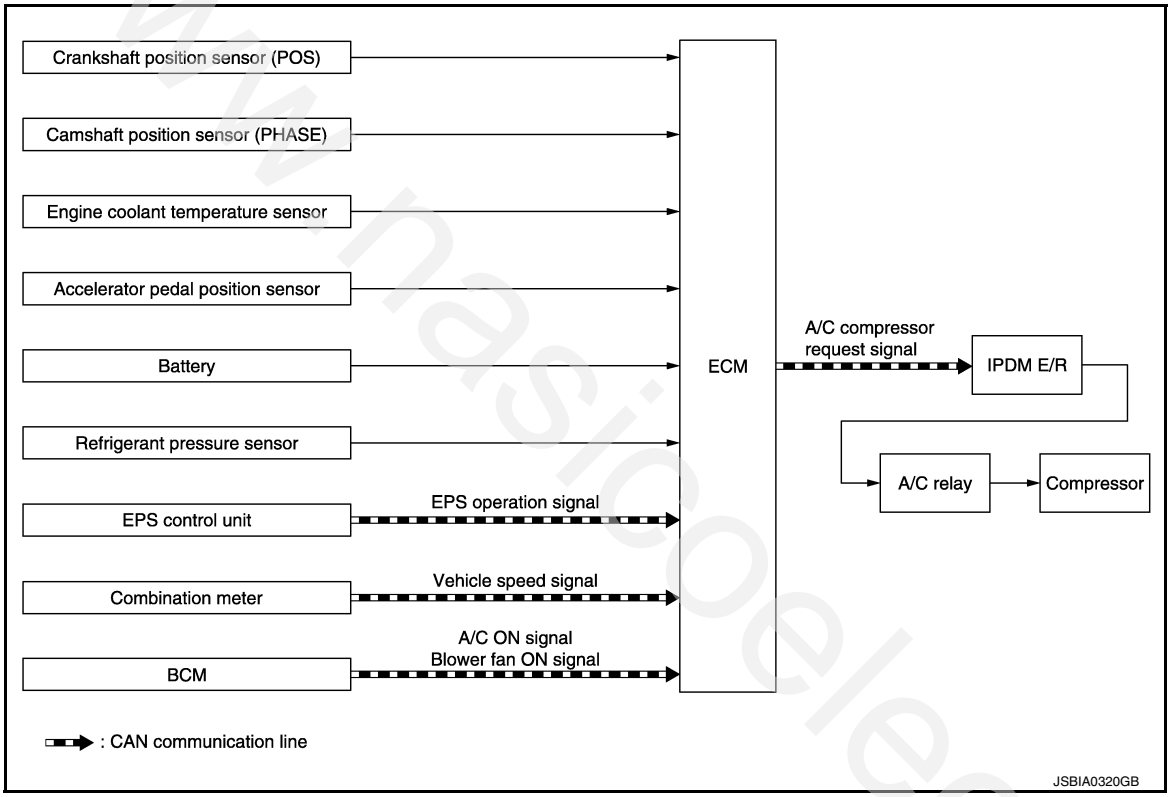
- Reset operation is performed by operating the meter control switch on the combination meter. Refer to MWI-20, "Switch Name and Function".
  - When the reset operation is performed, the combination meter transmits a fuel filler cap warning reset signal to ECM via CAN communication. ECM transmits a fuel filler cap warning display signal (request for display OFF) to the combination meter via CAN communication. When receiving the signal, the combination meter turns OFF the fuel filler cap warning display.
- EVAP leak diagnosis result is normal.
- Fuel refilled.
- DTC erased by using CONSULT.

NOTE:
MIL turns ON if a malfunction is detected in leak diagnosis results again at the trip after the fuel filler cap warning display turns ON/OFF.

AIR CONDITIONING CUT CONTROL

AIR CONDITIONING CUT CONTROL : System Diagram

INFOID:0000000012197682



AIR CONDITIONING CUT CONTROL : System Description

INFOID:0000000012197683

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM		ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*		Air conditioner cut control	IPDM E/R ↓ Air conditioner relay ↓ Compressor
Camshaft position sensor (PHASE)				
Engine coolant temperature sensor	Engine coolant temperature			
Accelerator pedal position sensor	Accelerator pedal position			
Battery	Battery voltage*			
Refrigerant pressure sensor	Refrigerant pressure			
EPS control unit	CAN communication	EPS operation signal		
Combination meter	CAN communication	Vehicle speed signal		
BCM	CAN communication	A/C ON signal		

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

SYSTEM DESCRIPTION

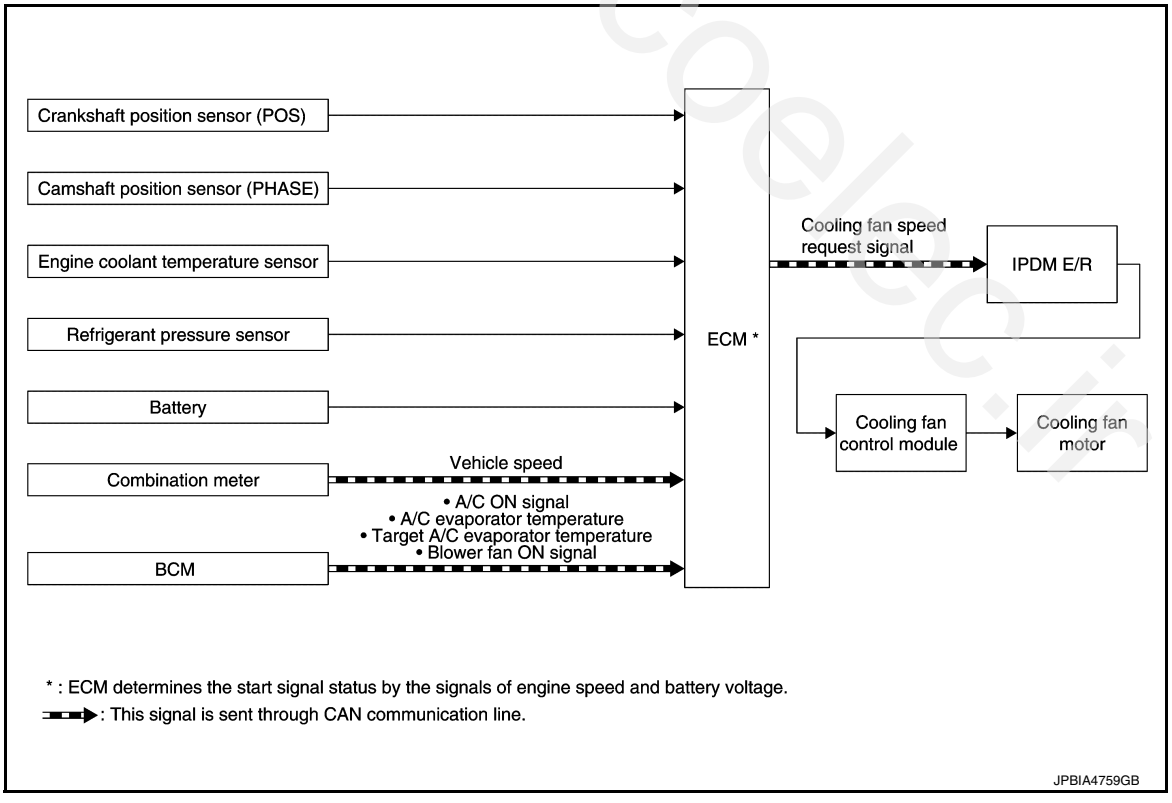
This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

COOLING FAN CONTROL

COOLING FAN CONTROL : System Diagram

INFOID:0000000012197684



COOLING FAN CONTROL : System Description

INFOID:0000000012197685

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM		ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*		Cooling fan control	IPDM E/R ↓ Cooling fan control module ↓ Cooling fan motor
Camshaft position sensor (PHASE)				
Engine coolant temperature sensor	Engine coolant temperature			
Refrigerant pressure sensor	Refrigerant pressure			
Battery	Battery voltage*			
Combination meter	CAN communication	Vehicle speed signal		
BCM	CAN communication	A/C ON signal		
		A/C evaporator temperature*		
		Target A/C evaporator temperature*		
		Blower fan ON signal*		

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

SYSTEM DESCRIPTION

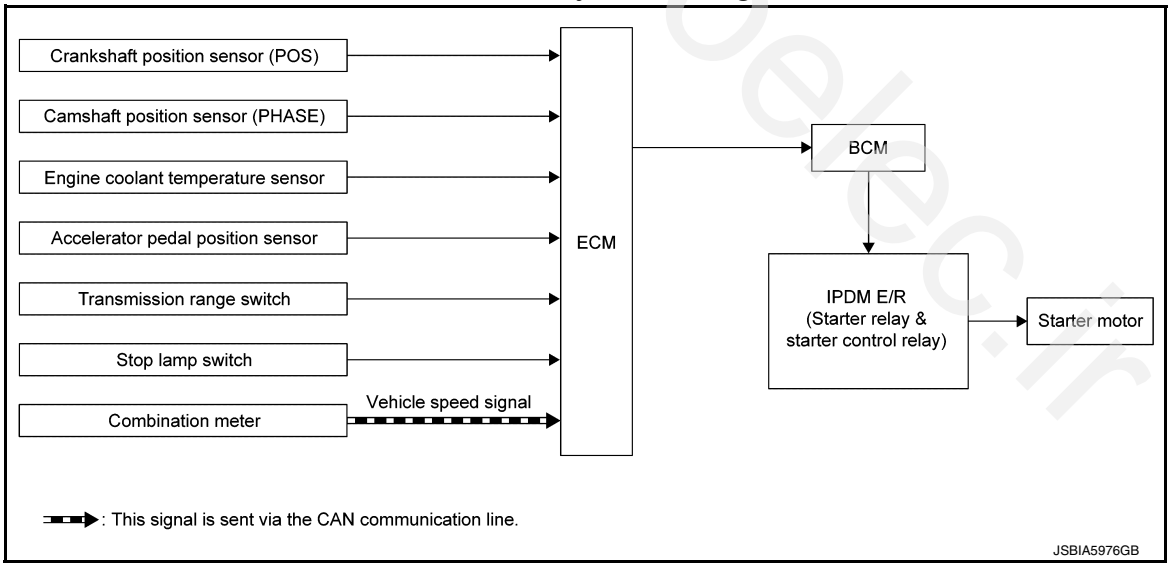
ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, A/C ON signal and refrigerant pressure.

Cooling fan control signal is sent to IPDM E/R from ECM by CAN communication line. Then, IPDM E/R sends ON/OFF pulse duty signal to cooling fan control module. Corresponding to this ON/OFF pulse duty signal, cooling fan control module gives cooling fan motor operating voltage to cooling fan motors. Cooling fan speed is controlled by duty cycle of cooling fan motor operating voltage sent from cooling fan control module.

STARTER MOTOR DRIVE CONTROL

STARTER MOTOR DRIVE CONTROL : System Diagram

INFOID:0000000012197686



STARTER MOTOR DRIVE CONTROL : System Description

INFOID:0000000012197687

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM		ECM function	Actuator
Crankshaft position sensor (POS)	• Engine speed • Piston position		Starter motor drive control	• BCM • IPDM E/R (Starter relay & starter control relay)
Camshaft position sensor (PHASE)				
Engine coolant temperature sensor	Engine coolant temperature			
Accelerator pedal position sensor	Accelerator pedal position			
Transmission range switch	Gear position			
Stop lamp switch	Brake pedal position			
Combination meter	CAN communication	Vehicle speed signal		

SYSTEM DESCRIPTION

When rapid deceleration occurs during engine runs or idle speed decreases due to heavy load conditions, ECM detects a decrease in idle speed and restarts the engine to secure reliability in handleability by transmitting a cranking request signal to IPDM E/R for activating the starter motor under the following conditions:

- Selector lever: P or any position other than N
- Idle switch: ON (Accelerator pedal not depressed)
- Brake switch: ON (Brake pedal depressed)

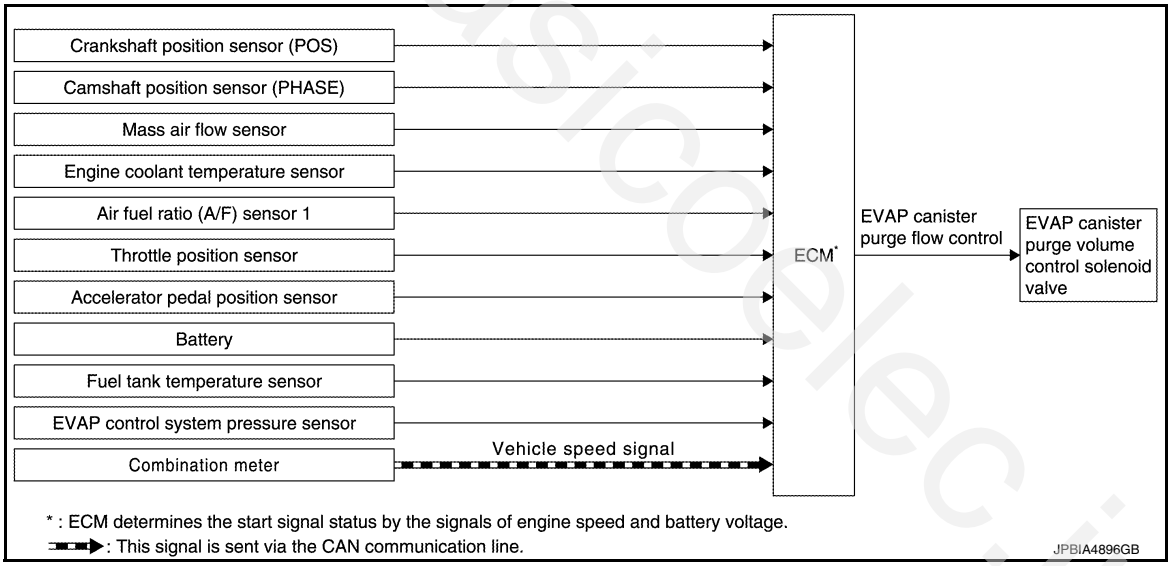
Models with the Intelligent Key System transmit a control signal to IPDM E/R by way of BCM via CAN communication.

IPDM E/R detects an operating state of the starter motor relay and the starter motor control relay and transmits a feed back signal to ECM via CAN Communication.

EVAPORATIVE EMISSION SYSTEM

EVAPORATIVE EMISSION SYSTEM : System Diagram

INFOID:0000000012197688



EVAPORATIVE EMISSION SYSTEM : System Description

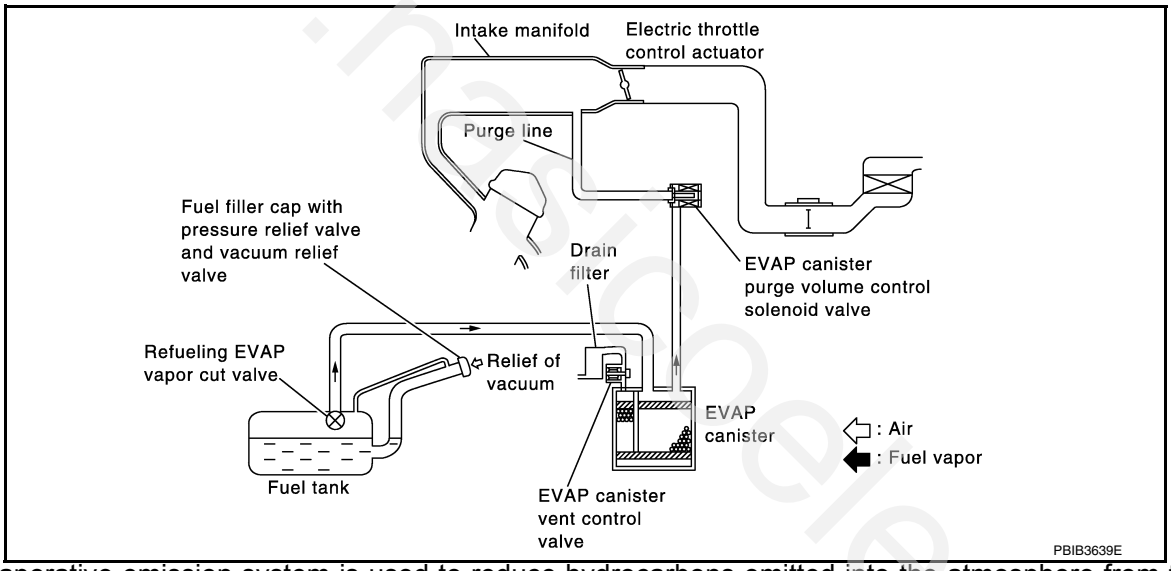
INFOID:0000000012197689

INPUT/OUTPUT SIGNAL CHART

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

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

SYSTEM DESCRIPTION



The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating.

ALTERNATOR POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM

ALTERNATOR POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : System Description

INFOID:0000000012567241

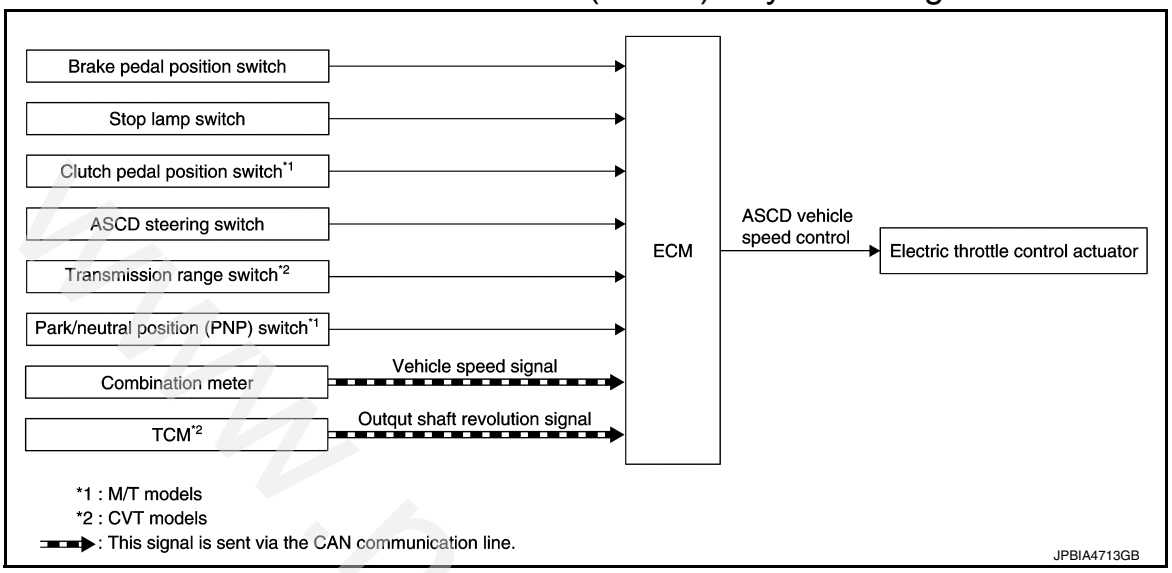
The alternator power generation voltage variable control system controls the amount of power generation, according to a battery loaded condition. ECM judges a battery condition, according to a signal received from the battery current sensor which detects a charge/discharge current. ECM then transmits a signal to IPDM E/R to command power generation via CAN communication. IPDM E/R transmits a power generation control sig-

nal to the alternator so that the system can control the amount of power generation. The voltage of power generation is lowered during battery low-load conditions and boosted under heavy load conditions. In this way, the system reduces the engine load through the adequate power generation control.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Diagram

INFOID:0000000012197690



AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

INFOID:0000000012197691

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM		ECM function	Actuator
Brake pedal position switch	Brake pedal operation		ASCD vehicle speed control	Electric throttle control actuator
Stop lamp switch				
Clutch pedal position switch*1	Clutch pedal operation			
ASCD steering switch	ASCD steering switch operation			
Transmission range switch*2	Gear position			
Park/neutral position (PNP) switch*1				
Combination meter	CAN communication	Vehicle speed signal		
TCM*2	CAN communication	Output shaft revolution signal		

*1: M/T models

*2: CVT models

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.

Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 144 km/h (90 MPH).

ECM controls throttle angle of electric throttle control actuator to regulate engine speed.

Operation status of ASCD is indicated by CRUISE indicator and SET indicator in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.

Refer to EC-71, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function" for ASCD operating instructions.

NOTE:

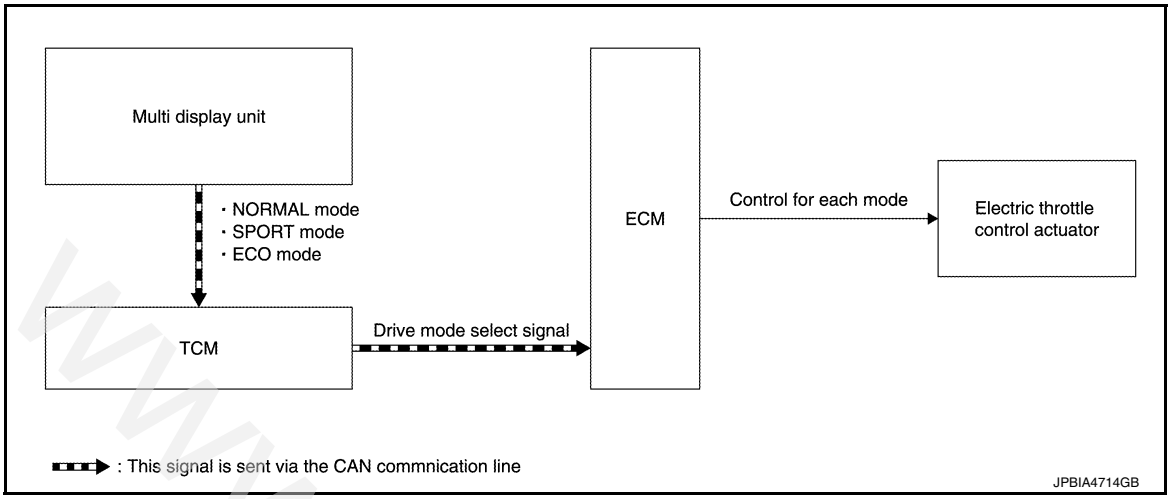
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

INTEGRATED CONTROL SYSTEM

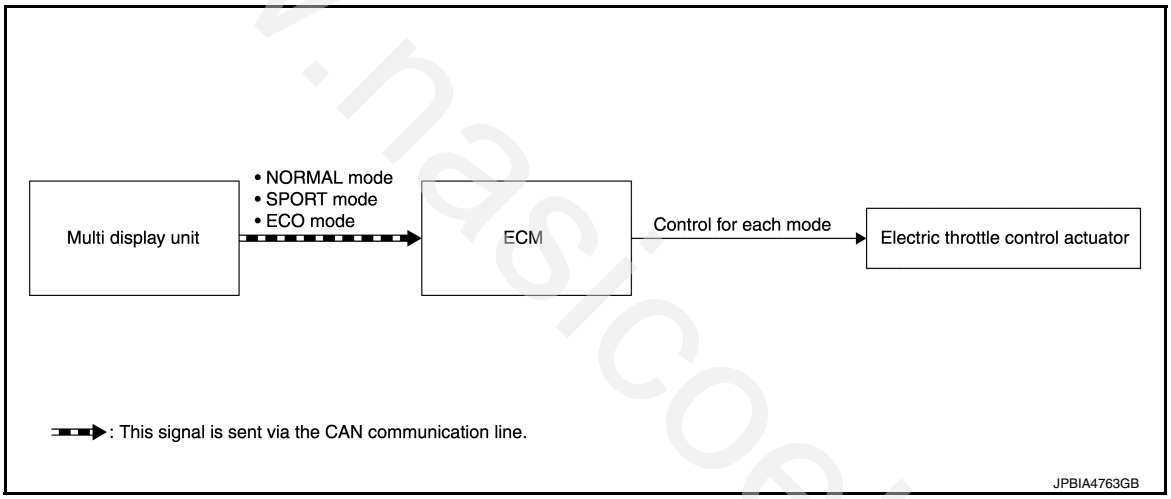
INTEGRATED CONTROL SYSTEM : System Diagram

INFOID:0000000012197692

CVT models



M/T models



INTEGRATED CONTROL SYSTEM : System Description

INFOID:0000000012197693

CVT models

System Description

TCM transmits a drive mode select signal to ECM via CAN communication, according to a NORMAL mode signal, SPORT mode signal, or ECO mode signal received from the multi display unit via CAN communication. ECM controls torque and throttle opening angle characteristics appropriate for each mode, based on a received drive mode select signal.

NOTE:

- Because of the multi display unit operation, the display may indicate that the mode is switching. However, the mode may not actually switch due to CAN communication error.
- When a CAN communication error occurs between ECM and TCM, the mode switches to NORMAL mode.

M/T models

System Description

ECM controls torque and throttle opening angle characteristics appropriate for each mode, based on a NORMAL mode signal, SPORT mode signal, or ECO mode signal received from the multi display unit via CAN communication.

NOTE:

- Because of the multi display unit operation, the display may indicate that the mode is switching. However, the mode may not actually switch due to CAN communication error.

- When a CAN communication error occurs between ECM and the multi display unit, the mode switches to NORMAL mode.

Control By Mode

Mode	Control
NORMAL mode	Offers a better balance of fuel economy and traveling performance.
SPORT mode	Allows throttle opening angle change and torque control for obtaining reality and acceleration performance appropriate to a winding run.
ECO mode	Allows throttle opening angle change and torque control for assisting better fuel efficiency.

CAN COMMUNICATION

CAN COMMUNICATION : System Description

INFOID:0000000012197694

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.
Refer to LAN-30, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart", about CAN communication for detail.

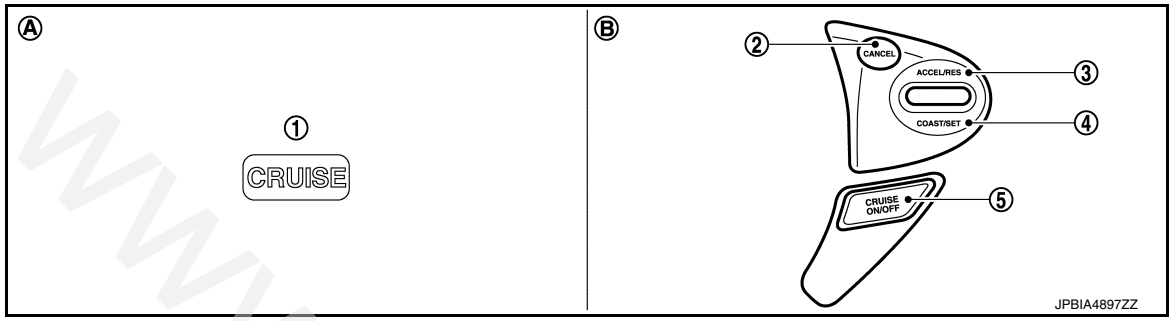
OPERATION

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function

INFOID:0000000012197695

SWITCHES AND INDICATORS



1. CRUISE indicator
2. CANCEL switch
3. ACCEL/RES switch
4. COAST/SET switch
5. ASCD MAIN switch
A. On the combination meter
B. On the steering wheel

SET SPEED RANGE

ASCD system can be set the following vehicle speed.

Minimum speed (Approx.)	Maximum speed (Approx.)
40 km/h (25 MPH)	144 km/h (90 MPH)

SWITCH OPERATION

Item	Function
CANCEL switch	Cancels the cruise control driving.
ACCEL/RES switch	• Resumes the set speed. • Increases speed incrementally during cruise control driving.
COAST/SET switch	• Sets desired cruise speed. • Decreases speed incrementally during cruise control driving.
ASCD MAIN switch	Master switch to activate the ASCD system.

SET OPERATION

Press MAIN switch. (The CRUISE indicator in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 144 km/h (90 MPH), press COAST/SET switch.

ACCELERATE OPERATION

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

CANCEL OPERATION

• When any of following conditions exist, the cruise operation is canceled.
- CANCEL switch is pressed
- ASCD MAIN switch is pressed (Set speed is cleared)
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed is cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to neutral position. (M/T models)
- Selector lever is changed to N, P or R position (CVT models)
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- TCS system is operated

- When the ECM detects any of the following conditions, the ECM cancels the cruise operation and informs the driver by blinking CRUISE indicator lamp.
- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE indicator lamp is blinked slowly.

  NOTE:

  Engine coolant temperature decreases to the normal operating temperature, CRUISE indicator lamp stop blinking and the cruise operation is able to work.
- Malfunction for some self-diagnoses regarding ASCD control: CRUISE indicator will blink quickly.
- When ASCD MAIN switch is turned to OFF during the cruise control driving, all of ASCD operations is canceled and vehicle speed memory is erased.

COAST OPERATION

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

RESUME OPERATION

- When the ACCEL/RES switch is pressed after the cancel operation other than pressing ASCD MAIN switch is performed, vehicle speed is return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.
- Brake pedal is released
- Clutch pedal is released (M/T models)
- Selector lever is in other than P and N positions (CVT models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (90 MPH)

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000012197696

This system is an on board diagnostic system that records exhaust emission-related diagnostic information and detects a sensors/actuator-related malfunction. A malfunction is indicated by the malfunction indicator lamp (MIL) and stored in control module memory as a DTC. The diagnostic information can be obtained with the diagnostic tool (GST: Generic Scan Tool).

GST (Generic Scan Tool)

INFOID:0000000012197697

When GST is connected with a data link connector equipped on the vehicle side, it will communicate with the control module equipped in the vehicle and then enable various kinds of diagnostic tests. Refer to GI-53, "Description".

NOTE:
Service $0A is not applied for regions where it is not mandated.

DIAGNOSIS SYSTEM (ECM)
DIAGNOSIS DESCRIPTION
DIAGNOSIS DESCRIPTION : 1st Trip Detection Logic and Two Trip Detection Logic

INFOID:0000000012197698

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not illuminate at this stage. <1st trip>
If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL illuminates. The MIL illuminates at the same time when the DTC is stored. <2nd trip> The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to illuminate or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Illuminated	Blinking	Illuminated				
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0304 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0304 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to EC-115, "DTC Index".)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

INFOID:0000000012197699

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not recur, the 1st trip DTC will not be displayed.
If a malfunction is detected during the 1st trip, the 1st trip DTC is saved in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are saved in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.
For malfunctions in which 1st trip DTCs are displayed, refer to EC-115, "DTC Index". These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT.
1st trip DTC is specified in Service $07 of SAE J1979/ISO 15031-5. 1st trip DTC detection occurs without illuminating the MIL and therefore does not warn the driver of a malfunction.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to EC-148, "Work Flow". Then perform DTC Confirmation Procedure or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT or GST. The 1st trip freeze frame data can only be displayed on the CONSULT screen.

Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 – P0304 Fuel Injection System Function — DTC: P0171
2		Except the above items
3	1st trip freeze frame data	

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

DIAGNOSIS DESCRIPTION : Counter System

INFOID:0000000012197700

RELATIONSHIP BETWEEN MIL, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS

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

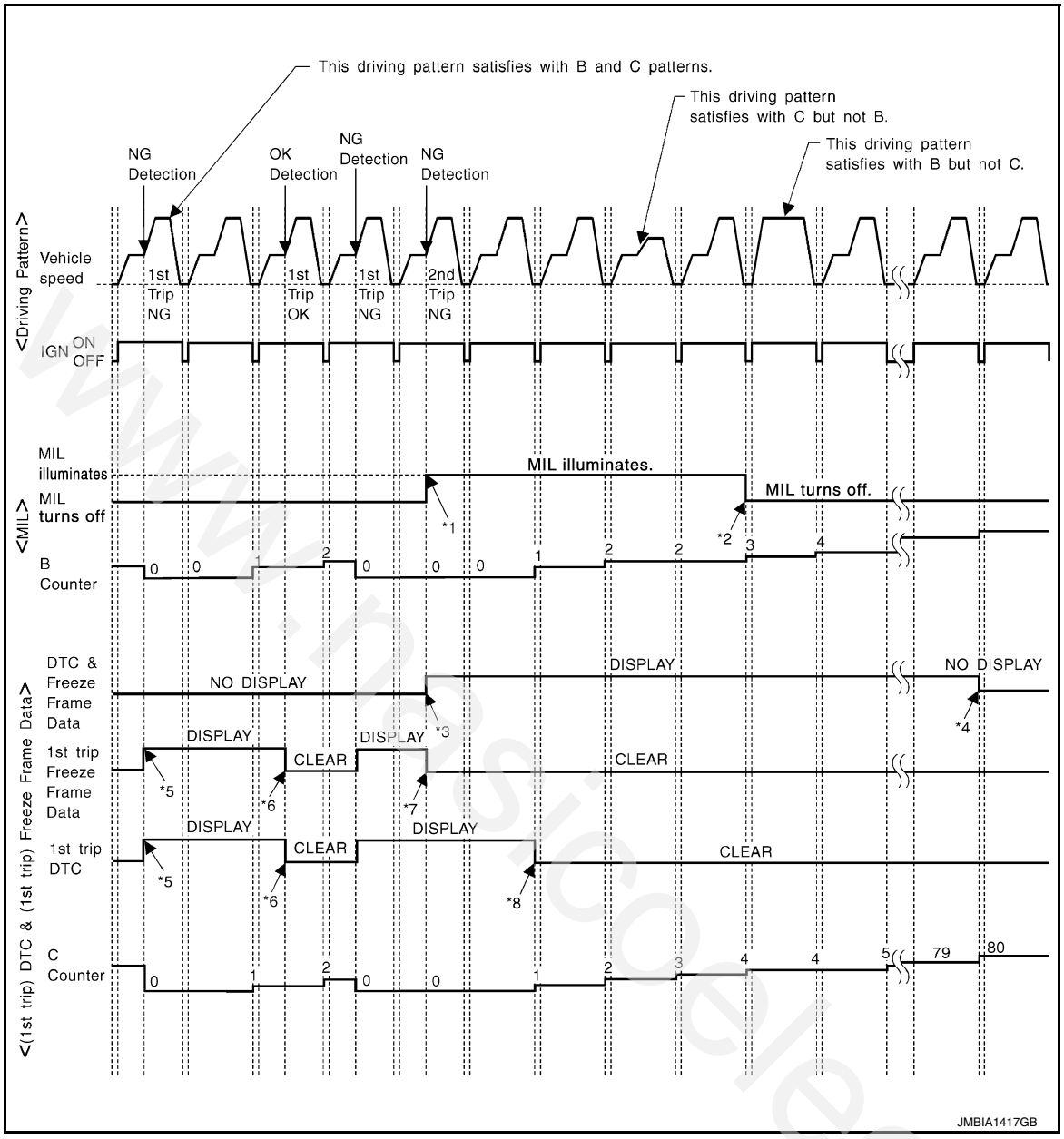
COUNTER SYSTEM CHART

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

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

- *1: Clear timing is at the moment OK is detected.
- *2: Clear timing is when the same malfunction is detected in the 2nd trip.

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



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

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

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

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

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

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

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

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

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

Driving Pattern B
Refer to EC-78, "DIAGNOSIS DESCRIPTION : Driving Pattern".

Driving Pattern C

Refer to EC-78, "DIAGNOSIS DESCRIPTION : Driving Pattern".

Example:

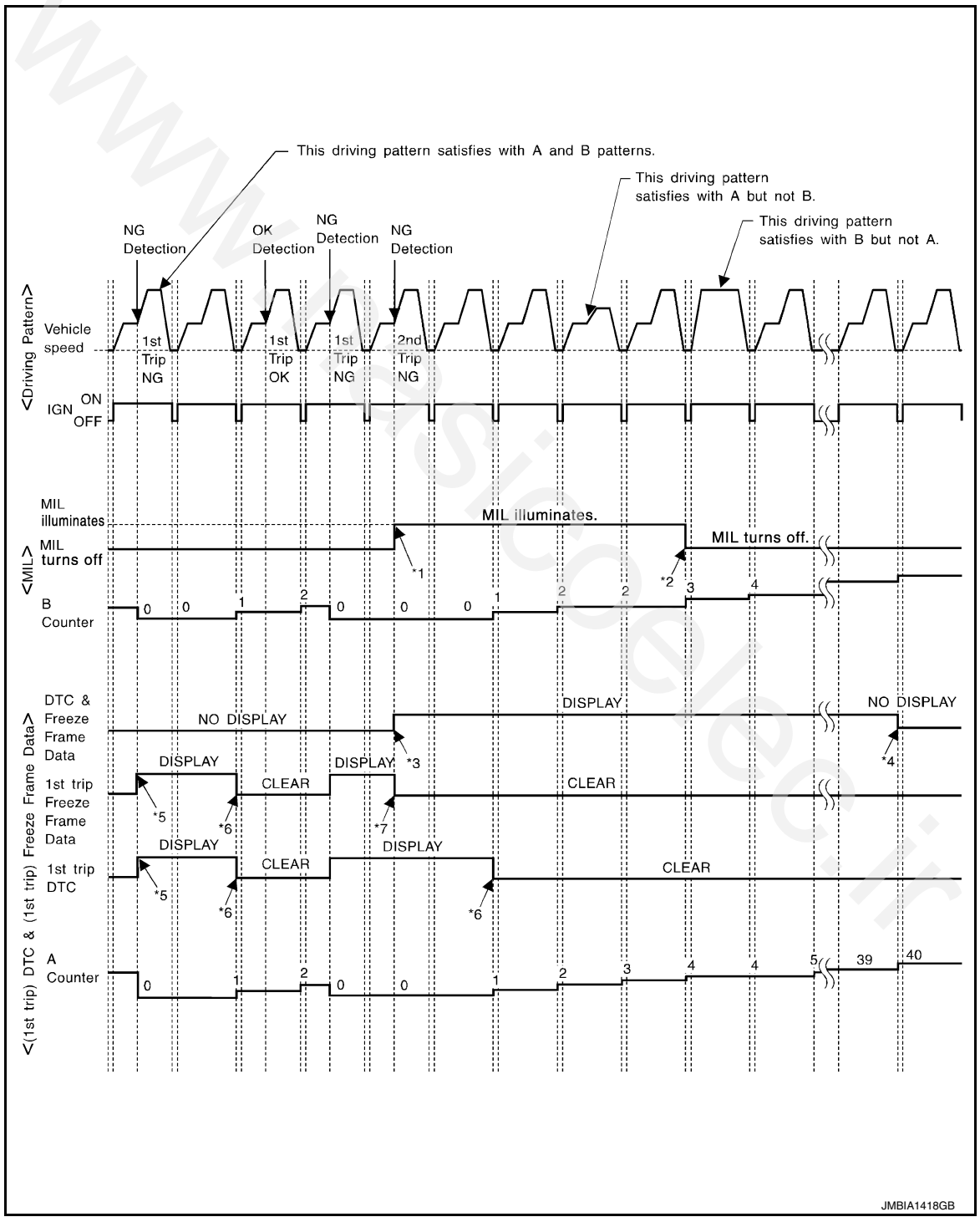
If the stored freeze frame data is as per the following:

Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)

To be satisfied with driving pattern C, the vehicle should run under the following conditions:

Engine speed: 475 – 1,225 rpm, Calculated load value: 27 – 33%, Engine coolant temperature: more than 70°C (158°F)

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



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

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

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

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

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

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

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

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

Driving Pattern A
Refer to EC-78, "DIAGNOSIS DESCRIPTION : Driving Pattern".

Driving Pattern B
Refer to EC-78, "DIAGNOSIS DESCRIPTION : Driving Pattern".

DIAGNOSIS DESCRIPTION : Driving Pattern

INFOID:0000000012197701

CAUTION:
Always drive at a safe speed.

DRIVING PATTERN A

Driving pattern A means a trip satisfying the following conditions.
- Engine speed reaches 400 rpm or more.
- Engine coolant temperature rises by 20°C (36°F) or more after starting the engine.
- Engine coolant temperature reaches 70°C (158°F) or more.
- The ignition switch is turned from ON to OFF.

NOTE:
- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern A.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern A.

DRIVING PATTERN B

Driving pattern B means a trip satisfying the following conditions.
- Engine speed reaches 400 rpm or more.
- Engine coolant temperature reaches 70°C (158°F) or more.
- Vehicle speed of 70 – 120 km/h (44 – 75 MPH) is maintained for 60 seconds or more under the control of closed loop.
- Vehicle speed of 30 – 60 km/h (19 – 37 MPH) is maintained for 10 seconds or more under the control of closed loop.
- Under the closed loop control condition, the following state reaches 12 seconds or more in total: Vehicle speed of 4 km/h (2 MPH) or less with idling condition.
- The state of driving at 10 km/h (7 MPH) or more reaches 10 minutes or more in total.
- A lapse of 22 minutes or more after engine start.

NOTE:
- Drive the vehicle at a constant velocity.
- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern B.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern B.

DRIVING PATTERN C

Driving pattern C means operating vehicle as per the following:
The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm

Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature condition:
- When the freeze frame data shows lower than 70°C (158°F), engine coolant temperature should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), engine coolant temperature should be higher than or equal to 70°C (158°F).

NOTE:
- When the same malfunction is detected regardless of the above vehicle conditions, reset the counter of driving pattern C.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern C.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

DRIVING PATTERN D

Driving pattern D means a trip satisfying the following conditions.
- The state of driving at 40 km/h (25 MPH) reaches 300 seconds or more in total.
- Idle speed lasts 30 seconds or more.
- A lapse of 600 seconds or more after engine start.

NOTE:
- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern D.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern D.

DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code

INFOID:0000000012197702

System Readiness Test (SRT) code is specified in Service $01 of SAE J1979/ISO 15031-5.
As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.
If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating “INCMP”, use the information in this Service Manual to set the SRT to “CMPLT”.
In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate “CMPLT” for each application system. Once set as “CMPLT”, the SRT status remains “CMPLT” until the self-diagnosis memory is erased.
Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate “INCMP” for these items.

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

NOTE:
If permanent DTC is stored or MIL illuminates during the state emissions inspection, the vehicle is also returned to the customeruntested even though the SRT indicates “CMPLT” for all test items. therefore, it is important to check SRT (“CMPLT”), DTC (No DTCs) and permanent DTC (No permanent DTC) before the inspection.

SRT SET TIMING

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

Self-diagnosis result		Example				
		Diagnosis	Ignition cycle ← ON → OFF ← ON → OFF ← ON → OFF ← ON →			
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)
		P0402	OK (1)	— (1)	— (1)	OK (2)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“CMPLT”	“CMPLT”	“CMPLT”	“CMPLT”
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)
		P0402	— (0)	— (0)	OK (1)	— (1)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“INCMP”	“INCMP”	“CMPLT”	“CMPLT”
NG exists	Case 3	P0400	OK	OK	—	—
		P0402	—	—	—	—
		P1402	NG	—	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MIL ON)
		SRT of EGR	“INCMP”	“INCMP”	“INCMP”	“CMPLT”

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

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

—: Self-diagnosis is not carried out.

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

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

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

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

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

NOTE:

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

DIAGNOSIS DESCRIPTION : Permanent Diagnostic Trouble Code (Permanent DTC)

INFOID:0000000012197703

Permanent DTC is defined in SAE J1979/ISO 15031-5 Service $0A.

ECM stores a DTC issuing a command of turning on MIL as a permanent DTC and keeps storing the DTC as a permanent DTC until ECM judges that there is no presence of malfunction.

Permanent DTCs cannot be erased by using the erase function of CONSULT or Generic Scan Tool (GST) and by disconnecting the battery to shut off power to ECM. This prevents a vehicle from passing the in-use inspection without repairing a malfunctioning part.

When not passing the in-use inspection due to more than one permanent DTC, permanent DTCs should be erased, referring to this manual.

NOTE:

- The important items in in-use inspection are that MIL is not ON, SRT test items are set, and permanent DTCs are not included.
- Permanent DTCs do not apply for regions that permanent DTCs are not regulated by law.

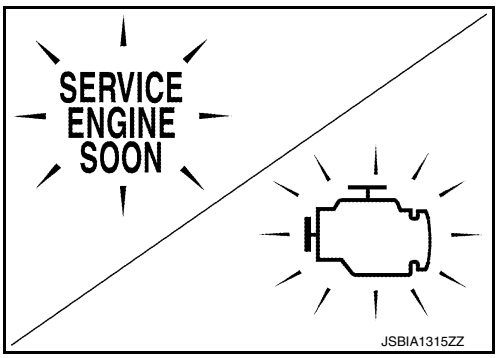
PERMANENT DTC SET TIMING

The setting timing of permanent DTC is stored in ECM with the lighting of MIL when a DTC is confirmed.

DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)

INFOID:0000000012197704

When emission-related ECU detects a malfunction in the emission control systems components and/or the powertrain control components (which affect vehicle emissions), it turns on/blinks MIL to inform the driver that a malfunction has been detected.



1. The MIL illuminates when ignition switch is turned ON (engine is not running).
   NOTE:
   Check the MIL circuit if MIL does not illuminate. Refer to EC-575, "Diagnosis Procedure".
2. When the engine is started, the MIL should go off.
   NOTE:
   If MIL continues to illuminate/blink, perform self-diagnoses and inspect/repair accordingly because an emission-related ECU has detected a malfunction in the emission control systems components and/or the powertrain control components (which affect vehicle emissions).

On Board Diagnosis Function

INFOID:0000000012197705

ON BOARD DIAGNOSIS ITEM

The on board diagnostic system has the following functions.

Diagnostic test mode	Function
Bulb check	MIL can be checked.
SRT status	ECM can read if SRT codes are set.
Malfunction warning	If ECM detects a malfunction, it illuminates or blinks MIL to inform the driver that a malfunction has been detected.
Self-diagnostic results	DTCs or 1st trip DTCs stored in ECM can be read.
Accelerator pedal released position learning	ECM can learn the accelerator pedal released position. Refer to EC-160, "Description".
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to EC-161, "Description".
Idle air volume learning	ECM can learn the idle air volume. Refer to EC-162, "Description".
Mixture ratio self-learning value clear	Mixture ratio self-learning value can be erased. Refer to EC-165, "Description".

BULB CHECK MODE

Description

This function allows damage inspection in the MIL bulb (blown, open circuit, etc.).

Operation Procedure

1. Turn ignition switch ON.
2. The MIL on the instrument panel should stay ON.
   If it remains OFF, check MIL circuit. Refer to EC-575, "Diagnosis Procedure".

SRT STATUS MODE

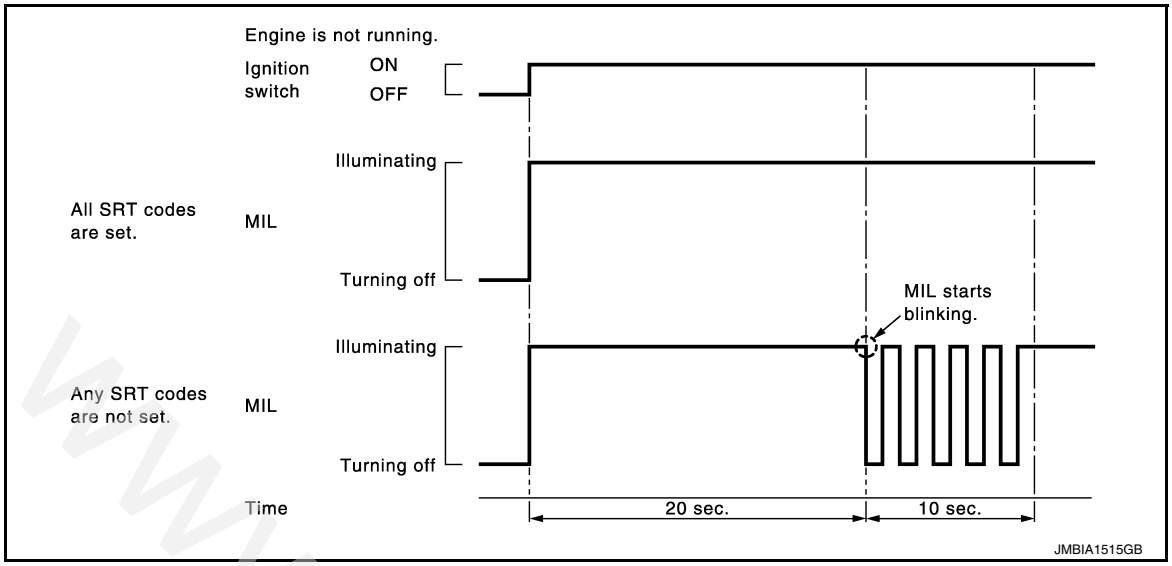
Description

This function allows to read if ECM has completed the self-diagnoses of major emission control systems and components. For SRT, refer to EC-79, "DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code".

Operation Procedure

1. Turn ignition switch ON and wait 20 seconds.
2. SRT status is indicated as shown blow.
   - ECM continues to illuminate MIL if all SRT codes are set.

- ECM blinks MIL for about 10 seconds if all SRT codes are not set.



MALFUNCTION WARNING MODE

Description

In this function ECM turns on or blinks MIL when it detects a malfunction in the emission control system components and/or the powertrain control components (which affect vehicle emissions) to inform the driver that a malfunction has been detected.

Operation Procedure

1. Turn ignition switch ON.
2. Check that MIL illuminates.
   If it remains OFF, check MIL circuit. Refer to EC-575, "Diagnosis Procedure".
3. Start engine and let it idle.
   - For two trip detection logic diagnoses, ECM turns on MIL when it detects the same malfunction twice in the two consecutive driving cycles.
   - For 1st trip detection logic diagnoses, ECM turns on MIL when it detects a malfunction in one driving cycle.
   - ECM blinks MIL when it detects a malfunction that may damage the three way catalyst (misfire).

SELF-DIAGNOSTIC RESULTS MODE

Description

This function allows to indicate DTCs or 1st trip DTCs stored in ECM according to the number of times MIL is blinking.

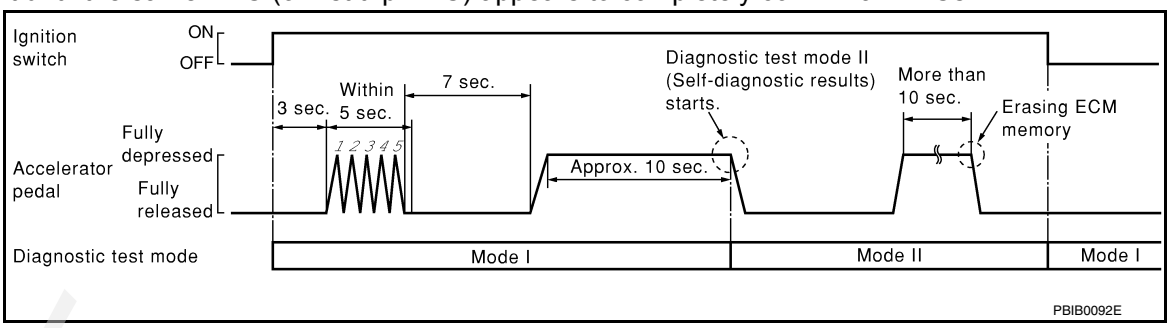
How to Set Self-diagnostic Results Mode

NOTE:

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.
- After ignition switch is turned off, ECM is always released from the “self-diagnostic results” mode.

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.
   - Fully depress the accelerator pedal.
   - Fully release the accelerator pedal.
3. Wait 7 seconds, fully depress the accelerator pedal and keep it depressed for approx. 10 seconds until the MIL starts blinking.
   NOTE:
   Do not release the accelerator pedal for 10 seconds if MIL starts blinking during this period. This blinking is displaying SRT status and is continued for another 10 seconds.
4. Fully release the accelerator pedal.
   ECM has entered to “Self-diagnostic results” mode.

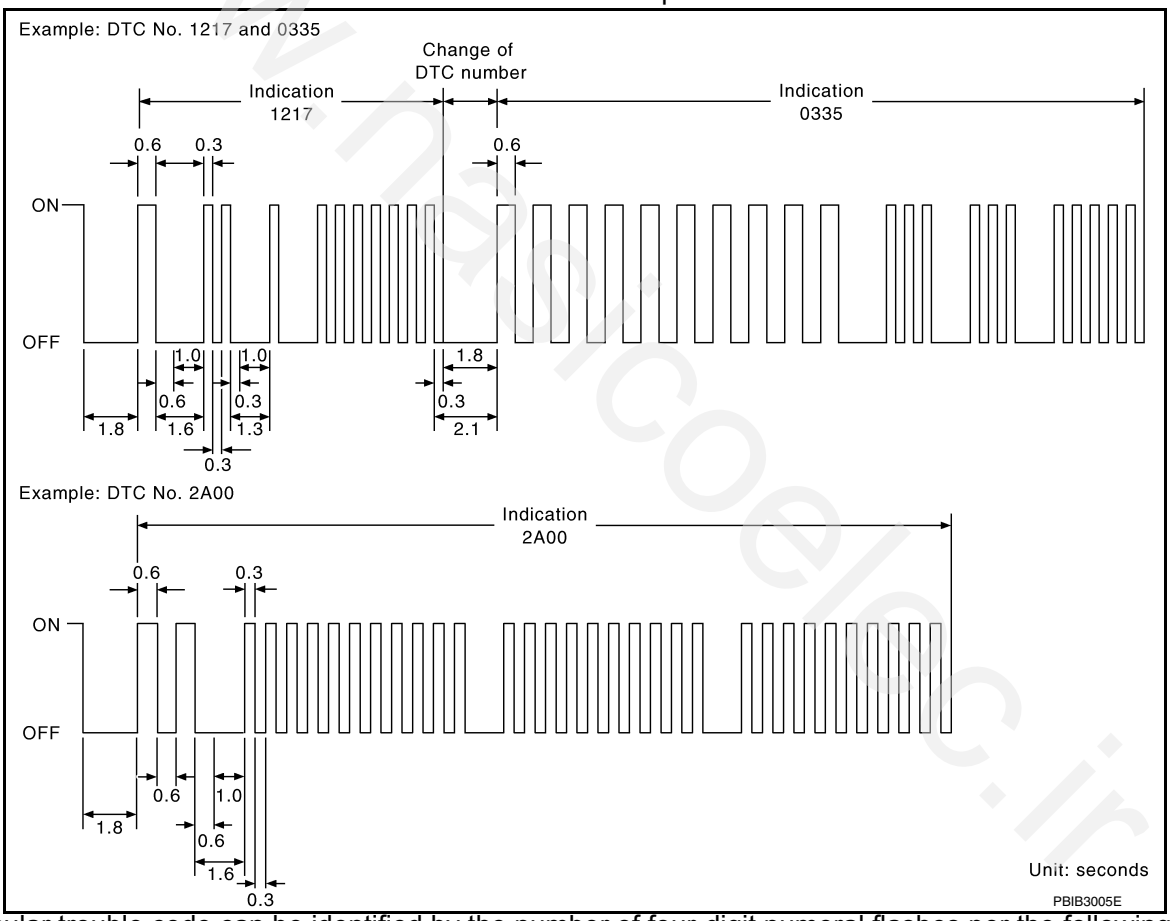
NOTE:
Wait until the same DTC (or 1st trip DTC) appears to completely confirm all DTCs.



How to Read Self-diagnostic Results

The DTC and 1st trip DTC are indicated by the number of blinks of the MIL as shown below.

The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL illuminates in “malfunction warning” mode, it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT or GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes per the following.

Number	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Flashes	10	1	2	3	4	5	6	7	8	9	11	12	13	14	15	16

The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-seconds) - OFF (0.6-seconds) cycle.

The 100th-digit numeral and lower digit numerals consist of a 0.3-seconds ON and 0.3-seconds OFF cycle.

A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.

A change from one trouble code to another occurs at an interval of 1.8-seconds OFF.

In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. Refer to EC-115, "DTC Index".

How to Erase Self-diagnostic Results

By performing this procedure, ECM memory is erased and the following diagnostic information is erased as well.

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

NOTE:

Also, if a battery terminal is disconnected, ECM memory is erased and the diagnostic information as listed above is erased. (The amount of time required for erasing may vary from a few seconds to several hours.)

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Set ECM in “self-diagnostic results” mode.
6. The diagnostic information has been erased from the backup memory in the ECM.
   Fully depress the accelerator pedal and keep it depressed for more than 10 seconds.
7. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

CONSULT Function

INFOID:0000000012197706

FUNCTION

Diagnostic test mode	Function
Self Diagnostic Results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data Monitor	Input/Output data in the ECM can be read.
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT unit.
Active Test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
ECU Identification	ECM part number can be read.
DTC Work Support	The status of system monitoring tests and the self-diagnosis status/results can be confirmed.

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

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

SELF DIAGNOSTIC RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-115, "DTC Index".

How to Read DTC and 1st Trip DTC

DTCs and 1st trip DTCs related to the malfunction are displayed in “self-diag results”.

- When ECM detects a 1st trip DTC, “1t” is displayed for “TIME”.
- When ECM has detected a current DTC, “0” is displayed for “TIME”.
- If “TIME” is neither “0” nor “1t”, the DTC occurred in the past and ECM shows the number of times the vehicle has been driven since the last detection of the DTC.

How to Erase DTC and 1st Trip DTC

NOTE:

- If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
- If the DTC is not for CVT related items (see EC-115, "DTC Index"), skip step 1.

1. Erase DTC in TCM. Refer to TM-190, "CONSULT Function".
2. Select “ENGINE” with CONSULT.
3. Select “SELF-DIAG RESULTS”.
4. Touch “ERASE”. (DTC in ECM will be erased.)

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	• The engine control component part/control system has a trouble code the is displayed as PXXXX. (Refer to EC-115, "DTC Index".)
FUEL SYS-B1	• “Fuel injection system status” at the moment a malfunction is detected is displayed. • One of the following mode is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop
FUEL SYS-B2	
CAL/LD VALUE [%]	• The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	• The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	• “Long-term fuel trim” at the moment a malfunction is detected is displayed. • The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
L-FUEL TRM-B2 [%]	
S-FUEL TRM-B1 [%]	• “Short-term fuel trim” at the moment a malfunction is detected is displayed. • The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
S-FUEL TRM-B2 [%]	
ENGINE SPEED [rpm]	• The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	• The vehicle speed at the moment a malfunction is detected is displayed.
ABSOL TH·P/S [%]	• The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	• The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	• The intake air temperature at the moment a malfunction is detected is displayed.
INT MANI PRES [kPa]	• These items are displayed but are not applicable to this model.
COMBUST CONDITION	

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

DATA MONITOR MODE

NOTE:

The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.

Monitored Item

For reference values of the following items, refer to EC-96, "Reference Value".

×: Applicable

Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN SIGNALS		
ENG SPEED	rpm	×	×	Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	• Accuracy becomes poor if engine speed drops below the idle rpm. • If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1	V	×	×	The signal voltage of the mass air flow sensor is displayed.	• When the engine is stopped, a certain value is indicated. • When engine is running specification range is indicated in “SPEC”.
B/FUEL SCHDL	msec	×	×	“Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	When engine is running specification range is indicated in “SPEC”.
A/F ALPHA-B1	%			The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • When engine is running specification range is indicated in “SPEC”. • This data also includes the data for the air-fuel ratio learning control.
COOLANT TEMP/S	°C or °F	×	×	The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
A/F SEN1 (B1)	V	×	×	The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed.	
HO2S2 (B1)	V	×	×	The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S2 MNTR(B1)	RICH/LEAN		×	• Display of heated oxygen sensor 2 signal: - RICH: means the amount of oxygen after three way catalyst is relatively small. - LEAN: means the amount of oxygen after three way catalyst is relatively large.	When the engine is stopped, a certain value is indicated.
VHCL SPEED SE	km/h or mph	×	×	The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT	V			The power supply voltage of ECM is displayed.	

Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN SIGNALS		
ACCEL SEN 1	V			The accelerator pedal position sensor signal voltage is displayed.	ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2					
TP SEN 1-B1	V	×	×	The throttle position sensor signal voltage is displayed.	TP SEN 2-B1 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
TP SEN 2-B1		×	×		
FUEL T/TMP SE	°C or °F			The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.	
EVAP SYS PRES	V			The signal voltage of EVAP control system pressure sensor is displayed.	
FUEL LEVEL SE	V	×		The signal voltage of the fuel level sensor is displayed.	
START SIGNAL	ON/OFF			Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS	ON/OFF	×	×	Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG	ON/OFF	×	×	Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
PW/ST SIGNAL	ON/OFF	×	×	[ON/OFF] condition of the power steering system (determined by the signal sent from EPS control unit) is indicated.	
LOAD SIGNAL	ON/OFF	×	×	• Indicates [ON/OFF] condition from the electrical load signal. - ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. - OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW	ON/OFF	×	×	Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW	ON/OFF	×		Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW	ON/OFF			Indicates [ON/OFF] condition from the stop lamp switch signal.	
IGN TIMING	BTDC		×	Indicates the ignition timing computed by ECM according to the input signals.	When the engine is stopped, a certain value is indicated.
COMBUSTION	—			These items are displayed but are not applicable to this model.	
CAL/LD VALUE	%			"Calculated load value" indicates the value of the current airflow divided by peak airflow.	
MASS AIRFLOW	g/s			Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor.	

Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN SIGNALS		
PURG VOL C/V	%			• Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
INT/V TIM(B1)	°CA			Indicates [°CA] of intake camshaft advance angle.	
EXHV TIM B1	°CA			Indicates [°CA] of exhaust camshaft advance angle.	
INT/V SOL(B1)	%			• The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. • The advance angle becomes larger as the value increases.	
AIR COND RLY	ON/OFF			The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY	ON/OFF			Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
VENT CONT/V	ON/OFF			• The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is displayed. - ON: Closed - OFF: Open	
THRTL RELAY	ON/OFF			Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
HO2S2 HTR (B1)	ON/OFF			Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
ALT DUTY SIG	ON/OFF			• The control condition of the power generation voltage variable control (determined by ECM according to the input signals) is indicated. - ON: Power generation voltage variable control is active. - OFF: Power generation	
I/P PULLY SPD	rpm			Indicates the engine speed computed from the input speed sensor signal.	
VEHICLE SPEED	km/h or mph			The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
IDL A/V LEARN	YET/CMPLT			• Display the condition of Idle Air Volume Learning - YET: Idle air volume learning has not been performed yet. - CMPLT: Idle air volume learning has already been performed successfully.	

Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN SIGNALS		
TRVL AFTER MIL	km/h or mph			Distance traveled while MIL is activated.	
ENG OIL TEMP	°C or °F			The engine oil temperature (determined by the signal voltage of the engine oil temperature sensor) is displayed.	
A/F S1 HTR(B1)	%			• Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals. • The current flow to the heater becomes larger as the value increases.	
VHCL SPEED SE	km/h or mph			The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
SET VHCL SPD	km/h or mph			The preset vehicle speed is displayed.	
MAIN SW	ON/OFF			Indicates [ON/OFF] condition from ASCD MAIN switch signal.	
CANCEL SW	ON/OFF			Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW	ON/OFF			Indicates [ON/OFF] condition from ACCEL/RES switch signal.	
SET SW	ON/OFF			Indicates [ON/OFF] condition from COAST/SET switch signal.	
BRAKE SW1	ON/OFF			Indicates [ON/OFF] condition from brake pedal position switch signal.	
BRAKE SW2	ON/OFF			Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT	NON/CUT			• Indicates the vehicle cruise condition. - NON: Vehicle speed is maintained at the ASCD set speed. - CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
LO SPEED CUT	NON/CUT			• Indicates the vehicle cruise condition. - NON: Vehicle speed is maintained at the ASCD set speed. - CUT: Vehicle speed decreased to excessively low, and ASCD operation is cut off.	
AT OD MONITOR	ON/OFF			Indicates [ON/OFF] condition of CVT O/D according to the input signal from the TCM.	For M/T models, always “OFF” is displayed.
AT OD CANCEL	ON/OFF			Indicates [ON/OFF] condition of CVT O/D cancel request signal.	For M/T models, always “OFF” is displayed.
CRUISE LAMP	ON/OFF			Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP	ON/OFF			**NOTE:** The item is indicated, but not used.	

Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN SIGNALS		
FAN DUTY	%			Indicates a command value for cooling fan. The value is calculated by ECM based on input signals.	
ALT DUTY	%			Indicates the duty ratio of the power generation command value. The ratio is calculated by ECM based on the battery current sensor signal.	
BAT CUR SEN	mV			The signal voltage of battery current sensor is displayed.	
A/F ADJ-B1	—			Indicates the correction of a factor stored in ECM. The factor is calculated from the difference between the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 signal.	
P/N POSI SW	ON/OFF	×	×	Indicates [ON/OFF] condition from the park/neutral position (PNP) signal.	
INT/A TEMP SE	°C or °F	×	×	The intake air temperature (determined by the signal voltage of the intake air temperature sensor1) is indicated.	
AC PRESS SEN	V			The signal voltage from the refrigerant pressure sensor is displayed.	
FUEL PRES SEN	MPa			Indicates the fuel rail pressure computed by ECM according to the input signals.	
TURBO BST SEN	V			The turbocharger boost sensor signal voltage is displayed.	
ATOM PRES SEN	V			The atmospheric pressure sensor signal voltage is displayed.	
FUEL INJ TIM	deg			Indicates the fuel injection timing computed by ECM according to the input signals.	
FUEL INJ B1	msec			ECM-calculated injection pulse width of the fuel injector on the Bank 1 side.	
EVAP LEAK DIAG	YET/ CMPLT			• Indicates the condition of EVAP leak diagnosis. - YET: EVAP leak diagnosis has not been performed yet. - CMPLT: EVAP leak diagnosis has been performed successfully.	
EVAP DIAG READY	ON/OFF			• Indicates the ready condition of EVAP leak diagnosis. - ON: Diagnosis has been ready condition. - OFF: Diagnosis has not been ready condition.	
BAT TEMP SEN	V			The signal voltage from the battery temperature sensor is displayed.	
THRTL STK CNT B1	—			**NOTE:** The item is indicated, but not used.	

Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN SIGNALS		
HO2 S2 DIAG1(B1)	INCMP/CMPLT			• Indicates DTC P0139 self-diagnosis (delayed response) condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
HO2 S2 DIAG2(B1)	INCMP/CMPLT			• Indicates DTC P0139 self-diagnosis (slow response) condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
H/P FUEL PUMP DEG	deg			Displays ECM-calculated fuel discharge position of the high pressure fuel pump.	
FUEL PRES SEN V	mV			The signal voltage of FRP sensor is displayed.	
EOP SENSOR	mV			The signal voltage of EOP sensor is displayed.	
ECM TEMP 1	°C or °F			The ECM temperature is indicated.	
ECM TEMP 2					
BOOST S/V DUTY	%			The turbocharger boost control solenoid valve control condition (determined by ECM according to the input signal) is indicated.	
G SENSOR	mV			The signal voltage of G sensor is displayed.	
A/F SEN1 DIAG1 (B1)	INCMP/CMPLT			• Indicates DTC P015A or P015B self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	
A/F SEN1 DIAG2 (B1)	INCMP/CMPLT			• Indicates DTC P014C or P014D self-diagnosis condition. INCMP: Self-diagnosis is incomplete. CMPLT: Self-diagnosis is complete.	
A/F SEN1 DIAG3 (B1)	ABSNT/PRSNT			• Indicates DTC P014C, P014D, P015A or P015B self-diagnosis condition. ABSNT: The vehicle condition is not within the diagnosis range. PRSNT: The vehicle condition is within the diagnosis range.	
A/F-S ATMSPHRC CRCT B1	—			Displays a determined value of atmospheric correction factor necessary for correcting an A/F sensor signal input to ECM. The signal used for the correction is an A/F sensor signal transmitted while driving under atmospheric pressure.	

Monitored item	Unit	Monitor Item Selection		Description	Remarks
		ECU INPUT SIGNALS	MAIN SIGNALS		
A/F-S ATMSPHRC CRCT B2	—			Displays a determined value of atmospheric correction factor necessary for correcting an A/F sensor signal input to ECM. The signal used for the correction is an A/F sensor signal transmitted while driving under atmospheric pressure.	
A/F-S ATMSPHRC CRCT UP B1	count			Displays the number of updates of the A/F sensor atmospheric correction factor.	
A/F-S ATMSPHRC CRCT UP B2	count			Displays the number of updates of the A/F sensor atmospheric correction factor.	
SYSTEM 1 DIAGNOSIS A B1	INCMP/CMPLT			• Indicates DTC P219A self-daiagnosis condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
SYSTEM 1 DIAGNOSIS B B1	ABSENT/PRSENT			• Indicates DTC P219A self-daiagnosis condition. - ABSENT: Self-diagnosis standby. - PRSENT: Under self-diagnosis.	

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

WORK SUPPORT MODE

Work Item

Work item	Condition	Usage
IDLE AIR VOL LEARN	The idle air volume that keeps the engine within the specified range is memorized in ECM.	When learning the idle air volume
EVAP SYSTEM CLOSE	Close the EVAP canister vent control valve in order to make EVAP system close under the following conditions. • Ignition switch ON • Engine not running • Ambient temperature is above 0°C (32°F) • No vacuum and no high pressure in EVAP system • Fuel tank temperature is more than 0°C (32°F) • Within 10 minutes after starting “EVAP SYSTEM CLOSE” • When trying to execute “EVAP SYSTEM CLOSE” under the condition except above, CONSULT will discontinue it and display appropriate instruction. **NOTE:** When starting engine, CONSULT may display “Battery voltage is low. Charge battery”, even in using charged battery.	When detecting EVAP vapor leak point of EVAP system
FUEL PRESSURE RELEASE	Crank a few times after engine stalls.	When releasing fuel pressure from fuel line
TARGET IGN TIM ADJ*	Idle condition	When adjusting target ignition timing
TARGET IDLE RPM ADJ*	Idle condition	When setting target idle speed
VIN REGISTRATION	In this mode, VIN is registered in ECM.	When registering VIN in ECM

Work item	Condition	Usage
SELF-LEARNING CONT	The coefficient of self-learning control mixture ratio returns to the original coefficient.	When clearing mixture ratio self-learning value
G SENSOR CALIBRATION	• Park the vehicle on a flat road. • Adjust pressure in all tires to the specified value.	Calibrates G sensor.
CLSD THL POS LEARN	• Ignition on and engine stopped.	When learning the throttle valve closed position
SAVING DATA FOR REPLC CPU	In this mode, save data that is in ECM.	When ECM is replaced.
WRITING DATA FOR REPLC CPU	In this mode, write data stored by “SAVE DATA FOR CPU REPLC” in work support mode to ECM.	When ECM is replaced.

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

ACTIVE TEST MODE

Test Item

Test item	Condition	Judgement	Check item (Remedy)
VENT CONTROL/V	• Ignition switch ON (Engine stopped) • Turn solenoid valve ON and OFF with the CONSULT and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connectors • EVAP canister vent control solenoid valve
ENG COOLANT TEMP	• Engine: Return to the original trouble condition • Change the engine coolant temperature using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Engine coolant temperature sensor • Fuel injector
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	• Harness and connectors • Fuel injector • Air fuel ratio (A/F) sensor 1
FUEL/T TEMP SEN	Change the fuel tank temperature using CONSULT.		
PURG VOL CONT/V	• Engine: After warming up, run engine at 1,500 rpm. • Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT.	Engine speed changes according to the opening percent.	• Harness and connectors • Solenoid valve
FUEL PUMP RELAY	• Ignition switch: ON (Engine stopped) • Turn the fuel pump relay “ON” and “OFF” using CONSULT and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connectors • Fuel pump relay
IGNITION TIMING	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing using CONSULT.	If trouble symptom disappears, see CHECK ITEM.	Perform Idle Air Volume Learning.
FAN DUTY CONTROL*	• Ignition switch: ON • Change duty ratio using CONSULT.	Cooling fan speed changes.	• Harness and connectors • Cooling fan motor • Cooling fan relay • Cooling fan control module • IPDM E/R

Test item	Condition	Judgement	Check item (Remedy)
ALTERNATOR DUTY	• Ignition switch: ON • Change duty ratio using CONSULT.	Battery voltage changes.	• Harness and connectors • Alternator • IPDM E/R
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch OFF • Shift lever: P or N (CVT), Neutral (M/T) • Cut off each fuel injector signal one at a time using CONSULT.	Engine runs rough or dies.	• Harness and connectors • Compression • Fuel injector • Power transistor • Spark plug • Ignition coil

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

DTC WORK SUPPORT MODE

Test Item

Test mode	Test item	Corresponding DTC No.	Reference page
EVAPORATIVE SYSTEM	PURG VOL CN/V P1444	P0443	EC-360
	PURG FLOW P0441	P0441	EC-355
HO2S2	HO2S2 (B1) P1146	P0138	EC-279
	HO2S2 (B1) P1147	P0137	EC-273
	HO2S2 (B1) P0139	P0139	EC-286
A/F SEN1	A/F SEN1 (B1) P1278/P1279	—	
	A/F SEN1 (B1) P1276	P0130	EC-263

SRT & P-DTC MODE

SRT STATUS Mode

- For items whose SRT codes are set, “CMPLT” is displayed on the CONSULT screen; for items whose SRT codes are not set, “INCMP” is displayed.
- “SRT STATUS” provides the presence or absence of permanent DTCs stored in ECM memory.

PERMANENT DTC STATUS Mode

How to display permanent DTC status

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “PERMANENT DTC STATUS” in “DTC & SRT CONFIRMATION” mode with CONSULT.

NOTE:

Permanent DTCs stored in ECM memory are displayed on the CONSULT screen to show if a driving pattern required for erasing permanent DTCs is complete (CMPLT) or incomplete (INCMP).

CAUTION:

Since the "PERMANENT DTC STATUS" screen displays the previous trip information, repeat the following twice to update the information: "Ignition switch OFF", "Wait for more than 10 seconds" and "Ignition switch ON".

PERMANENT DTC & SRT CONFIRMATION : PERMANENT DTC STATUS

CAUTION:
Turn ignition switch from ON to OFF twice to update the information on the status screen.

PERMANENT DTC	DRIVING PATTERN B	DRIVING PATTERN D
XXXX	INCMP	INCMP
XXXX	CMPLT	INCMP
XXXX	INCMP	CMPLT
XXXX	CMPLT	INCMP
XXXX	INCMP	INCMP
XXXX	INCMP	INCMP

The previous trip information is displayed.

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NOTE:
This mode is not used in regions that permanent DTCs are not regulated by law.

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

PERMANENT DTC WORK SUPPORT Mode
This mode enables a technician to drive a vehicle to complete the driving pattern that is required for erasing permanent DTC.

NOTE:
This mode is not used in regions that permanent DTCs are not regulated by law.

ECU DIAGNOSIS INFORMATION

ECM

Reference Value

INFOID:0000000012197707

VALUES ON THE DIAGNOSIS TOOL

NOTE:

The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.

- Numerical values in the following table are reference values.
- These values are input/output values that ECM receives/transmits and may differ from actual operations.

Example:

The ignition timing shown by the timing light may differ from the ignition timing displayed on the data monitor. This occurs because the timing light shows a value calculated by ECM according to signals received from the cam shaft position sensor and other sensors related to ignition timing.

For outlines of following items, refer to EC-84, "CONSULT Function".

Monitor Item	Condition		Values/Status
ENG SPEED	Run engine and compare CONSULT value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-181, "Diagnosis Procedure".		
B/FUEL SCHDL	See EC-181, "Diagnosis Procedure".		
A/F ALPHA-B1	See EC-181, "Diagnosis Procedure".		
COOLANT TEMP/S	Engine: After warming up		More than 70°C (158°F)
A/F SEN1 (B1)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 2.2 V
HO2S2 (B1)	• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		0 - 0.3 V ←→ Approx. 0.6 - 1.0 V
HO2S2 MNTR(B1)	• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		LEAN ←→ RICH
VHCL SPEED SE	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as speedometer indication.
BATTERY VOLT	Ignition switch: ON (Engine stopped)		11 - 14 V
ACCEL SEN 1	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9 V
		Accelerator pedal: Fully depressed	4.0 - 4.8 V
ACCEL SEN 2*1	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.3 - 4.7 V
		Accelerator pedal: Fully depressed	1.95 - 2.4 V
TP SEN 1-B1	• Ignition switch: ON (Engine stopped) • Selector lever: D (CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36 V
		Accelerator pedal: Fully depressed	Less than 4.75 V
TP SEN 2-B1*	• Ignition switch: ON (Engine stopped) • Selector lever: D (CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36 V
		Accelerator pedal: Fully depressed	Less than 4.75 V
FUEL T/TMP SE	Ignition switch: ON		Indicates fuel tank temperature.
EVAP SYS PRES	Ignition switch: ON		Approx 0.5 - 4.6 V
FUEL LEVEL SE	Ignition switch: ON		Depending on fuel level of fuel tank.
START SIGNAL	Ignition switch: ON → START → ON		OFF → ON → OFF

Monitor Item	Condition		Values/Status
CLSD THL POS	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF
AIR COND SIG	Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
PW/ST SIGNAL	Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON
		Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	Engine: After warming up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
IGN TIMING	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	5° - 15° BTDC
		2,000 rpm	30° - 50° BTDC
COMBUSTION		—	These items are displayed but are not applicable to this model.
CAL/LD VALUE	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	5 - 35 %
		2,500 rpm	5 - 35 %
MASS AIRFLOW	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	1.0 - 5.0 g/s
		2,500 rpm	2.0 - 10.0 g/s
PURG VOL C/V	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0 - 10 %
		2,000 rpm	0 - 20 %
INT/V TIM(B1)	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	–5° - 5°CA
		2,000 rpm	Approx. 0° - 20°CA
EXH/V TIM B1	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	–5° - 5°CA
		Around 2,500 rpm while the engine speed is rising	Approx. 0° - 30°CA
INT/V SOL(B1)	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	0 %
		2,000 rpm	Approx. 0% - 60 %

Monitor Item	Condition		Values/Status
AIR COND RLY	Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
VENT CONT/V	Ignition switch: ON		OFF
FUEL PUMP RLY	• For 1 seconds after turning ignition switch: ON • Engine running or cranking		ON
	Except above		OFF
THRTL RELAY	Ignition switch: ON		ON
HO2S2 HTR (B1)	• Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		ON
	Engine speed: Above 3,600 rpm		OFF
ALT DUTY SIG	Power generation voltage variable control: Operating		ON
	Power generation voltage variable control: Not operating		OFF
I/P PULLY SPD	Vehicle speed: More than 20 km/h (12 MPH)		Almost the same speed as the tachometer indication
VEHICLE SPEED	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as the speedometer indication
IDL A/V LEARN	Engine: running	Idle air volume learning has not been performed yet.	YET
		Idle air volume learning has already been performed successfully.	CMPLT
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has illuminated.	0 - 65,535 km (0 - 40,723 miles)
ENG OIL TEMP	Engine: After warming up		More than 70°C (158°F)
A/F S1 HTR(B1)	Engine: After warming up, idle the engine (More than 140 seconds after starting engine)		4 - 100 %
SET VHCL SPD	Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
MAIN SW	Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	Ignition switch: ON	ACCEL/RES switch: Pressed	ON
		ACCEL/RES switch: Released	OFF
SET SW	Ignition switch: ON	COAST/SET switch: Pressed	ON
		COAST/SET switch: Released	OFF
BRAKE SW1 (Brake pedal position switch)	Ignition switch: ON	Brake pedal: Fully released	ON
		Brake pedal: Slightly depressed	OFF
BRAKE SW2 (Stop lamp switch)	Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
VHCL SPD CUT	Ignition switch: ON		NON
LO SPEED CUT	Ignition switch: ON		NON
AT OD MONITOR	Ignition switch: ON		OFF
AT OD CANCEL	Ignition switch: ON		OFF
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF

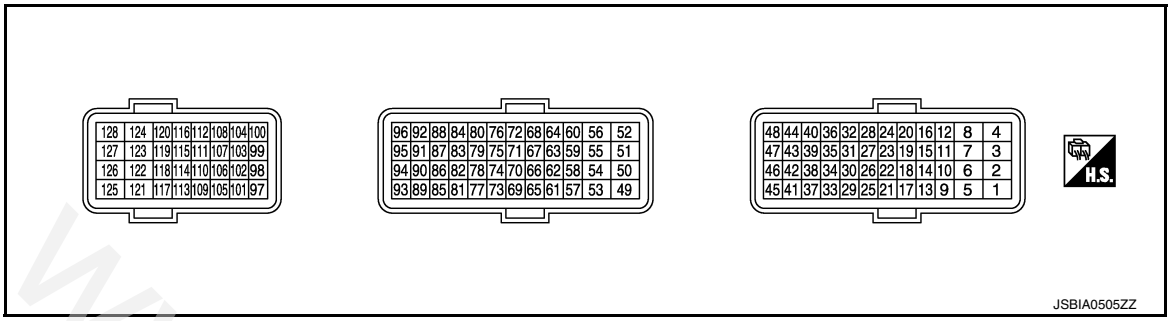
Monitor Item	Condition		Values/Status
SET LAMP	**NOTE:** The item is indicated, but not used.		
FAN DUTY	Engine: Running		0 - 100 %
ALT DUTY	Engine: Idle		0 - 80 %
BAT CUR SEN	• Engine speed: Idle • Battery: Fully charged*2 • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load		Approx. 2,600 - 3,500 mV
A/F ADJ-B1	Engine: Running		−0.450 - 0.330
P/N POSI SW	Ignition switch: ON	Selector lever: P or N (CVT), Neutral (M/T)	ON
		Selector lever: Except above	OFF
INT/A TEMP SE	Ignition switch: ON		Indicates intake air temperature
AC PRESS SEN	• Engine: Idle • Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0 V
FUEL PRES SEN	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Approx. 2.74 MPa
		2,000 rpm	Approx. 3.0 MPa
TURBO BST SEN	• Engine speed: Idle • Selector lever: D (CVT), Neutral (M/T) • Fuel: Premium gasoline	• The accelerator pedal is depressed to a half stroke position or more. • The readings of boost in the multi-function meter are the same as the ambient pressure or more. • Engine speed: More than 3,000 rpm	3.07 - 3.15 V
	• Engine speed: Idle • Selector lever: D (CVT), Neutral (M/T) • Fuel: Regular gasoline	• The accelerator pedal is depressed to a half stroke position or more. • The readings of boost in the multi-function meter are the same as the ambient pressure or more. • Engine speed: More than 3,000 rpm	2.91 - 2.99 V
ATOM PRES SEN	Ignition switch: ON		1.80 - 4.80 V
FUEL INJ TIM	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Approx. 30 deg
		2,000 rpm	Approx. 30 deg
FUEL INJ B1	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Approx. 0.8 msec
		2,000 rpm	Approx. 1.1 msec
EVAP LEAK DIAG	Ignition switch: ON		Indicates the condition of EVAP leak diagnosis.
EVAP DIAG READY	Ignition switch: ON		Indicates the ready condition of EVAP leak diagnosis.
BAT TEMP SEN	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Indicates the temperature around the battery.
THRTL STK CNT B1	**NOTE:** The item is indicated, but not used.		—

Monitor Item	Condition		Values/Status
HO2 S2 DIAG1(B1)	DTC P0139 self-diagnosis (delayed response) has not been performed yet.		INCMP
	DTC P0139 self-diagnosis (delayed response) has already been performed successfully.		CMPLT
HO2 S2 DIAG2(B1)	DTC P0139 self-diagnosis (slow response) has not been performed yet.		INCMP
	DTC P0139 self-diagnosis (slow response) has already been performed successfully.		CMPLT
H/P FUEL PUMP DEG	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Approx. 255 - 275 deg
		2,000 rpm	Approx. 255 - 275 deg
FUEL PRES SEN V	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Approx. 1,140 - 1,460 mV
		Revving engine from idle to 4,000 rpm quickly	Approx. 1,300 - 2,900 mV
EOP SENSOR	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Approx. 1,450 mV
		2,000 rpm	Approx. 2,850 mV
ECM TEMP 1	• Engine: After cooling • Ignition switch: ON		Indicates the temperature around the ECM.
ECM TEMP 2	• Engine: After cooling • Ignition switch: ON		Indicates the temperature around the ECM.
BOOST S/V DUTY	Engine: After warming up	Idle	0 %
		• The accelerator pedal is depressed to a half stroke position or more. • Engine speed: Below 3,000 rpm	100 %
		• The accelerator pedal is depressed to a half stroke position or more. • Engine speed: More than 3,000 rpm	30 - 60 %
G SENSOR	Vehicle is level		Approx. 2,500 mV
A/F SEN1 DIAG1 (B1)	DTC P015A and P015B self-diagnosis is incomplete.		INCMP
	DTC P015A and P015B self-diagnosis is complete.		CMPLT
A/F SEN1 DIAG2 (B1)	DTC P014C and P014D self-diagnosis is incomplete.		INCMP
	DTC P014C and P014D self-diagnosis is complete.		CMPLT
A/F SEN1 DIAG3 (B1)	The vehicle condition is not within the diagnosis range of DTC P014C, P014D, P015A or P015B.		ABSNT
	The vehicle condition is within the diagnosis range of DTC P014C, P014D, P015A or P015B.		PRSNT
A/F-S ATMSPHRC CRCT B1	Engine: After warming up, idle the engine		Varies depending on vehicle environment.
A/F-S ATMSPHRC CRCT B2	Engine: After warming up, idle the engine		Varies depending on vehicle environment.
A/F-S ATMSPHRC CRCT UP B1	Engine: Running		Varies depending on the number of updates.
A/F-S ATMSPHRC CRCT UP B2	Engine: Running		Varies depending on the number of updates.
SYSTEM 1 DIAGNOSIS A B1	DTC P219A self-diagnosis is incomplete.		INCMP
	DTC P219A self-diagnosis is complete.		CMPLT
SYSTEM 1 DIAGNOSIS B B1	DTC P219A self-diagnosis is on standby.		ABSENT
	DTC P219A self-diagnosis is under diagnosis.		PRSENT

*1: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

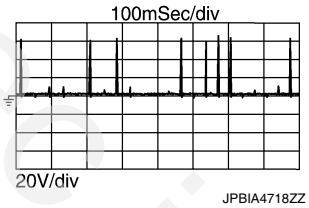
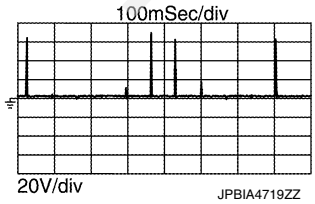
*2: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-97, "How to Handle Battery".

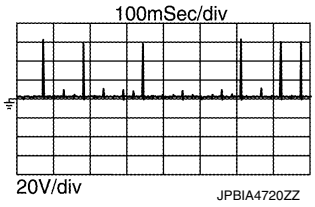
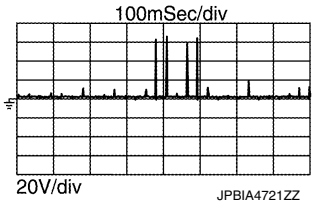
TERMINAL LAYOUT



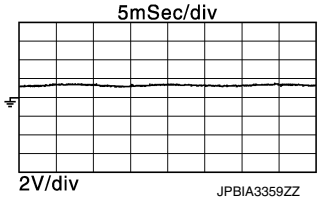
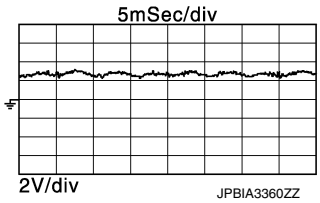
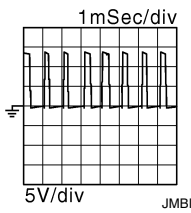
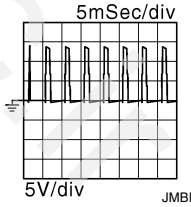
PHYSICAL VALUES

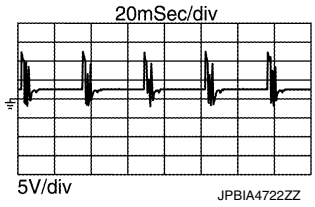
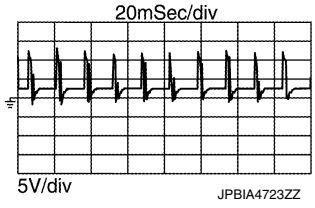
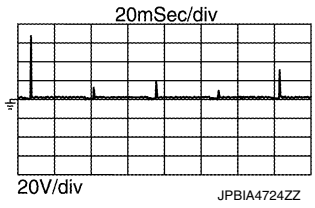
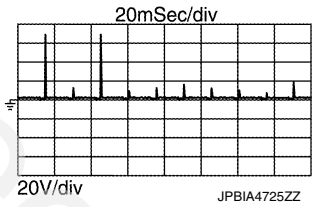
NOTE:
- ECM is located in the engine room left side near battery.
- Connect a break-out box (EG17550000) and harness adapter (EG17550400) between the ECM and ECM harness connector.
- Use extreme care not to 2 pins at one time.
- Data is for comparison and may not be exact.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT.

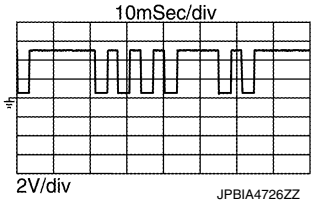
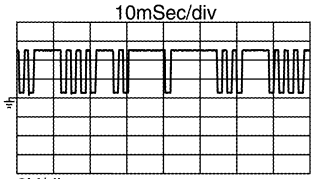
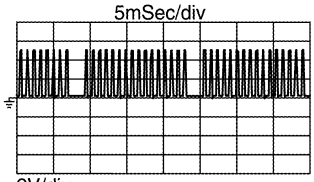
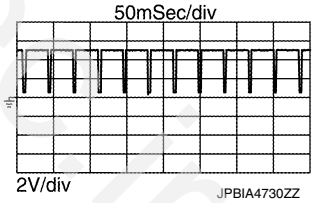
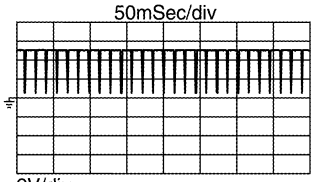
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
1 (B)	—	ECM ground (Fuel injector)	—	—	—
2 (B)	—	ECM ground (Fuel injector)	—	—	—
3 (G)	1 (B)	Fuel injector No. 1, 4 (HI)	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14 V) ★ 
4 (Y)		Fuel injector No. 2, 3 (HI)		[Engine is running] • Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14 V) ★ 

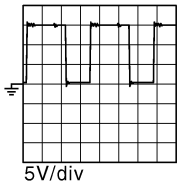
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
5 (R)	1 (B)	Fuel injector No. 1 (LO)	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14 V) ★ 
6 (BR)		Fuel injector No. 2 (LO)			
7 (W)		Fuel injector No. 3 (LO)		[Engine is running] • Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14 V) ★ 
8 (R)		Fuel injector No. 4 (LO)			
9 (W)	—	Sensor ground (Mass air flow sensor, intake air temperature sensor1)	—	—	—
10 (LG)	—	Sensor ground (Engine coolant temperature sensor)	—	—	—
11 (P)	—	Sensor ground (Engine oil temperature sensor)	—	—	—
12 (BR)	—	Sensor ground (Refrigerant pressure sensor, EVAP control system pressure sensor)	—	—	—
13 (G)	9 (W)	Mass air flow sensor	Input	[Ignition switch: ON] • Engine stopped	0.4 V
				[Engine is running] • Warm-up condition • Idle speed	0.9 - 1.2 V
				[Engine is running] • Warm-up condition • Engine is revving from idle to about 4,000 rpm	0.9 - 1.2 to 2.4 V (Check for linear voltage rise in response to engine being increased to about 4,000 rpm.)
14 (L)	10 (LG)	Engine coolant temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.
15 (L)	12 (BR)	EVAP control system pressure sensor	Input	[Ignition switch: ON]	0.5 - 4.6 V
17 (Y)	9 (W)	Intake air temperature sensor 1	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.

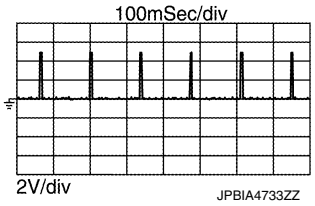
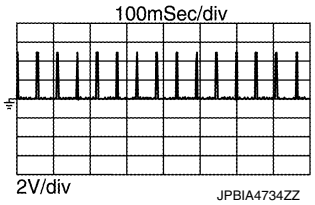
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
18 (GR)	44 (SB)	Fuel rail pressure sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.14 - 1.46 V
				[Engine is running] • Warm-up condition • Revving engine from idle to 4,000 rpm quickly	1.3 - 2.9 V
19 (P)	12 (BR)	Refrigerant pressure sensor	Input	[Engine is running] • Warm-up condition • Both A/C switch and blower fan motor switch: ON (Compressor operates)	1.0 - 4.0 V
21 (W)	127 (B/Y)	A/F sensor 1	Input	[Ignition switch: ON]	2.2 V
22 (Y)	11 (P)	Engine oil temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine oil temperature.
23 (W)	12 (BR)	Sensor power supply (Refrigerant pressure sensor, EVAP control system pressure sensor)	—	[Ignition switch: ON]	5.0 V
25 (B)	127 (B/Y)	A/F sensor 1	Input	[Engine is running] • Engine speed is 2,000 rpm	1.8 V Output voltage varies with air fuel ratio.
29 (W)	33 (R)	Heated oxygen sensor 2	Input	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0 V
33 (R)	—	Sensor ground (Heated oxygen sensor 2)	—	—	—
35 (B)	—	Sensor ground (Knock sensor)	—	—	—
36 (W)	35 (B)	Knock sensor	Input	[Engine is running] • Idle speed	2.5 V
38 (B)	—	Shield	—	—	—
39 (R)	44 (SB)	Sensor power supply (Fuel rail pressure sensor, turbocharger boost sensor, engine oil pressure sensor)	—	[Ignition switch: ON]	5.0 V
41 (W)	44 (SB)	Turbocharger boost sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.9 V
				[Engine is running] • Warm-up condition • Engine speed is 2,000 rpm	2.0 V

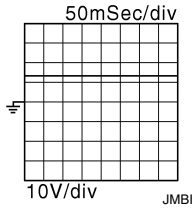
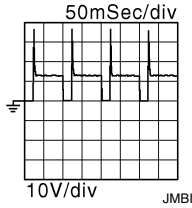
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
43 (G)	44 (SB)	Engine oil pressure sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.3 V★  JPBIA3359ZZ
				[Engine is running] • Warm-up condition • Engine speed is 2,000 rpm	2.7 V★  JPBIA3360ZZ
44 (SB)	—	Sensor ground (Fuel rail pressure sensor, turbocharger boost sensor, engine oil pressure sensor)	—	—	—
49 (G)	—	Fuel injector driver power supply 1	Input	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
50 (B)	—	ECM ground (High pressure fuel pump)	—	—	—
51 (GR)	127 (B/Y)	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	3.2 V★  JMBIA0324GB
52 (BR)	127 (B/Y)	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	1.8 V★  JMBIA0326GB
53 (BR)	—	Fuel injector driver power supply 2	Input	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
54 (R)	—	High pressure fuel pump driver power supply	Input	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
55 (BR)	50 (B)	High pressure fuel pump (HI)	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14 V) ★ 
				[Engine is running] • Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14 V) ★ 
56 (Y)	127 (B/Y)	High pressure fuel pump (LO)	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14 V) ★ 
				[Engine is running] • Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14 V) ★ 
58 (G)	—	Sensor power supply [Crankshaft position sensor (POS)]	—	[Ignition switch: ON]	5 V
59 (L)	—	Sensor ground [Camshaft position sensor (PHASE), exhaust valve timing control position sensor]	—	—	—
60 (W)	—	Sensor ground [Crankshaft position sensor (POS)]	—	—	—
62 (B)	—	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5 V

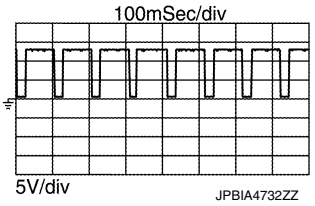
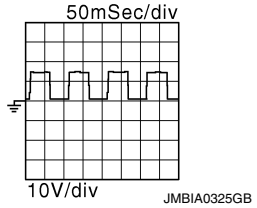
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
63 (BR)	59 (L)	Camshaft position sensor (PHASE)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 2.0★ 10mSec/div  2V/div JPBIA4726ZZ
				[Engine is running] • Engine speed is 2,000 rpm	1.0 - 2.0★ 10mSec/div  2V/div JPBIA4727ZZ
64 (R)	60 (W)	Crankshaft position sensor (POS)	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	4.0 V★ 5mSec/div  2V/div JPBIA4728ZZ
				[Engine is running] • Engine speed: 2,000 rpm	4.0 V★ 5mSec/div  2V/div JPBIA4729ZZ
67 (LG)	59 (L)	Exhaust valve timing control position sensor	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 2.0★ 50mSec/div  2V/div JPBIA4730ZZ
				[Engine is running] • Engine speed is 2,000 rpm	1.0 - 2.0★ 50mSec/div  2V/div JPBIA4731ZZ
68 (Y)	—	Sensor power supply (Battery current sensor, battery temperature sensor, G sensor)	—	[Ignition switch: ON]	5 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
69 (L)	127 (B/Y)	EVAP canister vent control valve	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
72 (GR)	—	Sensor power supply [Camshaft position sensor (PHASE), exhaust valve timing control position sensor]	—	[Ignition switch: ON]	5 V
73 (BR)	127 (B/Y)	Turbocharger boost control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
				[Engine is running] • Warm-up condition • Engine speed is 2,000 rpm	8.0 V
74 (R)	—	Sensor ground (Throttle position sensor 1, 2)	—	—	—
75 (G)	74 (R)	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36 V
				[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75 V
76 (W)	74 (R)	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	Less than 4.75 V
				[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	More than 0.36 V
77 (Y)	127 (B/Y)	Throttle control motor relay	Output	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON]	0 - 1.0 V
79 (BG)	87 (BR)	Battery temperature sensor	Input	[Engine is running] • Battery temperature: 25°C (°F) • Idle speed	3.3 V
80 (G)	87 (BR)	Battery current sensor	Input	[Engine is running] • Battery: Fully charged* • Idle speed	2.6 - 3.5 V
81 (W)	127 (B/Y)	Intake valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	0 V
				[Engine is running] • Warm-up condition • When revving engine up to 2,000rpm Quickly	BATTERY VOLTAGE (11 - 14 V) ★  5V/div JMBIA0038GB

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
82 (R) 86 (LG) 90 (P) 94 (SB)	127 (B/Y)	Ignition signal No. 1 Ignition signal No. 2 Ignition signal No. 3 Ignition signal No. 4	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.3 V★ 
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.2 - 0.5 V★ 
83 (G)	87 (BR)	G sensor	Input	[Engine is running] • Warm-up condition • Idle speed	2.5 V
84 (P)	127 (B/Y)	Fuel tank temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with fuel tank temperature
85 (G)	127 (B/Y)	Exhaust valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	0 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V)
87 (BR)	—	Sensor ground (Battery current sensor, battery temperature sensor, G sensor)	—	—	—
88 (V)	44 (SB)	Intake air temperature sensor 2	Input	[Engine is running] • Warm-up condition • Idle speed	0 - 4.8 V Output voltage varies with intake air temperature.
92 (R)	127 (B/Y)	Cranking request signal	Output	[Ignition switch: OFF]	3.6 V
				[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
95 (L)	127 (B/Y)	EVAP canister purge volume control solenoid valve	Output	[Engine is running] • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14 V)★  JMBIA0327GB
				[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.)	10 V★  JMBIA0328GB
99 (P)	—	CAN communication line (CAN-L)	Input/ Output	—	—
100 (L)	—	CAN communication line (CAN-H)	Input/ Output	—	—
101 (V)	—	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5 V
102 (R)	105 (GR)	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
103 (BR)	127 (B/Y)	PNP signal	Input	[Ignition switch: ON] • Selector lever: P or N (CVT), Neutral (M/T)	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON] • Selector lever: Except above	0 V
104 (R)	127 (B/Y)	Data link connector	Input/ Output	[Ignition switch: ON] • CONSULT or GST: Disconnected	10.5 V
105 (GR)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—
106 (Y)	127 (B/Y)	Power supply for ECM (Backup)	Input	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
108 (GR)	127 (B/Y)	Clutch pedal position switch	Input	[Ignition switch: ON] • Clutch pedal: Fully released	0 V
				[Ignition switch: ON] • Clutch pedal: Fully depressed	BATTERY VOLTAGE (11 - 14 V)
109 (O)	127 (B/Y)	Ignition switch	Input	[Ignition switch: OFF]	0 V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
110 (P)	111 (B)	ASCD steering switch	Input	[Ignition switch: ON] • ASCD steering switch: OFF	4 V
				[Ignition switch: ON] • MAIN switch: Pressed	0 V
				[Ignition switch: ON] • CANCEL switch: Pressed	1 V
				[Ignition switch: ON] • ACCEL/RES switch: Pressed	3 V
				[Ignition switch: ON] • COAST/SET switch: Pressed	2 V
111 (B)	—	Sensor ground (ASCD steering switch)	—	—	—
112 (BR)	127 (B/Y)	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] • A few seconds after turning ignition switch OFF	0 - 1.0 V
				[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)
115 (R)	127 (B/Y)	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)
116 (G)	127 (B/Y)	Brake pedal position switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON] • Brake pedal: Slightly depressed	0 V
117 (Y)	127 (B/Y)	Fuel pump relay	Output	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.0 V
118 (O)	—	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5 V
119 (W)	120 (Y)	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 - 2.4 V
120 (Y)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
121 (G)	127 (B/Y)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
122 (G)	127 (B/Y)	Throttle control motor power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
123 (GR)	—	ECM ground	—	—	—
124 (GR)	—	ECM ground	—	—	—

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
125 (L)	127 (B/Y)	A/F sensor 1 heater	Input	[Engine is running] • Warm-up condition • Idle speed (More than 140 seconds after starting engine)	2.9 - 8.8 V★ 
126 (W)	33 (R)	Heated oxygen sensor 2 heater	Output	[Engine is running] • Engine speed: Below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	10 V★ 
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
127 (B/Y)	—	ECM ground	—	—	—

Fail Safe

INFOID:0000000012197708

DTC No.	Detected items	Engine operating condition in fail safe mode
P0011	Intake valve timing control	The signal is not energized to the intake valve timing control solenoid valve and the valve control does not function.
P0014	Exhaust valve timing control	The signal is not energized to the exhaust valve timing control magnet retarder and the magnet retarder control does not function.
P0045 P0048	Turbocharger boost control solenoid valve	Sets the duty ratio of the turbocharger boost control solenoid valve to 0%, and decreases the boost to the lower limit.
P0047		The ECM controls the electric throttle control actuator and restricts the torque.
P0087 P0090	FRP control system	Engine torque is limited or engine speed is limited.
P0088		Engine speed is limited.
P0101 P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the following conditions. CONSULT displays the engine coolant temperature decided by ECM.

Condition	Engine coolant temperature decided (CONSULT display)
Just as ignition switch is turned ON or START	40°C (104°F)
Approx. 4 minutes or more after engine starting	80°C (176°F)
Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)

When the fail safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.

DTC No.	Detected items	Engine operating condition in fail safe mode
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.
P0190	FRP sensor	• Engine speed is limited. • High pressure fuel pump is activated at maximum discharge pressure.
P0196 P0197 P0198	Engine oil temperature sensor	Exhaust valve timing control does not function.
P0201 P0202 P0203 P0204	Injector	• Engine torque is limited. • Fuel injection shut-off of malfunction cylinder. • Mixture ratio feedback control does not function. • Idle engine speed is increased.
P0234	Turbocharger system	The ECM controls the electric throttle control actuator and restricts the torque.
P0235 P0237 P0238	Turbocharger boost sensor	Sets the duty ratio of the turbocharger boost control solenoid valve to 0%, and decreases the boost to the lower limit.
P0500	Vehicle speed sensor	The cooling fan operates (Highest) while engine is running.
P0524	Engine oil pressure	• ECM illuminates oil pressure warning lamp on the combination meter. • Engine speed will not rise more than 4,000 rpm due to the fuel cut. • Fail-safe is canceled when ignition switch OFF → ON.
P0603 P0607	ECM	Engine torque may be limited.
P0604	ECM	• ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. • The position of the following components is fixed. - Intake valve timing control solenoid valve - Exhaust valve timing control solenoid valve • ASCD operation may be deactivated.
P0605 P0606 P060B	ECM	**NOTE:** Fail-safe may not occur depending on malfunction type. • ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. • The position of the following components is fixed. - Intake valve timing control solenoid valve - Exhaust valve timing control solenoid valve • ASCD operation may be deactivated.
P060A	ECM	**NOTE:** Fail-safe may not occur depending on malfunction type. • ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. • The position of the following components is fixed. - Intake valve timing control solenoid valve - Exhaust valve timing control solenoid valve • Engine torque may be limited. • ASCD operation may be deactivated.
P062B		• Engine torque is limited. • Idle engine speed is increased. • Fuel injector power supply shut-off. • High fuel pressure limitation.
P0643	Sensor power supply	• ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. • The position of the following components is fixed. - Intake valve timing control solenoid valve - Exhaust valve timing control solenoid valve

DTC No.	Detected items	Engine operating condition in fail safe mode
P1805	Brake switch	ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor. Vehicle condition: When engine is idling — Driving condition: Normal Vehicle condition: When accelerating — Driving condition: Poor acceleration
P1197	Out of gas	Engine torque is limited.
P2100 P2103	Throttle control motor relay	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P2101	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P2118	Throttle control motor	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P2119	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
		(When throttle valve opening angle in fail safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in the Neutral position, and engine speed will not exceed 1,000 rpm or more.
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Inspection Priority Chart

INFOID:0000000012197709

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
1	• U0101 U0122 U1001 CAN communication line • P0096 P0097 P0098 Intake air temperature sensor 2 • P0101 P0102 P0103 Mass air flow sensor • P0111 P0112 P0113 P0127 Intake air temperature sensor 1 • P0116 P0117 P0118 P0125 Engine coolant temperature sensor • P011C Intake air temperature sensor 2 • P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor • P0128 Thermostat function • P0181 P0182 P0183 Fuel tank temperature sensor • P0190 P0192 P0193 P119A P119B P119C Fuel rail pressure sensor • P0196 P0197 P0198 Engine oil temperature sensor • P0235 Turbocharger boost sensor • P0327 P0328 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 Camshaft position sensor (PHASE) • P0460 P0461 P0462 P0463 Fuel level sensor • P0500 P0501 P2159 P2162 Vehicle speed sensor • P0520 Engine oil pressure sensor • P0603 P0604 P0605 P0606 P0607 P060A P060B P0611 P062B ECM • P0643 Sensor power supply • P0705 Transmission range switch • P0850 Park/neutral position (PNP) switch • P1197 Out of gas* • P1550 P1551 P1552 P1553 P1554 Battery current sensor • P1556 P1557 Batter temperature sensor • P158A ECM • P159A P159B P159C P159D G sensor • P1610 - P1612 NATS • P1650 P1651 P1652 Starter motor relay • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor

Priority	Detected items (DTC)
2	• P0030 P0031 P0032 Air fuel ratio (A/F) sensor 1 heater • P0037 P0038 Heated oxygen sensor 2 heater • P0045 P0047 P0048 Turbocharger boost control solenoid valve • P0075 Intake valve timing control solenoid valve • P0078 Exhaust valve timing control solenoid valve • P0130 P0131 P0132 P014C P014D P015A P015B P2096 P2097 Air fuel ratio (A/F) sensor 1 • P0137 P0138 P0139 Heated oxygen sensor 2 • P0237 P0238 Turbocharger boost sensor • P0441 EVAP control system purge flow monitoring • P0443 P0444 P0445 EVAP canister purge volume control solenoid valve • P0447 P0448 EVAP canister vent control valve • P0451 P0452 P0453 EVAP control system pressure sensor • P0710 P0715 P0720 P0740 P0744 P0745 P0746 P0776 P0778 P0840 P1740 P1777 P1778 CVT related sensors, solenoid valves and switches • P1078 Exhaust valve timing position sensor • P1217 Engine over temperature (OVERHEAT) • P1451 Pressure sensor • P1805 Brake switch • P1807 P1808 Brake pedal position switch • P2100 P2103 Throttle control motor relay • P2101 Electric throttle control function • P2118 Throttle control motor
3	• P0011 Intake valve timing control • P0014 Exhaust valve timing control • P0087 P0088 P0090 FRP control system • P0171 P0172 Fuel injection system function • P0201 - P0204 Injector • P0234 P2263 Turbocharger system • P0300 - P0304 Misfire • P0420 Three way catalyst function • P0456 EVAP control system (very small leak) • P0506 P0507 Idle speed control system • P050A P050E P1423 P1424 Cold start control • P0524 Engine oil pressure • P1148 Closed loop control • P1212 TCS communication line • P1564 ASCD steering switch • P1572 ASCD brake switch • P1574 ASCD vehicle speed sensor • P2119 Electric throttle control actuator • P219A Air fuel ratio sensor

NOTE:
*: If “P1197” is displayed with other DTC in priority 1, perform trouble diagnosis for “P1197” first.

DTC Index

INFOID:0000000012197710

×:Applicable —: Not applicable

DTC[*1]		Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group[*4]	Reference page
CONSULT GST[*2]	ECM[*3]						
U0100	0100	COMMUNICATION ERROR (LOST)	—	2	×	—	EC-191
U0101	0101	LOST COMM (TCM)	—	1	×	B	EC-193
U0122	0122	VDC MDL	—	2	×	B	EC-194
U1001	1001[*5]	CAN COMM CIRCUIT	—	2	—	—	EC-195
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	Flashing[*9]	—	—
P0011	0011	INT/V TIM CONT-B1	×	2	×	B	EC-196
P0014	0014	EXH/V TIM CONT-B1	—	2	×	B	EC-199

DTC[*1]		Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group[*4]	Reference page
CONSULT GST[*2]	ECM[*3]						
P0030	0030	A/F SEN1 HTR (B1)	—	2	×	B	EC-203
P0031	0031	A/F SEN1 HTR (B1)	—	2	×	B	EC-203
P0032	0032	A/F SEN1 HTR (B1)	—	2	×	B	EC-203
P0037	0037	HO2 HTR (B1)	—	2	×	B	EC-206
P0038	0038	HO2 HTR (B1)	—	2	×	B	EC-206
P0045	0045	TC BOOST SOL/V	—	2	×	B	EC-209
P0047	0047	TC/SC BOOST CONT A	—	1	×	B	EC-209
P0048	0048	TC/SC BOOST CONT A	—	1	×	B	EC-209
P0075	0075	INT/V TIM V/CIR-B1	—	2	×	B	EC-211
P0078	0078	EX V/T ACT/CIRC-B1	—	2	×	B	EC-214
P0087	0087	LOW FUEL PRES	—	2	×	A or B	EC-217
P0088	0088	HIGH FUEL PRES	—	2	×	A or B	EC-220
P0090	0090	FUEL PUMP	—	2	×	B	EC-222
P0096	0096	IAT SENSOR 2 B1	—	2	×	B	EC-227
P0097	0097	IAT SENSOR 2 B1	—	2	×	B	EC-229
P0098	0098	IAT SENSOR 2 B1	—	2	×	B	EC-229
P0101	0101	MAF SEN/CIRCUIT-B1	—	2	×	B	EC-233
P0102	0102	MAF SEN/CIRCUIT-B1	—	1	×	B	EC-238
P0103	0103	MAF SEN/CIRCUIT-B1	—	1	×	B	EC-238
P0111	0111	IAT SENSOR 1 B1	—	2	×	A	EC-243
P0112	0112	IAT SEN/CIRCUIT-B1	—	2	×	B	EC-245
P0113	0113	IAT SEN/CIRCUIT-B1	—	2	×	B	EC-245
P0116	0116	ECT SEN/CIRC	—	2	×	A	EC-247
P0117	0117	ECT SEN/CIRC	—	1	×	B	EC-249
P0118	0118	ECT SEN/CIRC	—	1	×	B	EC-249
P011C	011C	CAT/IAT CRRLTN B1	—	2	×	B	EC-251
P0122	0122	TP SEN 2/CIRC-B1	—	1	×	B	EC-253
P0123	0123	TP SEN 2/CIRC-B1	—	1	×	B	EC-253
P0125	0125	ECT SENSOR	—	2	×	B	EC-256
P0127	0127	IAT SENSOR-B1	—	2	×	B	EC-258
P0128	0128	THERMSTAT FNCTN	—	2	×	A	EC-260
P0130	0130	A/F SENSOR1 (B1)	×	2	×	A	EC-263
P0131	0131	A/F SENSOR1 (B1)	—	2	×	B	EC-267
P0132	0132	A/F SENSOR1 (B1)	—	2	×	B	EC-270
P0137	0137	HO2S2 (B1)	×	2	×	A	EC-273
P0138	0138	HO2S2 (B1)	×	2	×	A	EC-279
P0139	0139	HO2S2 (B1)	×	2	×	A	EC-286
P014C	014C	A/F SENSOR1 (B1)	×	2	×	A	EC-292
P014D	014D	A/F SENSOR1 (B1)	×	2	×	A	EC-292
P015A	015A	A/F SENSOR1 (B1)	×	2	×	A	EC-292
P015B	015B	A/F SENSOR1 (B1)	×	2	×	A	EC-292
P0171	0171	FUEL SYS-LEAN-B1	—	2	×	B	EC-297

DTC[*1]		Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group[*4]	Reference page
CONSULT GST[*2]	ECM[*3]						
P0172	0172	FUEL SYS-RICH-B1	—	2	×	B	EC-301
P0181	0181	FTT SENSOR	—	2	×	A and B	EC-305
P0182	0182	FTT SEN/CIRCUIT	—	2	×	B	EC-309
P0183	0183	FTT SEN/CIRCUIT	—	2	×	B	EC-309
P0190	0190	FUEL PRES SEN/CIRC	—	1	×	B	EC-312
P0192	0192	FRP SEN/CIRC	—	2	×	B	EC-312
P0193	0193	FRP SEN/CIRC	—	2	×	B	EC-312
P0196	0196	EOT SENSOR	—	2	×	A and B	EC-316
P0197	0197	EOT SEN/CIRC	—	2	×	B	EC-320
P0198	0198	EOT SEN/CIRC	—	2	×	B	EC-320
P0201	0201	INJECTOR CIRC-CYL1	—	2	×	B	EC-322
P0202	0202	INJECTOR CIRC-CYL2	—	2	×	B	EC-322
P0203	0203	INJECTOR CIRC-CYL3	—	2	×	B	EC-322
P0204	0204	INJECTOR CIRC-CYL4	—	2	×	B	EC-322
P0222	0222	TP SEN 1/CIRC-B1	—	1	×	B	EC-323
P0223	0223	TP SEN 1/CIRC-B1	—	1	×	B	EC-323
P0234	0234	TC SYSTEM-B1	—	1	×	B	EC-326
P0235	0235	TURBO BOOST SENSOR	—	2	×	B	EC-329
P0237	0237	TC BOOST SEN/CIRC-B1	—	2	×	B	EC-332
P0238	0238	TC BOOST SEN/CIRC-B1	—	2	×	B	EC-332
P0300	0300	MULTI CYL MISFIRE	—	1 or 2	× or —	B	EC-335
P0301	0301	CYL 1 MISFIRE	—	1 or 2	× or —	B	EC-335
P0302	0302	CYL 2 MISFIRE	—	1 or 2	× or —	B	EC-335
P0303	0303	CYL 3 MISFIRE	—	1 or 2	× or —	B	EC-335
P0304	0304	CYL 4 MISFIRE	—	1 or 2	× or —	B	EC-335
P0327	0327	KNOCK SEN/CIRC-B1	—	2	—	—	EC-341
P0328	0328	KNOCK SEN/CIRC-B1	—	2	—	—	EC-341
P0335	0335	CKP SEN/CIRCUIT	—	2	×	B	EC-343
P0340	0340	CMP SEN/CIRC-B1	—	2	×	B	EC-346
P0420	0420	TW CATALYST SYS-B1	×	2	×	A	EC-350
P0441	0441	EVAP PURG FLOW/MON	×	2	×	A	EC-355
P0443	0443	PURG VOLUME CONT/V	—	2	×	A	EC-360
P0444	0444	PURG VOLUME CONT/V	—	2	×	B	EC-365
P0445	0445	PURG VOLUME CONT/V	—	2	×	B	EC-365
P0447	0447	VENT CONTROL VALVE	—	2	×	B	EC-368
P0448	0448	VENT CONTROL VALVE	—	2	×	B	EC-372
P0451	0451	EVAP SYS PRES SEN	—	2	×	A	EC-376
P0452	0452	EVAP SYS PRES SEN	—	2	×	B	EC-380
P0453	0453	EVAP SYS PRES SEN	—	2	×	A	EC-383
P0456	0456	EVAP VERY SML LEAK	×[*6]	2	×	A	EC-387
P0460	0460	FUEL LEV SEN SLOSH	—	2	×	A	EC-393
P0461	0461	FUEL LEVEL SENSOR	—	2	×	B	EC-394

DTC[*1]		Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group[*4]	Reference page
CONSULT GST[*2]	ECM[*3]						
P0462	0462	FUEL LEVEL SEN/CIRC	—	2	×	B	EC-396
P0463	0463	FUEL LEVEL SEN/CIRC	—	2	×	B	EC-396
P0500	0500	VEHICLE SPEED SEN A[*7]	—	2	×	B	EC-397 (CVT) EC-398 (M/T)
P0501	0501	VEHICLE SPEED SEN A	—	2	×	B	EC-401
P0506	0506	ISC SYSTEM	—	2	×	B	EC-402
P0507	0507	ISC SYSTEM	—	2	×	B	EC-404
P050A	050A	COLD START CONTROL	—	2	×	A	EC-406
P050E	050E	COLD START CONTROL	—	2	×	A	EC-406
P0520	0520	EOP SENSOR/SWITCH	—	2	—	—	EC-408
P0524	0524	ENGINE OIL PRESSURE	—	1	—	—	EC-412
P0603	0603	ECM BACK UP/CIRCUIT[*8]	—	2	× or —	B	EC-415
P0604	0604	ECM	—	1	×	B	EC-416
P0605	0605	ECM	—	1 or 2	×	B	EC-417
P0606	0606	CONTROL MODULE	—	1	× or —	B	EC-418
P0607	0607	ECM	—	1 or 2	—	B	EC-419
P060A	060A	CONTROL MODULE	—	1 or 2	—	B	EC-420
P060B	060B	CONTROL MODULE	—	1	—	B	EC-421
P0611	0611	FIC MODULE	—	2	×	B	EC-422
P062B	062B	ECM	—	2	×	B	EC-423
P0643	0643	SENSOR POWER/CIRC	—	1	×	B	EC-424
P0705	0705	T/M RANGE SENSOR A	—	2	×	B	TM-241
P0710	0710	FLUID TEMP SENSOR A	—	2	×	B	TM-244
P0715	0715	INPUT SPEED SENSOR A	—	2	×	B	TM-248
P0720	0720	OUTPUT SPEED SENSOR[*7]	—	2	×	B	TM-251
P0740	0740	TORQUE CONVERTER	—	2	×	B	TM-255
P0744	0744	TORQUE CONVERTER	—	2	×	B	TM-258
P0745	0745	PC SOLENOID A	—	2	×	B	TM-260
P0746	0746	PC SOLENOID A	—	2	×	B	TM-262
P0776	0776	PC SOLENOID B	—	2	×	B	TM-264
P0778	0778	PC SOLENOID B	—	2	×	B	TM-266
P0840	0840	FLUID PRESS SEN/SW A	—	2	×	B	TM-274
P0850	0850	P-N POS SW/CIRCUIT	—	2	×	B	EC-426
P1078	1078	EXH TIM SEN/CIRC-B1	—	2	×	B	EC-430
P1148	1148	CLOSED LOOP-B1	—	1	×	A	EC-434
P1197	1197	FUEL RUN OUT	—	2	—	—	EC-435
P119A	119A	FRP SENSOR A	—	2	×	B	EC-437
P119B	119B	FRP SENSOR A	—	2	×	B	EC-437
P119C	119C	FRP SENSOR A	—	2	×	B	EC-442
P1212	1212	TCS/CIRC	—	2	—	—	EC-446
P1217	1217	ENG OVER TEMP	—	1	×	B	EC-447
P1225	1225	CTP LEARNING-B1	—	2	—	—	EC-450

DTC[*1]		Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group[*4]	Reference page
CONSULT GST[*2]	ECM[*3]						
P1226	1226	CTP LEARNING-B1	—	2	—	—	EC-451
P1423	1423	COLD START CONTROL	—	2	×	B	EC-452
P1424	1424	COLD START CONTROL	—	2	×	B	EC-452
P1451	1451	TC/SC PRES-EVAP PRES	—	2	×	B	EC-454
P1550	1550	BAT CURRENT SENSOR	—	2	—	—	EC-457
P1551	1551	BAT CURRENT SENSOR	—	2	—	—	EC-460
P1552	1552	BAT CURRENT SENSOR	—	2	—	—	EC-460
P1553	1553	BAT CURRENT SENSOR	—	2	—	—	EC-463
P1554	1554	BAT CURRENT SENSOR	—	2	—	—	EC-466
P1556	1556	BAT TMP SEN/CIRC	—	2	—	—	EC-470
P1557	1557	BAT TMP SEN/CIRC	—	2	—	—	EC-470
P1564	1564	ASCD SW	—	1	—	—	EC-472
P1572	1572	ASCD BRAKE SW	—	1	—	—	EC-475
P1574	1574	ASCD VHL SPD SEN	—	1	—	—	EC-480
P158A	158A	G SENSOR	—	1	—	—	EC-482
P159A	159A	G SENSOR	—	2	—	—	EC-483
P159B	159B	G SENSOR	—	2	×	B	EC-487
P159C	159C	G SENSOR	—	2	×	B	EC-483
P159D	159D	G SENSOR	—	2	×	B	EC-483
P1610	1610	LOCK MODE	—	2	—	—	SEC-50
P1611	1611	ID DISCORD, IMMU-ECM	—	2	—	—	SEC-51
P1612	1612	CHAIN OF ECM-IMMU	—	2	—	—	SEC-52
P1650	1650	STR MTR RELAY 2	—	2	×	B	EC-492
P1651	1651	STR MTR RELAY	—	2	×	B	EC-495
P1652	1652	STR MTR SYS COMM	—	1	×	B	EC-497
P1740	1740	SLCT SOLENOID	—	2	×	B	TM-291
P1777	1777	STEP MOTOR	—	2	×	B	TM-293
P1778	1778	STEP MOTOR	—	2	×	B	TM-296
P1805	1805	BRAKE SW/CIRCUIT	—	2	—	—	EC-499
P1807	1807	Brake pedal position switch	—	1	—	B	EC-501
P1808	1808	Brake pedal position switch	—	1	—	B	EC-501
P2096	2096	POST CAT FUEL TRIM SYS B1	—	2	×	A	EC-504
P2097	2097	POST CAT FUEL TRIM SYS B1	—	2	×	A	EC-504
P2100	2100	ETC MOT PWR-B1	—	1	×	B	EC-508
P2101	2101	ETC FNCTN/CIRC-B1	—	1	×	B	EC-510
P2103	2103	ETC MOT PWR	—	1	×	B	EC-508
P2118	2118	ETC MOT-B1	—	1	×	B	EC-513
P2119	2119	ETC ACTR-B1	—	1	×	B	EC-515
P2122	2122	APP SEN 1/CIRC	—	1	×	B	EC-517
P2123	2123	APP SEN 1/CIRC	—	1	×	B	EC-517
P2127	2127	APP SEN 2/CIRC	—	1	×	B	EC-520
P2128	2128	APP SEN 2/CIRC	—	1	×	B	EC-520

DTC*1		Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group*4	Reference page
CONSULT GST*2	ECM*3						
P2135	2135	TP SENSOR-B1	—	1	×	B	EC-523
P2138	2138	APP SENSOR	—	1	×	B	EC-526
P2159	2159	VEHICLE SPEED SEN B	—	2	×	B	EC-401
P2162	2162	VEHICLE SPEED SEN A-B	—	2	×	B	EC-530
P219A	219A	AIR FUEL RATIO IMBALANCE B1	—	2	×	A	EC-532
P2263	2263	TC SYSTEM-B1	—	2	×	B	EC-537

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J1979/ ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: Refer to EC-174, "Description".

*5: The troubleshooting for this DTC needs CONSULT.

*6: SRT code will not be set if the self-diagnostic result is NG.

*7: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

*8: This self-diagnosis is not for ECM power supply circuit, even though “ECM BACK UP/CIRCUIT” is displayed on CONSULT screen.

*9: When the ECM is in the mode that displays SRT status, MIL may blink. For details, Refer to EC-81, "On Board Diagnosis Function".

Test Value and Test Limit

INFOID:0000000012819110

The following is the information specified in Service $06 of SAE J1979/ISO 15031-5.
The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
These data (test value and test limit) are specified by On Board Monitor ID (OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.
The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (e.g., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	01H	Air fuel ratio (A/F) sensor 1 (Bank 1)	P0131	83H	0BH	Minimum sensor output voltage for test cycle
			P0131	84H	0BH	Maximum sensor output voltage for test cycle
			P0130	85H	0BH	Minimum sensor output voltage for test cycle
			P0130	86H	0BH	Maximum sensor output voltage for test cycle
			P0133	87H	04H	Response rate: Response ratio (lean to rich)
			P0133	88H	04H	Response rate: Response ratio (rich to lean)
			P2A00 or P2096	89H	84H	The amount of shift in air fuel ratio (too lean)
			P2A00 or P2097	8AH	84H	The amount of shift in air fuel ratio (too rich)
			P0130	8BH	0BH	Difference in sensor output voltage
			P0133	8CH	83H	Response gain at the limited frequency
			P014C	8DH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1
			P014C	8EH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1
			P014D	8FH	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1
			P014D	90H	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1
			P015A	91H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1
			P015A	92H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1
			P015B	93H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1
			P015B	94H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1
			P0133	95H	04H	Response rate: Response ratio (lean to rich)
			P0133	96H	84H	Response rate: Response ratio (rich to lean)

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	02H	Heated oxygen sensor 2 (Bank 1)	P0138	07H	0CH	Minimum sensor output voltage for test cycle
			P0137	08H	0CH	Maximum sensor output voltage for test cycle
			P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
			P0139	82H	11H	Rear O2 sensor delay response diagnosis
	03H	Heated oxygen sensor 3 (Bank 1)	P0143	07H	0CH	Minimum sensor output voltage for test cycle
			P0144	08H	0CH	Maximum sensor output voltage for test cycle
			P0146	80H	0CH	Sensor output voltage
			P0145	81H	0CH	Difference in sensor output voltage
	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P0151	83H	0BH	Minimum sensor output voltage for test cycle
			P0151	84H	0BH	Maximum sensor output voltage for test cycle
			P0150	85H	0BH	Minimum sensor output voltage for test cycle
			P0150	86H	0BH	Maximum sensor output voltage for test cycle
			P0153	87H	04H	Response rate: Response ratio (lean to rich)
			P0153	88H	04H	Response rate: Response ratio (rich to lean)
			P2A03 or P2098	89H	84H	The amount of shift in air fuel ratio (too lean)
			P2A03 or P2099	8AH	84H	The amount of shift in air fuel ratio (too rich)
			P0150	8BH	0BH	Difference in sensor output voltage
			P0153	8CH	83H	Response gain at the limited frequency
			P014E	8DH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1
			P014E	8EH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1
			P014F	8FH	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1
			P014F	90H	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1
			P015C	91H	01H	O2 sensor delayed response - Rich to lean bank 2 sensor 1
			P015C	92H	01H	O2 sensor delayed response - Rich to lean bank 2 sensor 1
			P015D	93H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display) TID	Test value and Test limit (GST display) Unit and Scaling ID	Description
HO2S	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P015D	94H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1
			P0153	95H	04H	Response rate: Response ratio (lean to rich)
			P0153	96H	84H	Response rate: Response ratio (rich to lean)
	06H	Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle
			P0157	08H	0CH	Maximum sensor output voltage for test cycle
			P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
			P0159	82H	11H	Rear O2 sensor delay response diagnosis
	07H	Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle
			P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
			P0165	81H	0CH	Difference in sensor output voltage
CATALYST	21H	Three way catalyst function (Bank1)	P0420	80H	01H	O2 storage index
			P0420	82H	01H	Switching time lag engine exhaust index value
			P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2423	84H	84H	O2 storage index in HC trap catalyst
	22H	Three way catalyst function (Bank2)	P0430	80H	01H	O2 storage index
			P0430	82H	01H	Switching time lag engine exhaust index value
			P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst
EGR SYSTEM	31H	EGR function	P0400	80H	96H	Low flow faults: EGR temp change rate (short term)
			P0400	81H	96H	Low flow faults: EGR temp change rate (long term)
			P0400	82H	96H	Low flow faults: Difference between max EGR temp and EGR temp under idling condition
			P0400	83H	96H	Low flow faults: Max EGR temp
			P1402	84H	96H	High Flow Faults: EGR temp increase rate
			P0402	85H	FCH	EGR differential pressure high flow
			P0401	86H	37H	EGR differential pressure low flow
			P2457	87H	96H	EGR temperature

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
VVT SYSTEM	35H	VVT Monitor (Bank1)	P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
			P100A	84H	10H	VEL slow response diagnosis
			P1090	85H	10H	VEL servo system diagnosis
			P0011	86H	9DH	VTC intake intermediate lock function diagnosis (VTC intermediate position alignment check diagnosis)
			Advanced: P052A Retarded: P052B	87H	9DH	VTC intake intermediate lock system diagnosis (VTC intermediate lock position check diagnosis)
	36H	VVT Monitor (Bank2)	P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
			P100B	84H	10H	VEL slow response diagnosis
			P1093	85H	10H	VEL servo system diagnosis
			P0021	86H	9DH	VTC intake intermediate lock function diagnosis (VTC intermediate position alignment check diagnosis)
			Advanced: P052C Retarded: P052D	87H	9DH	VTC intake intermediate lock system diagnosis (VTC intermediate lock position check diagnosis)
EVAP SYSTEM	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3BH	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)
	3CH	EVAP control system leak (Very small leak)	P0456	80H	05H	Leak area index (for more than 0.02 inch)
			P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
			P0456	82H	FDH	Internal pressure of EVAP system at the end of monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
O2 SENSOR HEATER	41H	A/F sensor 1 heater (Bank 1)	Low Input: P0031 High Input: P0032	81H	0BH	Converted value of heater electric current to voltage
			P0030	83H	0BH	A/F sensor heater circuit malfunction
	42H	Heated oxygen sensor 2 heater (Bank 1)	Low Input: P0037 High Input: P0038	80H	0CH	Converted value of heater electric current to voltage
			P0141	81H	14H	Rear O2 sensor internal impedance
	43H	Heated oxygen sensor 3 heater (Bank 1)	P0043	80H	0CH	Converted value of heater electric current to voltage
	45H	A/F sensor 1 heater (Bank 2)	Low Input: P0051 High Input: P0052	81H	0BH	Converted value of heater electric current to voltage
			P0036	83H	0BH	A/F sensor heater circuit malfunction
	46H	Heated oxygen sensor 2 heater (Bank 2)	Low Input: P0057 High Input: P0058	80H	0CH	Converted value of heater electric current to voltage
			P0161	81H	14CH	Rear O2 sensor internal impedance
	47H	Heated oxygen sensor 3 heater (Bank 2)	P0063	80H	0CH	Converted value of heater electric current to voltage
SECONDARY AIR	71H	Secondary air system	P0411	80H	01H	Secondary air injection system incorrect flow detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary air injection system insufficient flow
			P2445	82H	01H	Secondary air injection system pump stuck off
			P2448	83H	01H	Secondary air injection system high airflow
			Bank1: P2440 Bank2: P2442	84H	01H	Secondary air injection system switching valve stuck open
			P2440	85H	01H	Secondary air injection system switching valve stuck open
			P2444	86H	01H	Secondary air injection system pump stuck on

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
FUEL SYSTEM	81H	Fuel injection system function (Bank 1)	P0171 or P0172	80H	2FH	Long term fuel trim
			P0171 or P0172	81H	24H	The number of lambda control clamped
			P117A / P219A	82H	03H	Cylinder A/F imbalance monitoring
			P219C	83H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #1 cylinder parameter
			P219D	84H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #2 cylinder parameter
			P219E	85H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #3 cylinder parameter
			P219F	86H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #4 cylinder parameter
			P21A0	87H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #5 cylinder parameter
			P21A2	89H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #7 cylinder parameter
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	80H	2FH	Long term fuel trim
			P0174 or P0175	81H	24H	The number of lambda control clamped
			P117B / P219B	82H	03H	Cylinder A/F imbalance monitoring
			P219D	84H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #2 cylinder parameter
			P219F	86H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #4 cylinder parameter
			P21A1	88H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #6 cylinder parameter
			P21A3	8AH	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #8 cylinder parameter

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A1H	Multiple cylinder misfires	P0301	80H	24H	Misfiring counter at 1000 revolution of the first cylinder
			P0302	81H	24H	Misfiring counter at 1000 revolution of the second cylinder
			P0303	82H	24H	Misfiring counter at 1000 revolution of the third cylinder
			P0304	83H	24H	Misfiring counter at 1000 revolution of the fourth cylinder
			P0305	84H	24H	Misfiring counter at 1000 revolution of the fifth cylinder
			P0306	85H	24H	Misfiring counter at 1000 revolution of the sixth cylinder
			P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder
			P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder
			P0300	88H	24H	Misfiring counter at 1000 revolution of the multiple cylinders
			P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder
			P0302	8AH	24H	Misfiring counter at 200 revolution of the second cylinder
			P0303	8BH	24H	Misfiring counter at 200 revolution of the third cylinder
			P0304	8CH	24H	Misfiring counter at 200 revolution of the fourth cylinder
			P0305	8DH	24H	Misfiring counter at 200 revolution of the fifth cylinder
			P0306	8EH	24H	Misfiring counter at 200 revolution of the sixth cylinder
			P0307	8FH	24H	Misfiring counter at 200 revolution of the seventh cylinder
			P0308	90H	24H	Misfiring counter at 200 revolution of the eighth cylinder
			P0300	91H	24H	Misfiring counter at 1000 revolution of the single cylinder
			P0300	92H	24H	Misfiring counter at 200 revolution of the single cylinder
			P0300	93H	24H	Misfiring counter at 200 revolution of the multiple cylinders

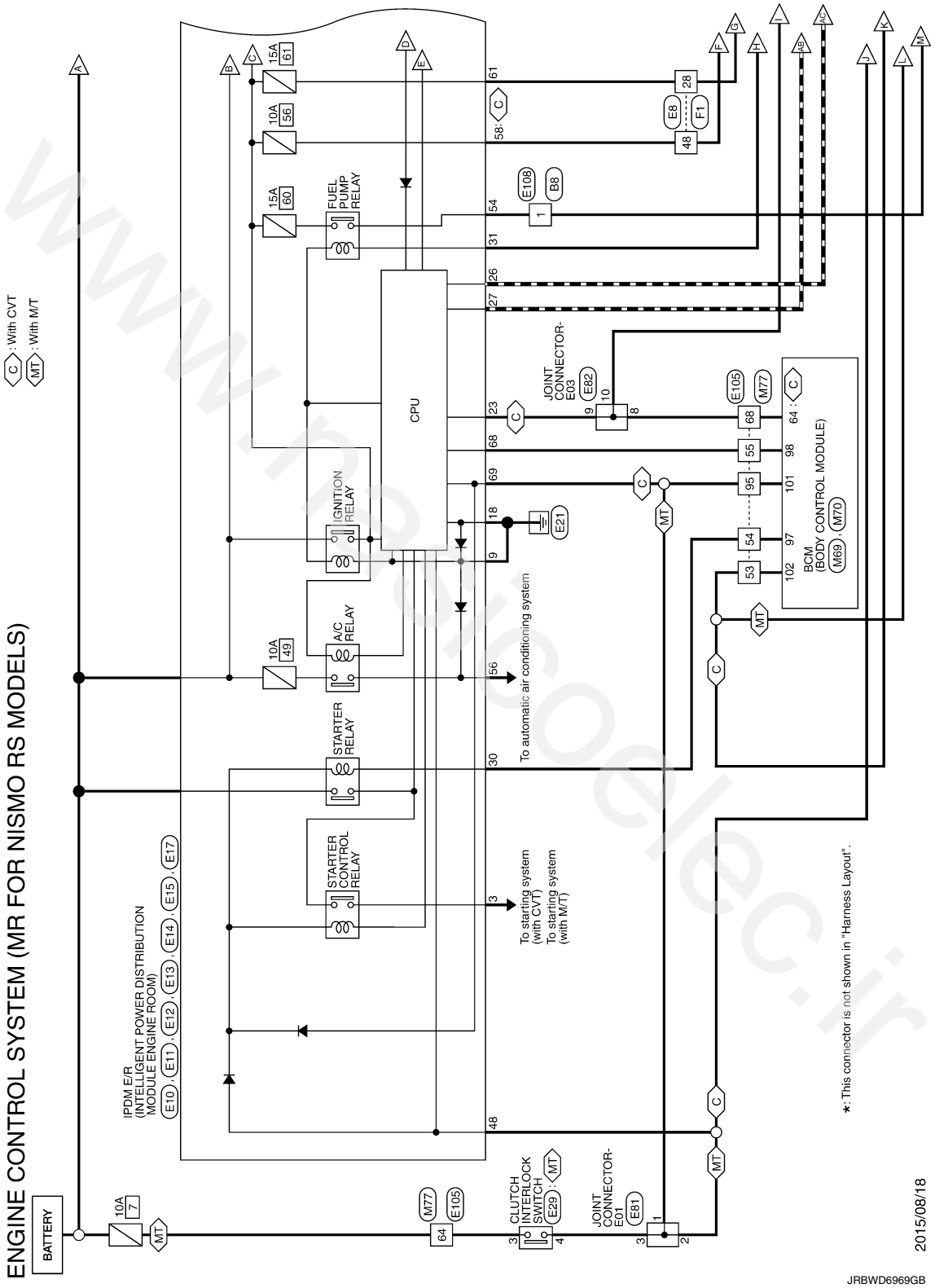
Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A2H	No. 1 cylinder misfire	P0301	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0301	0CH	24H	Misfire counts for last/current driving cycles
	A3H	No. 2 cylinder misfire	P0302	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0302	0CH	24H	Misfire counts for last/current driving cycles
	A4H	No. 3 cylinder misfire	P0303	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0303	0CH	24H	Misfire counts for last/current driving cycles
	A5H	No. 4 cylinder misfire	P0304	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0304	0CH	24H	Misfire counts for last/current driving cycles
	A6H	No. 5 cylinder misfire	P0305	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0305	0CH	24H	Misfire counts for last/current driving cycles
	A7H	No. 6 cylinder misfire	P0306	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0306	0CH	24H	Misfire counts for last/current driving cycles
	A8H	No. 7 cylinder misfire	P0307	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0307	0CH	24H	Misfire counts for last/current driving cycles
	A9H	No. 8 cylinder misfire	P0308	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0308	0CH	24H	Misfire counts for last/current driving cycles

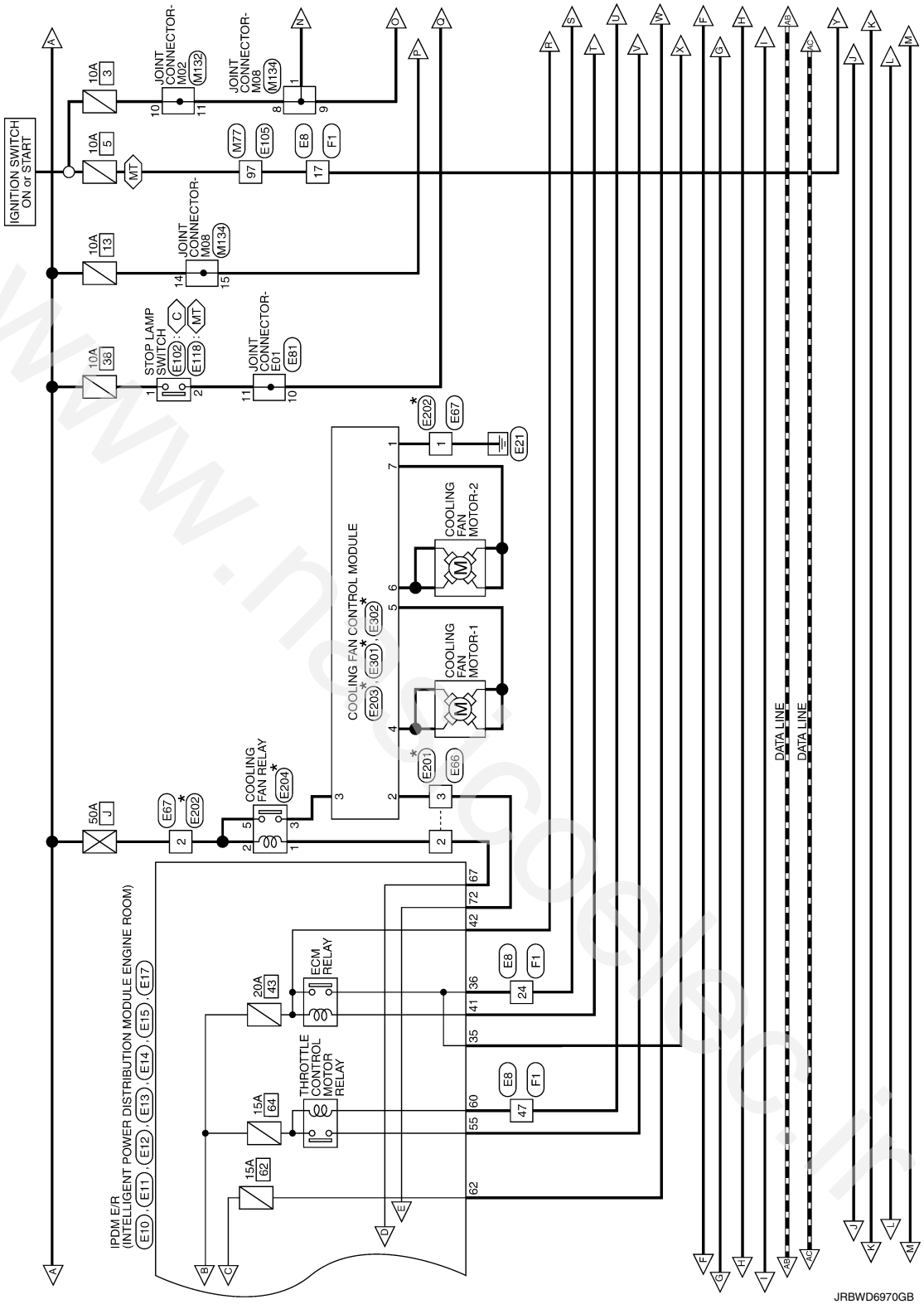
WIRING DIAGRAM

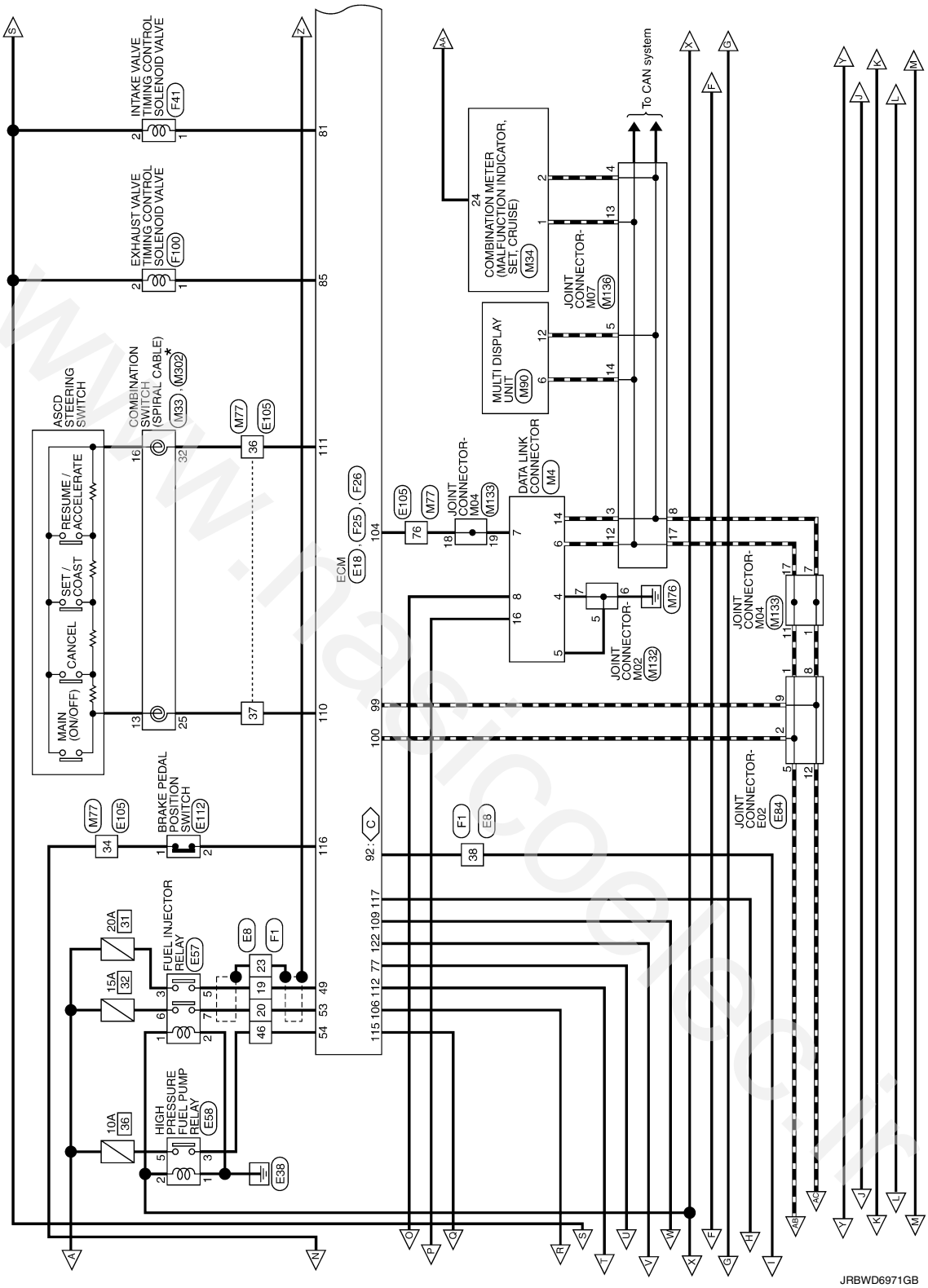
ENGINE CONTROL SYSTEM

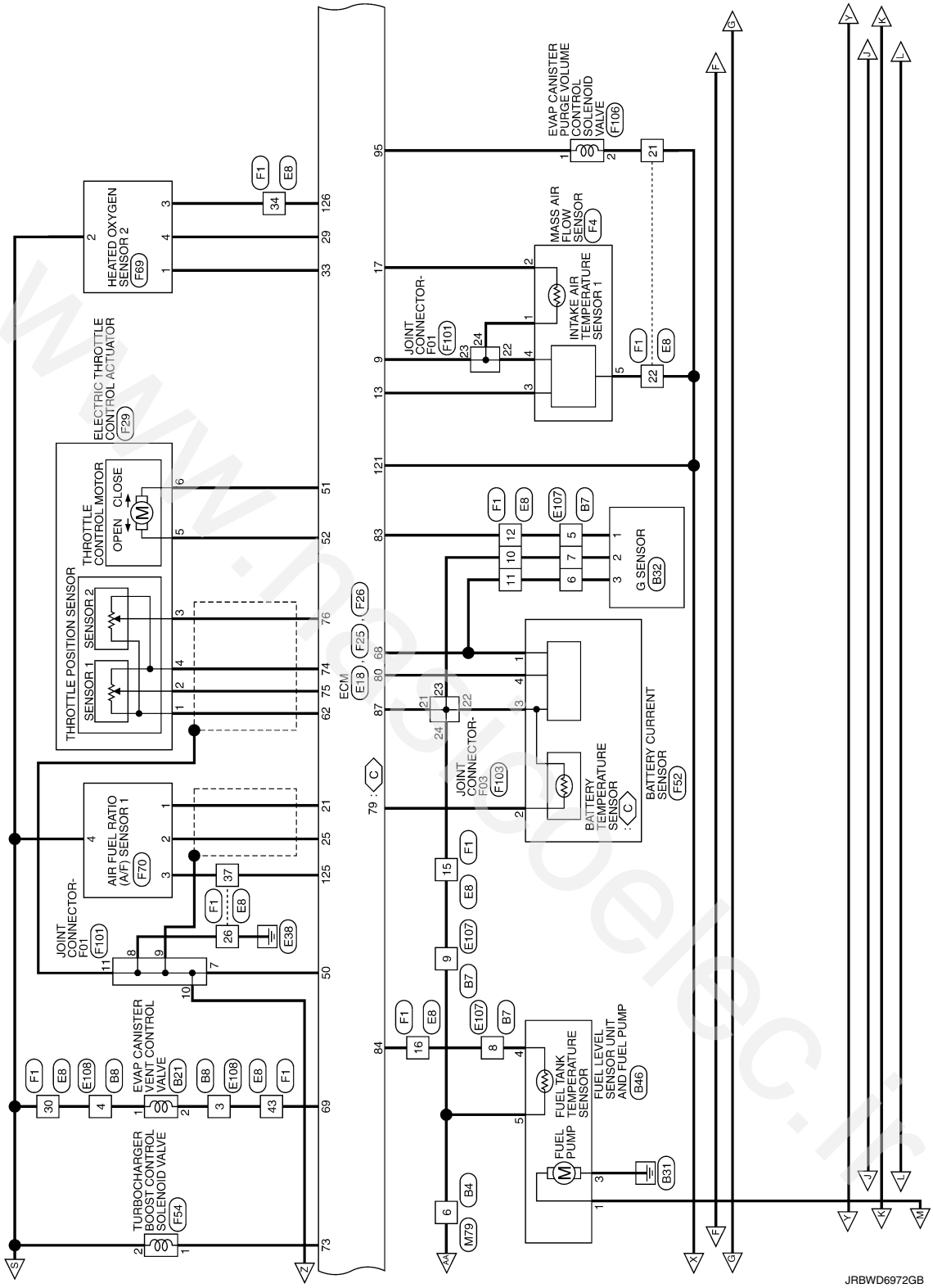
Wiring Diagram

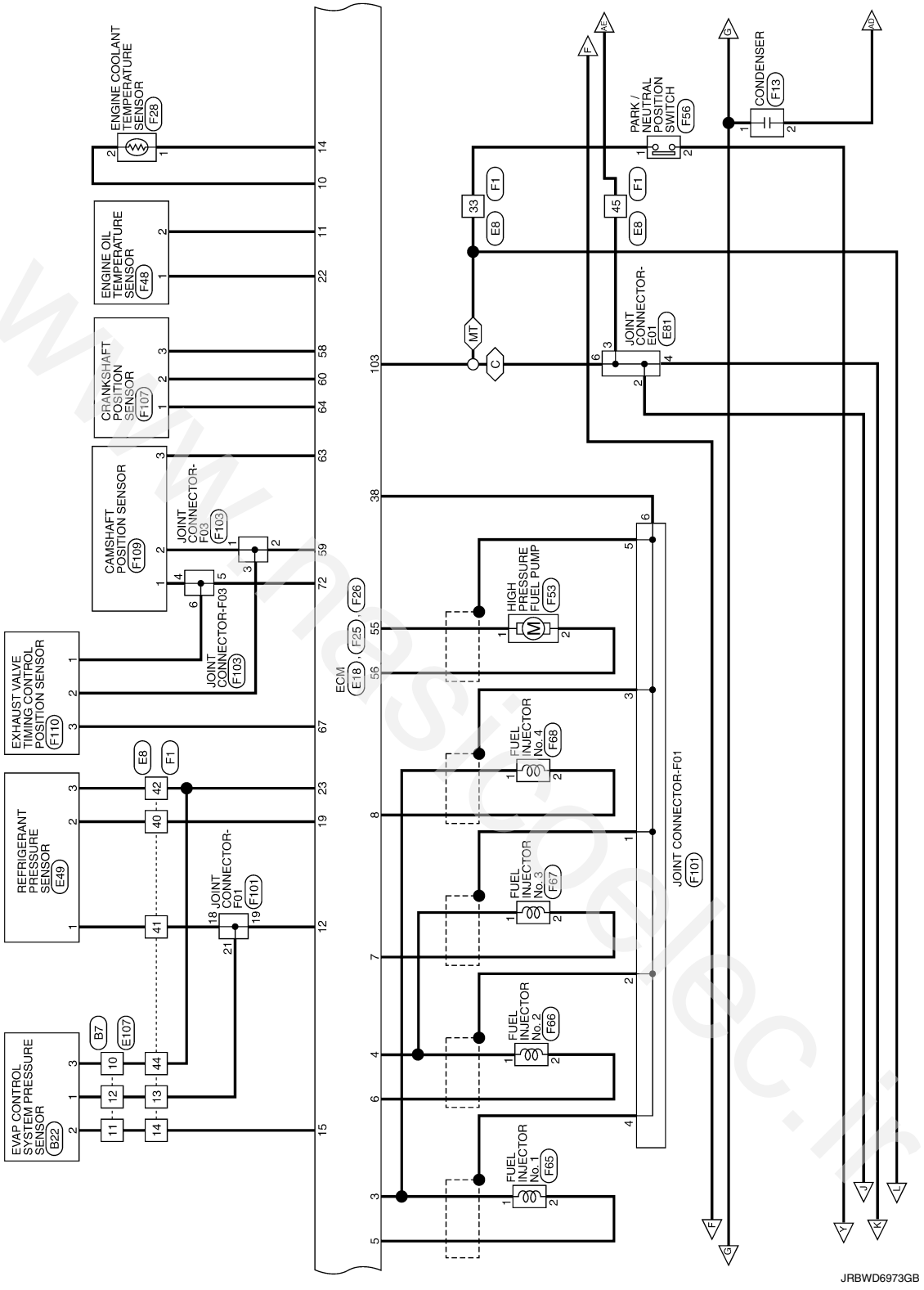
INFOID:0000000012197712

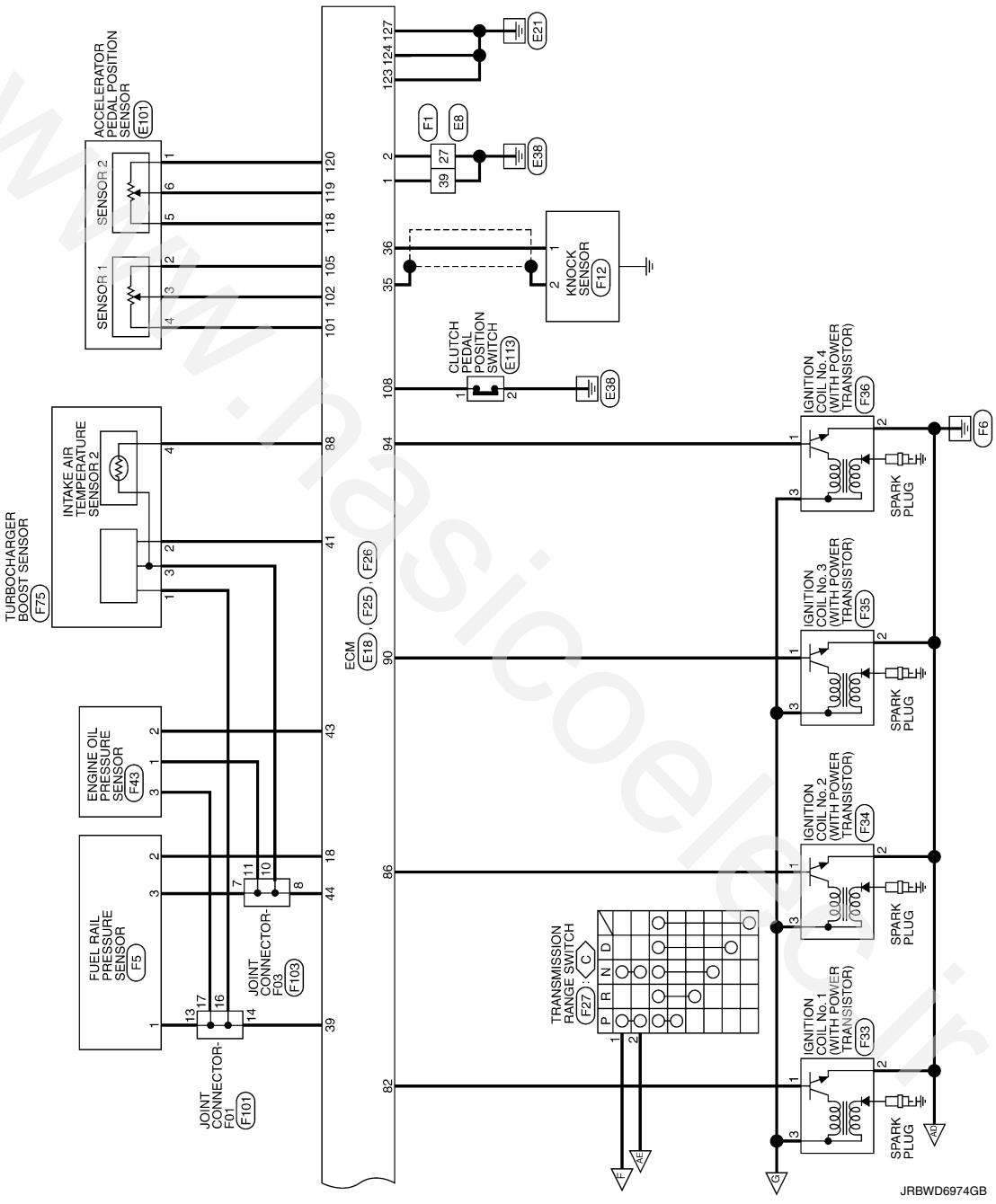


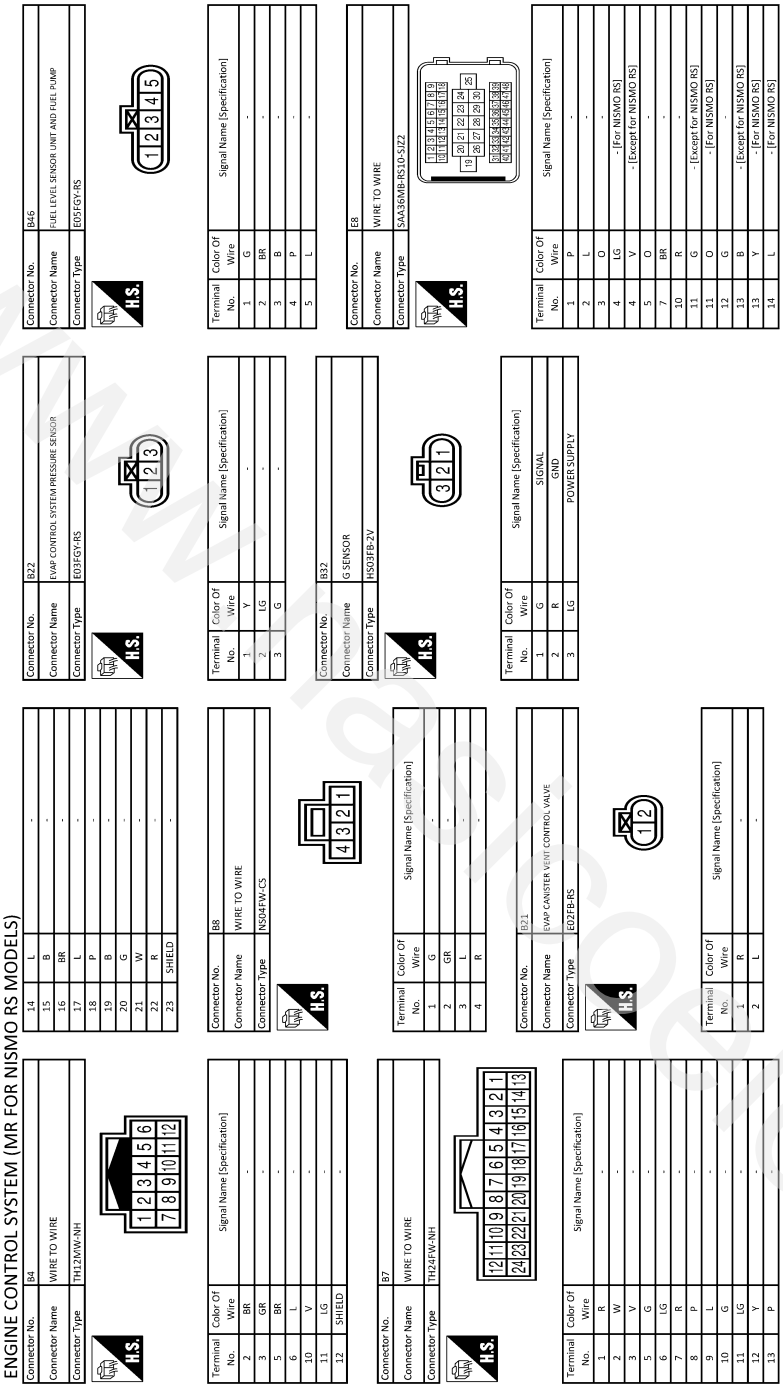





HEATED OXYGEN SENSOR 2 F69
ELECTRIC THROTTLE CONTROL ACTUATOR F29
THROTTLE CONTROL MOTOR
OPEN CLOSE
THROTTLE POSITION SENSOR
SENSOR 1
SENSOR 2
AIR FUEL RATIO (A/F) SENSOR 1 F70
JOINT CONNECTOR-F01 F101
TURBOCHARGER BOOST CONTROL SOLENOID VALVE F54
EVAP CANISTER VENT CONTROL VALVE B21
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE F106
MASS AIR FLOW SENSOR F4
INTAKE AIR TEMPERATURE SENSOR 1
JOINT CONNECTOR-F01 F101
ECM E18 E25 F26
JOINT CONNECTOR-F03 F103
BATTERY TEMPERATURE SENSOR
BATTERY CURRENT SENSOR F52
G SENSOR B32
FUEL TANK TEMPERATURE SENSOR
FUEL PUMP
FUEL LEVEL SENSOR UNIT AND FUEL PUMP B46
JRBWD6972GB







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ENGINE CONTROL SYSTEM (MR FOR NISMO RS MODELS)

14	LG	- [Except for NISMO RS]
15	R	
16	SB	-
17	GR	-
18	W	-
19	L/B	-
20	L/W	-
21	G	-
22	G	- [For NISMO RS]
22	Y	- [Except for NISMO RS]
23	B	- [Except for NISMO RS]
23	SHIELD	- [For NISMO RS]
24	P	-
25	R	-
26	B	-
27	B	-
28	LG	-
29	SB	-
30	G	- [Except for NISMO RS]
30	P	- [For NISMO RS]
31	G	-
32	Y	-
33	BR	-
34	P	- [Except for NISMO RS]
34	W	- [For NISMO RS]
37	L	- [Without Intelligent Key]
37	LG	- [With Intelligent Key]
38	SB	-
39	B	-
40	P	-
41	V	-
42	L	-
43	BR	- [For NISMO RS]
43	W	- [Except for NISMO RS]
44	BR	- [Except for NISMO RS]
44	G	- [For NISMO RS]
45	BR	-
46	Y	-
47	SB	-
48	LG	- [With Intelligent Key]
48	Y	- [Without Intelligent Key]

Connector No.	E10
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	M06FW-LC

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
3	R	-
4	P	-
5	LG	-
7	Y	-
8	W/R	-

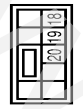
Connector No.	E11
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	M06FB-LC

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
9	B/Y	-
10	L	-
14	R	-

Connector No.	E12
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS08FBR-CS

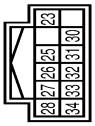
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
18	GR	-
19	R	- [Without front fog lamp]
19	W	- [With front fog lamp]
20	G	- [Without front fog lamp]
20	V	- [With front fog lamp]

Connector No.	E13
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	TH12FW-NH

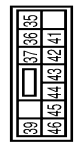
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
23	SB	-
25	BR	-
26	P	-
27	L	-
28	Y	-
30	V	-
31	Y	-
32	R	-
33	G	-
34	L	-

Connector No.	E14
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS12FBR-CS

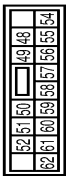
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
35	G	-
36	P	-
37	L	-
39	L	-
41	BR	-
42	Y	-
43	L	-
44	BR	-
45	W	-
46	LG	-

Connector No.	E15
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS16FW-CS

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
48	BR	-
49	Y	-
50	G	-
51	L	-
52	P	-
54	P	-
55	G	-
56	SB	-
57	O	-
58	LG	-

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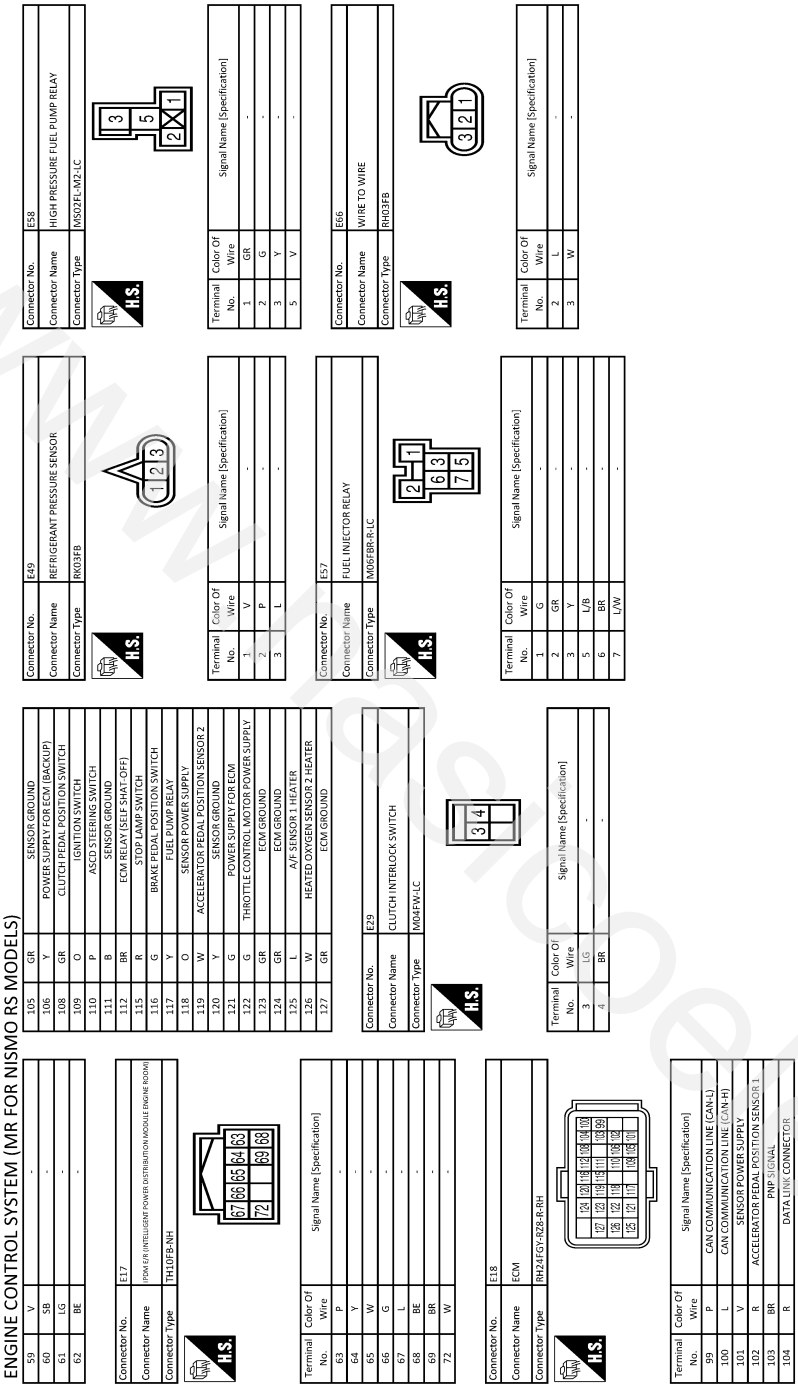


ENGINE CONTROL SYSTEM (MR FOR NISMO RS MODELS)

Connector No.	E67
Connector Name	WIRE TO WIRE
Connector Type	X02FB

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	B/Y	-
2	V	-

Connector No.	E81
Connector Name	JOINT CONNECTOR-E01
Connector Type	A12FL

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	-
2	BR	-
3	BR	-
4	BR	-
6	BR	-
8	R	-
9	R	-
10	R	-
11	R	-
12	R	-

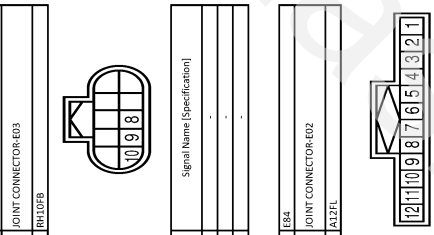
Connector No.	E82
Connector Name	JOINT CONNECTOR-E03
Connector Type	RH10FB

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
8	SB	-
9	SB	-
10	SB	-

Connector No.	E84
Connector Name	JOINT CONNECTOR-E02
Connector Type	A12FL

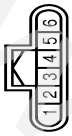
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	-
2	L	-
3	L	-
4	L	-
5	L	-
6	L	-
7	P	-
8	P	-
9	P	-
10	P	-
11	P	-
12	P	-

Connector No.	E101
Connector Name	ACCELERATOR PEDAL POSITION SENSOR
Connector Type	RH06FB

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	-
2	GR	-
3	R	-
4	V	-
5	O	-
6	W	-

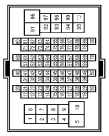
Connector No.	E102
Connector Name	STOP LAMP SWITCH
Connector Type	M04FW-LC

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	R	-
3	BE	-
4	P	-

Connector No.	E105
Connector Name	WIRE TO WIRE
Connector Type	TH80MW-CS16-TM4

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	-
4	Y	-
6	P	-
10	R	-
11	W	-
12	B	-
13	R	-
14	SHIELD	-
34	BE	-
35	R	-
36	B	-
37	P	-
52	R	-
53	BR	-
54	V	-
55	BE	-
58	G	-
59	Y	-
62	Y	-
63	V	-
64	LG	-
65	L	-
66	R	-
67	W	-
68	SB	-
70	BR	-
71	LG	-
72	V	-
73	L	-
76	R	-
78	B	-
79	W	-
80	L	-
83	Y	-
84	LG	-
85	P	-

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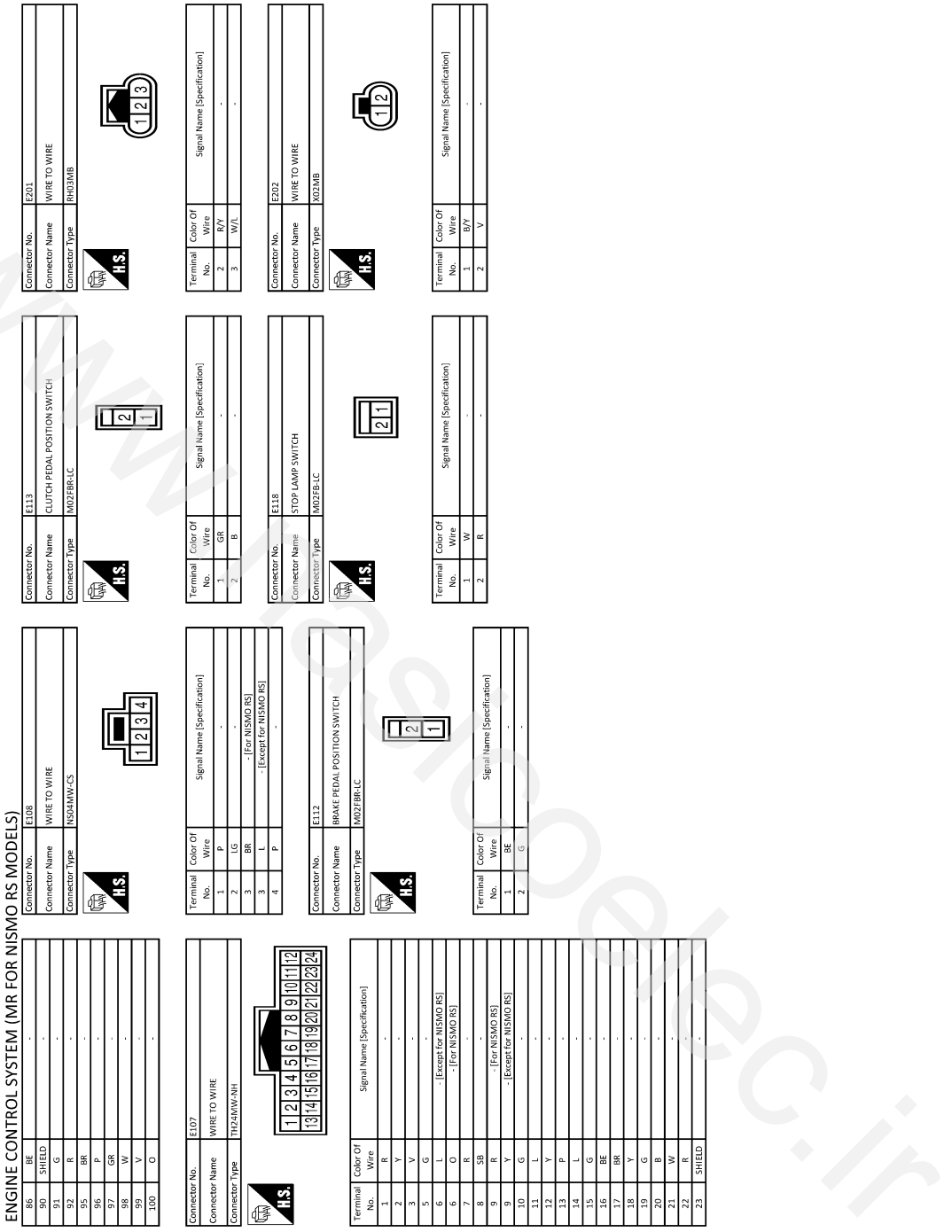

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ENGINE CONTROL SYSTEM (MR FOR NISMO RS MODELS)

Connector No.	E203
Connector Name	COOLING FAN CONTROL MODULE
Connector Type	SJZ01FGY-SNZ2

Terminal No.	Color Of Wire	Signal Name [Specification]
1	B/Y	GND
2	W/L	PWM SIG
3	R/W	PWM POWER

Connector No.	E204
Connector Name	COOLING FAN RELAY
Connector Type	24347-9F900

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R/Y	-
2	V	-
3	R/W	-
5	V	-

Connector No.	E301
Connector Name	COOLING FAN CONTROL MODULE
Connector Type	6188-0259

Terminal No.	Color Of Wire	Signal Name [Specification]
4	-	-
5	-	-

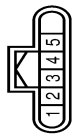
Connector No.	E302
Connector Name	COOLING FAN CONTROL MODULE
Connector Type	6188-0259

Terminal No.	Color Of Wire	Signal Name [Specification]
6	-	-
7	-	-

Connector No.	F1
Connector Name	WIRE TO WIRE
Connector Type	SAA36FB-RS10-SJZ2

Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	-
2	L	-
3	W	- [Except for NISMO RS]
3	Y	- [For NISMO RS]
4	BG	- [For NISMO RS]
4	GR	- [Except for NISMO RS]
5	LG	-
7	G	-
10	R	- [Except for NISMO RS]
10	Y	- [For NISMO RS]
11	G	- [Except for NISMO RS]
11	Y	- [For NISMO RS]
12	G	-
13	B	- [Except for NISMO RS]
13	BG	- [For NISMO RS]
14	L	- [For NISMO RS]
14	V	- [Except for NISMO RS]
15	BR	-
16	P	-
17	SB	-
18	G	-
19	G	-
20	BR	-
21	G	-
22	BR	- [For NISMO RS]
22	Y	- [Except for NISMO RS]
23	B	-
24	R	-
25	R	-
26	B	-
27	B	-
28	R	-
29	W	-
30	GR	- [Except for NISMO RS]
30	R	- [For NISMO RS]
31	BG	-
32	LG	-
33	BR	-
34	G	- [For NISMO RS]
34	P	- [Except for NISMO RS]
37	G	- [Without Intelligent Key]
37	GR	- [With Intelligent Key]
38	R	-
39	GR	-
40	P	-
41	BR	- [For NISMO RS]
41	V	- [Except for NISMO RS]
42	L	- [Except for NISMO RS]
42	W	- [For NISMO RS]
43	L	- [For NISMO RS]
43	W	- [Except for NISMO RS]
44	BR	- [Except for NISMO RS]
44	G	- [For NISMO RS]
45	BR	-
46	R	-
47	Y	-
48	GR	- [With Intelligent Key]
48	Y	- [Without Intelligent Key]

Connector No.	F4
Connector Name	MASS AIR FLOW SENSOR
Connector Type	RH06FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	-
2	Y	-
3	G	-
4	W	-
5	BR	-

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ENGINE CONTROL SYSTEM (MR FOR NISMO RS MODELS)

Connector No.	F5
Connector Name	FUEL RAIL PRESSURE SENSOR
Connector Type	AFZ03FB

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	GR	-
3	SB	-

Connector No.	F13
Connector Name	CONDENSER
Connector Type	MO2FW-LC

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	B	-

Connector No.	F12
Connector Name	KNOCK SENSOR
Connector Type	BSO2FGY_B-AHY

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	B	-

Connector No.	F25
Connector Name	ECM
Connector Type	RH40FB-RZ8-L-RH

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	ECM GROUND (FUEL INJECTOR)
2	B	ECM GROUND (FUEL INJECTOR)
3	G	FUEL INJECTOR NO. 1, 4 (HI)
4	Y	FUEL INJECTOR NO. 2, 3 (HI)
5	R	FUEL INJECTOR NO.1 (LO)
6	BR	FUEL INJECTOR NO.2 (LO)
7	W	FUEL INJECTOR NO.3 (LO)
8	R	FUEL INJECTOR NO.4 (LO)
9	W	SENSOR GROUND
10	LG	SENSOR GROUND
11	P	SENSOR GROUND
12	BR	SENSOR GROUND
13	G	MASS AIR FLOW SENSOR
14	L	ENGINE COOLANT TEMPERATURE SENSOR
15	L	EVAP CONTROL SYSTEM PRESSURE SENSOR
17	Y	INTAKE AIR TEMPERATURE SENSOR 1
18	GR	FUEL RAIL PRESSURE SENSOR
19	P	REFRIGERANT PRESSURE SENSOR

21	W	A/F SENSOR 1
22	Y	ENGINE OIL TEMPERATURE SENSOR
23	W	SENSOR POWER SUPPLY
25	B	A/F SENSOR 1
29	W	HEATED OXYGEN SENSOR 2
33	R	SENSOR GROUND
35	B	SENSOR GROUND
36	W	KNOCK SENSOR
38	B	SHIELD
39	R	SENSOR POWER SUPPLY
41	W	TURBOCHARGER BOOST SENSOR
43	G	ENGINE OIL PRESSURE SENSOR
44	SB	SENSOR GROUND

Connector No.	F26
Connector Name	ECM
Connector Type	RH40FBR-RZ8-L-RH

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
49	G	FUEL INJECTOR DRIVER POWER SUPPLY 1
50	B	ECM GROUND (HIGH PRESSURE FUEL PUMP)
51	GR	THROTTLE CONTROL MOTOR (OPEN)
52	BR	THROTTLE CONTROL MOTOR (CLOSE)
53	BR	FUEL INJECTOR DRIVER POWER SUPPLY 2
54	R	HIGH PRESSURE FUEL PUMP DRIVER POWER SUPPLY
55	BR	HIGH PRESSURE FUEL PUMP (HI)
56	Y	HIGH PRESSURE FUEL PUMP (LO)
58	G	SENSOR POWER SUPPLY
59	L	SENSOR GROUND
60	W	SENSOR GROUND
62	B	SENSOR POWER SUPPLY
63	BR	CAMSHAFT POSITION SENSOR (PHASE)
64	R	CRANKSHAFT POSITION SENSOR (POS)
67	LG	EXHAUST VALVE TIMING CONTROL POSITION SENSOR
68	Y	SENSOR POWER SUPPLY
69	L	EVAP CANISTER VENT CONTROL VALVE
72	GR	SENSOR POWER SUPPLY
73	BR	TURBOCHARGER BOOST CONTROL SOLENOID VALVE
74	R	SENSOR GROUND
75	G	THROTTLE POSITION SENSOR 1

76	W	THROTTLE POSITION SENSOR 2
77	Y	THROTTLE CONTROL RELAY
79	BG	BATTERY TEMPERATURE SENSOR
80	G	BATTERY CURRENT SENSOR
81	W	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
82	R	IGNITION SIGNAL NO.1
83	G	G SENSOR
84	P	FUEL TANK TEMPERATURE SENSOR
85	G	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE
86	LG	IGNITION SIGNAL NO.2
87	BR	SENSOR GROUND
88	V	INTAKE AIR TEMPERATURE SENSOR 2
90	P	IGNITION SIGNAL NO.3
92	R	CRANKING ENABLE SIGNAL
94	SB	IGNITION SIGNAL NO.4
95	L	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Connector No.	F27
Connector Name	TRANSMISSION RANGE SWITCH
Connector Type	RK08FG

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	-
2	BR	-
3	LG	-
4	L	-
5	G	-
6	Y	-
7	W	-
8	V	-

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ENGINE CONTROL SYSTEM (MR FOR NISMO RS MODELS)

Connector No.	F28
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR
Connector Type	E02FGY-RS

Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	-
2	LG	-

Connector No.	F29
Connector Name	ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Type	RH06FB

Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	[For NISMO RS]
1	GR	- [Except for NISMO RS]
2	BR	- [Except for NISMO RS]
2	G	- [For NISMO RS]
3	W	-
4	R	-
5	B	- [Except for NISMO RS]
5	BR	- [For NISMO RS]
6	G	- [Except for NISMO RS]
6	GR	- [For NISMO RS]

Connector No.	F33
Connector Name	IGNITION COIL No. 1 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	B	-
3	R	-

Connector No.	F34
Connector Name	IGNITION COIL No. 2 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	-
2	B	-
3	R	-

Connector No.	F35
Connector Name	IGNITION COIL No. 3 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	-
2	B	-
3	R	-

Connector No.	F36
Connector Name	IGNITION COIL No. 4 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

Terminal No.	Color Of Wire	Signal Name [Specification]
1	SB	-
2	B	-
3	R	-

Connector No.	F41
Connector Name	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
Connector Type	E02FGS-RS-LGY

Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	R	-

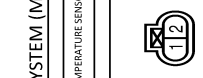
Connector No.	F43
Connector Name	ENGINE OIL PRESSURE SENSOR
Connector Type	RH03FB

Terminal No.	Color Of Wire	Signal Name [Specification]
1	SB	-
2	G	-
3	L	- [Except for NISMO RS]
3	R	- [For NISMO RS]

JRBWD6982GB

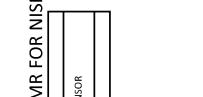
ENGINE CONTROL SYSTEM (MR FOR NISMO RS MODELS)

Connector No.	F48
Connector Name	ENGINE OIL TEMPERATURE SENSOR
Connector Type	E02FGY-RS



Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	-
2	P	-

Connector No.	F52
Connector Name	BATTERY CURRENT SENSOR
Connector Type	SAZ04FGY



Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	-
2	BG	-
3	BR	-
4	G	-

Connector No.	F53
Connector Name	HIGH PRESSURE FUEL PUMP
Connector Type	HS02FLGY-VR

Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	-
2	Y	-

Connector No.	F54
Connector Name	TURBOCHARGER BOOST CONTROL SOLENOID VALVE
Connector Type	E02FL-RS-LGY

Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	-
2	R	-

Connector No.	F56
Connector Name	PARK / NEUTRAL POSITION SWITCH
Connector Type	RK02FB

Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	-
2	SB	-

Connector No.	F65
Connector Name	FUEL INJECTOR No. 1
Connector Type	HS02FGY

Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	- [For NISMO RS]
1	GR	- [Except for NISMO RS]
2	BR	- [Except for NISMO RS]
2	R	- [For NISMO RS]

Connector No.	F66
Connector Name	FUEL INJECTOR No. 2
Connector Type	HS02FGY

Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	- [Except for NISMO RS]
1	Y	- [For NISMO RS]
2	BR	- [For NISMO RS]
2	SB	- [Except for NISMO RS]

Connector No.	F67
Connector Name	FUEL INJECTOR No. 3
Connector Type	HS02FGY

Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	- [For NISMO RS]
1	R	- [Except for NISMO RS]
2	W	-

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ENGINE CONTROL SYSTEM (MR FOR NISMO RS MODELS)

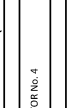
Connector No.	F68
Connector Name	FUEL INJECTOR No. 4
Connector Type	HS02FGY

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	R	-

Connector No.	F69
Connector Name	HEATED OXYGEN SENSOR 2
Connector Type	RH04MB

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	R	-
3	G	-
4	W	-

Connector No.	F70
Connector Name	AIR FUEL RATIO (A/F) SENSOR 1
Connector Type	RH04MLGY

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	B	-
3	G	-
4	R	-

Connector No.	F75
Connector Name	TURBOCHARGER BOOST SENSOR
Connector Type	RH04FB

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	- [For NISMO RS]
1	W	- [Except for NISMO RS]
2	L	- [Except for NISMO RS]
2	W	- [For NISMO RS]
3	SB	- [For NISMO RS]
3	V	- [Except for NISMO RS]
4	SB	- [Except for NISMO RS]
4	V	- [For NISMO RS]

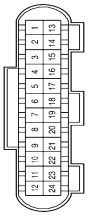
Connector No.	F100
Connector Name	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE
Connector Type	E02FG-RS-LGY

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	R	-

Connector No.	F101
Connector Name	JOINT CONNECTOR-F01
Connector Type	SAA24FB-J

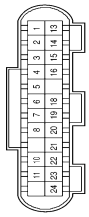
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	- [For NISMO RS]
1	R	- [Except for NISMO RS]
2	B	- [For NISMO RS]
2	R	- [Except for NISMO RS]
3	B	-
4	B	- [For NISMO RS]
4	W	- [Except for NISMO RS]
5	B	- [For NISMO RS]
5	W	- [Except for NISMO RS]
6	B	-
7	B	-
8	B	-
9	B	- [For NISMO RS]
9	P	- [Except for NISMO RS]
10	B	- [For NISMO RS]
10	Y	- [Except for NISMO RS]
11	B	- [For NISMO RS]
11	BR	- [Except for NISMO RS]
12	BR	-
13	R	- [For NISMO RS]
13	V	- [Except for NISMO RS]
14	R	- [For NISMO RS]
14	SB	- [Except for NISMO RS]
15	SB	-
16	R	- [For NISMO RS]
16	SB	- [Except for NISMO RS]
17	R	-
18	BR	-
19	BR	-
20	GR	-
21	BG	- [For NISMO RS]
21	GR	- [Except for NISMO RS]
22	W	-
23	G	- [Except for NISMO RS]
23	W	- [For NISMO RS]
24	G	- [Except for NISMO RS]
24	P	- [For NISMO RS]

Connector No.	F103
Connector Name	JOINT CONNECTOR-F03
Connector Type	SAA24FB-J

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	-
2	L	-
3	L	-
4	GR	-
5	GR	-
6	GR	-
7	SB	-
8	SB	-
10	SB	-
11	SB	-
13	Y	-
14	Y	-
15	Y	-
16	Y	-
18	LG	-

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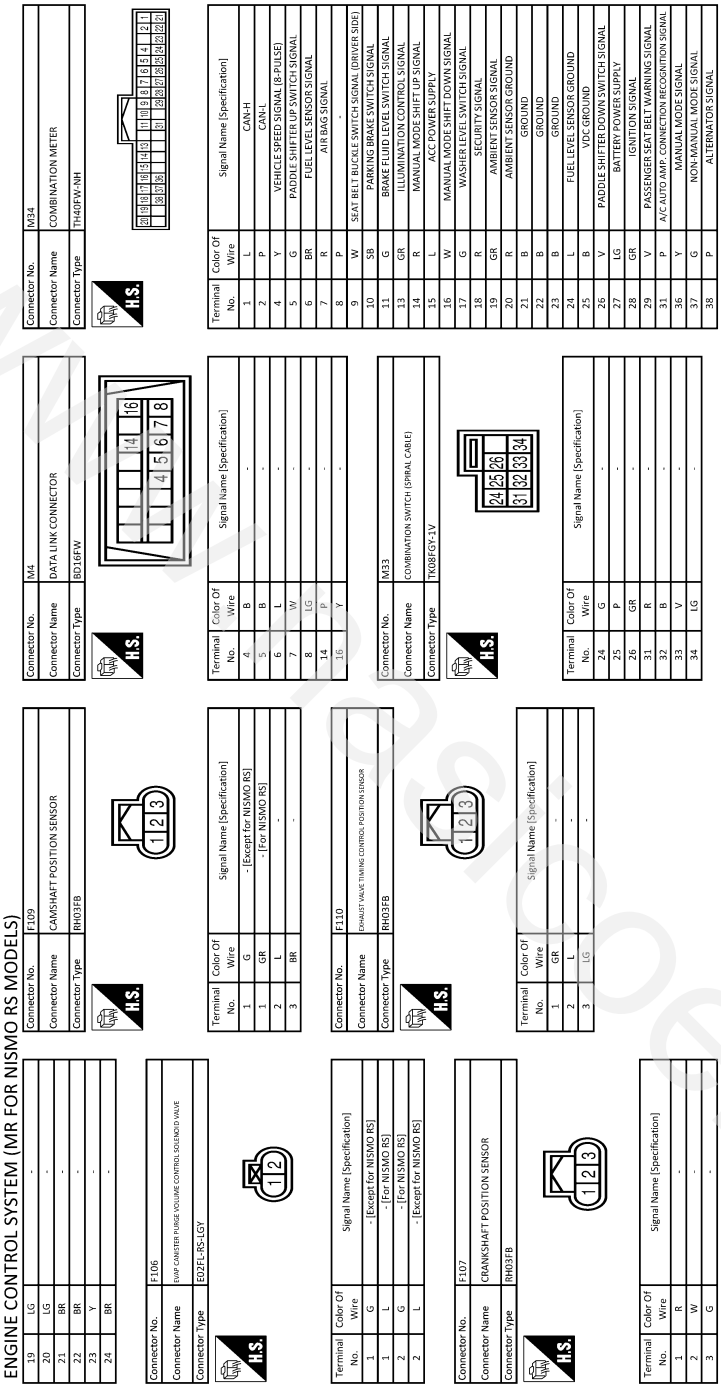

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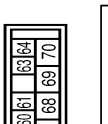
ENGINE CONTROL SYSTEM (MR FOR NISMO RS MODELS)

Connector No.	M69
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	FEA09FW-FHA6-SA

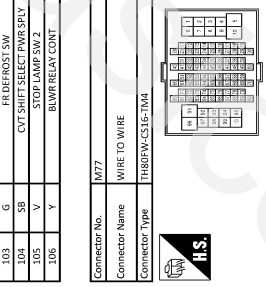


Terminal No.	Color Of Wire	Signal Name [Specification]
56	P	INT ROOM LAMP PWR SPLY
57	P	BATT(FUSE)
59	SB	PASS DOOR UNLK OUTPUT
60	V	TURN SIG LH OUTPUT
61	W	TURN SIG RH OUTPUT
63	BR	INT ROOM LAMP CONT
64	R	REVERSE SW
65	V	ALL DOOR LOCK OUTPUT
66	SB	DR DOOR UNLK OUTPUT
67	B	GND
68	L	PW PWR SPLY (IGN)
69	P	PW PWR SPLY (BAT)
70	Y	BAT (F/L)

Connector No.	M70
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH40FW-NH

Terminal No.	Color Of Wire	Signal Name [Specification]
72	SB	A/C IND OUTPUT
75	LG	DR DOOR REQ SW
76	LG	PUSH SW
78	P	DRIVER DOOR ANT+
79	V	DRIVER DOOR ANT-
80	BR	PASS DOOR ANT+
81	G	PASS DOOR ANT-
82	W	REAR BMPR ANT+
83	B	REAR BMPR ANT-
84	BR	ROOM ANT 1+
85	GR	ROOM ANT 1-
86	V	ROOM ANT2 +
87	LG	ROOM ANT2 -
90	W	PUSH-BTN IGN SW I LL PWR
91	V	ACC / ON IND
92	R	PUSH-BTN IGN SW I LL GND
93	GR	I-KEY WARN BUZZER
96	BR	ACC RELAY CONT
97	SB	STARTER RELAY CONT
98	P	IGN RELAY (I)PDM E/R) CONT
99	R	IGN RELAY (F/B) CONT
100	P	PASS DOOR REQ SW
101	Y	CLUTCH INTERLOCK SW [FOR M/T MODELS]
101	Y	IGN SPLY NO2. [EXCEPT FOR M/T MODELS]
102	L	NEUTRAL SW [FOR M/T MODELS]
102	L	P/N POSITION [EXCEPT FOR M/T MODELS]
103	G	FR DEFOGS SW
104	SB	CVT SHIFT SELECT PWR SPLY
105	V	STOP LAMP SW 2
106	Y	BLWR RELAY CONT

Connector No.	M77
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	-
4	V	-
6	P	-
10	R	-
11	R	-
12	LG	-
13	V	-
14	SHIELD	-
34	LG	-
35	SB	-
36	B	-
37	P	-
52	R	-
53	L	-
54	SB	-
55	P	-
58	LG	-
59	G	-
62	Y	-
63	W	-
64	G	-
65	GR	-
66	Y	-
67	V	-
68	R	-
70	V	-
71	R	-
72	GR	-
73	G	-
76	W	-
78	LG	-
79	V	-
80	LG	-
83	P	-
84	G	-
85	BR	-
86	LG	-
90	SHIELD	-
91	Y	-
92	BR	-
95	Y	-
96	L	-
97	GR	-
98	G	-
99	R	-
100	LG	-

Connector No.	M79
Connector Name	WIRE TO WIRE
Connector Type	TH12FW-NH

Terminal No.	Color Of Wire	Signal Name [Specification]
2	BR	-
3	W	-
5	BR	-
6	L	-
10	V	-
11	LG	-

Connector No.	M90
Connector Name	MULTI DISPLAY UNIT
Connector Type	TH12FW-NH

Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	BATTERY POWER SUPPLY
2	V	ILLUMINATION SIGNAL
5	GR	ILLUMINATION CONTROL SIGNAL
6	L	CAN-H
7	LG	IGNITION SIGNAL
10	B	GROUND
11	B	GROUND
12	P	CAN-L

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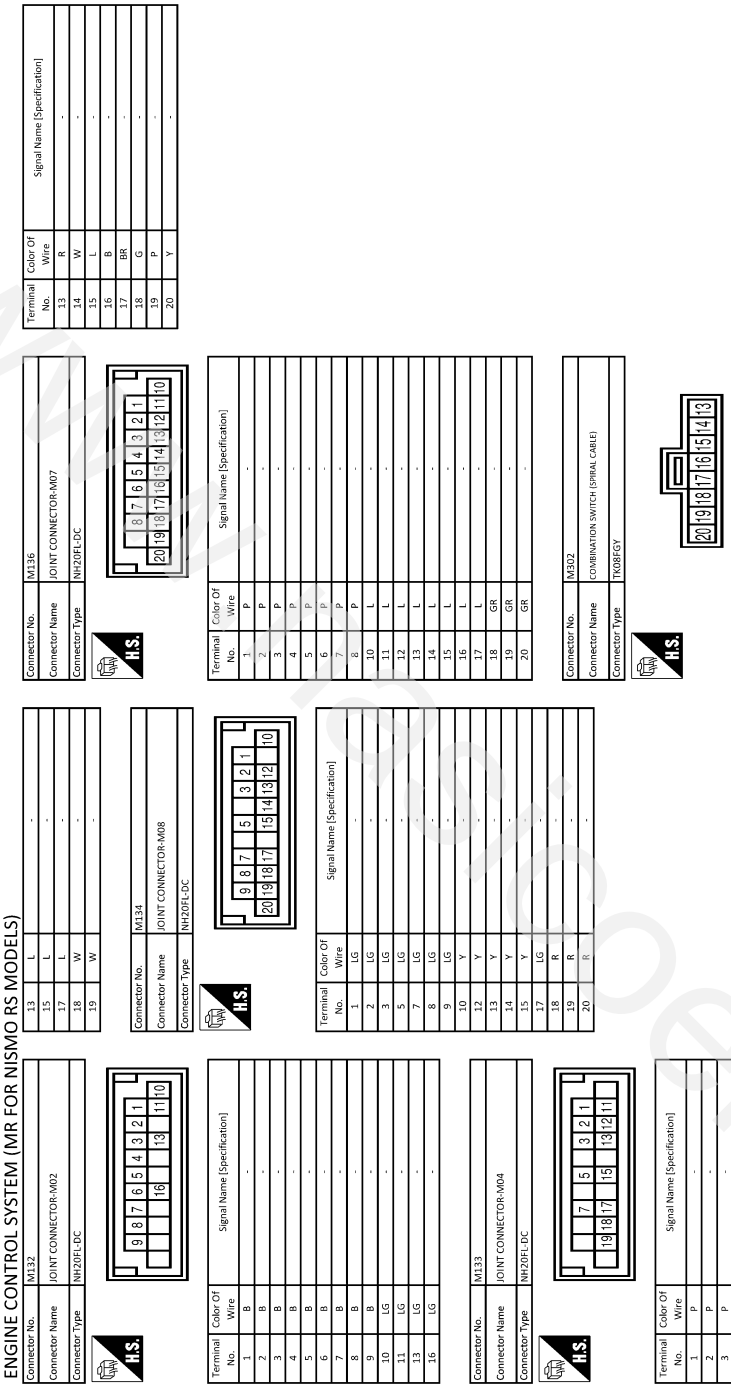

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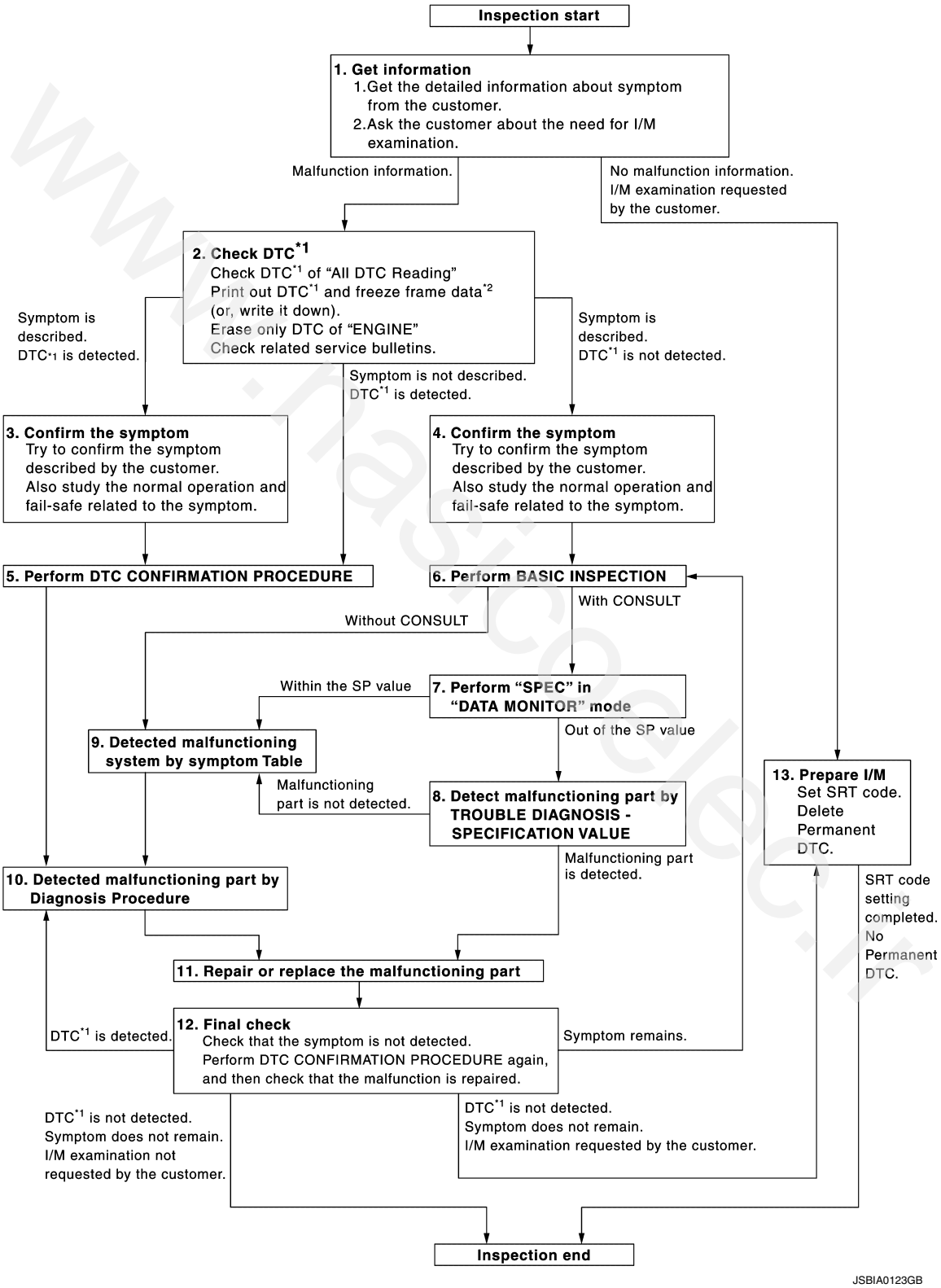
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000012197713

OVERALL SEQUENCE



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DETAILED FLOW

1.GET INFORMATION FOR SYMPTOM

1. 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-151, "Diagnostic Work Sheet".)
2. Ask if the customer requests I/M examination.

Malfunction information, obtained>>GO TO 2.
No malfunction information, but a request for I/M examination>>GO TO 13.

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 or GST.)
- Erase only DTC of “ENGINE”.
  - With CONSULT: “How to Erase DTC and 1st Trip DTC” in EC-84, "CONSULT Function".
  - Without CONSULT: “How to Erase Self-diagnostic Results” in EC-81, "On Board Diagnosis Function".
- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Matrix Chart is useful. Refer to EC-576, "Symptom Table".)

3. Check related service bulletins for information.

Are any symptoms described and any DTCs detected?

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

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).
Also study the normal operation and fail-safe related to the symptom. Refer to EC-583, "Description" and EC-111, "Fail Safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
Also study the normal operation and fail-safe related to the symptom. Refer to Refer to EC-576, "Symptom Table" and EC-111, "Fail Safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then check that DTC is detected again.
If two or more DTCs are detected, refer to EC-113, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

NOTE:

- Freeze frame data is useful if the DTC is not detected.
- Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.
  If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIRMATION PROCEDURE.

Is DTC detected?

YES >> GO TO 10.
NO >> Check according to GI-45, "Intermittent Incident".

6.PERFORM BASIC INSPECTION

Perform EC-153, "Work Procedure".

Do you have CONSULT?

YES >> GO TO 7.
NO >> GO TO 9.

7.PERFORM SPEC IN DATA MONITOR MODE

With CONSULT
Check that “MAS A/F SE-B1”, “MAS A/F SE-B2”, “B/FUEL SCHDL”, “A/F ALPHA-B1” and “A/F ALPHA-B2” are within the SP value using “SPEC” in “DATA MONITOR” mode with CONSULT. Refer to EC-180, "Component Function Check".

Is the measurement value within the SP value?

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

8.DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-181, "Diagnosis Procedure".

Is a malfunctioning part detected?

YES >> GO TO 11.
NO >> GO TO 9.

9.DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to EC-576, "Symptom Table" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptoms.

>> GO TO 10.

10.DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure. For details, refer to GI-48, "Circuit Inspection".

Is a malfunctioning part detected?

YES >> GO TO 11.
NO >> Monitor input data from related sensors or check voltage of related ECM terminals using CONSULT. Refer to EC-96, "Reference Value".

11.REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it. Refer to the following.
   With CONSULT: “How to Erase DTC and 1st Trip DTC” in EC-84, "CONSULT Function".
   Without CONSULT: “How to Erase Self-diagnostic Results” in EC-81, "On Board Diagnosis Function".

>> GO TO 12.

12.FINAL CHECK

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then check that the malfunction have been completely repaired.
When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and check that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 10.
YES-2 >> Symptom remains: GO TO 6.

NO-1 >> No request for I/M examination from the customer: Before returning the vehicle to the customer, always erase unnecessary DTC in ECM and TCM (With CONSULT: Refer to “How to Erase DTC and 1st Trip DTC” in EC-84, "CONSULT Function", Without CONSULT: Refer to “How to Erase Self-diagnostic Results” in EC-81, "On Board Diagnosis Function"). If the completion of SRT is needed, drive vehicle under the specific driving pattern. Refer to EC-169, "SRT Set Driving Pattern".

NO-2 >> I/M examination, requested from the customer: GO TO 13.

13. PREPARE FOR I/M EXAMINATION

1. Set SRT codes. Refer to EC-168, "Description".
2. Erase permanent DTCs. Refer to EC-174, "Description".

>> INSPECTION END

Diagnostic Work Sheet

INFOID:0000000012197714

DESCRIPTION

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

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

Utilize a diagnostic worksheet like the WORKSHEET SAMPLE below in order to organize all the information for troubleshooting.

Some conditions may cause the MIL to illuminate or blink, and DTC to be detected. Examples:

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

KEY POINTS

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

SEF907L

WORKSHEET SAMPLE

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

MTBL0017

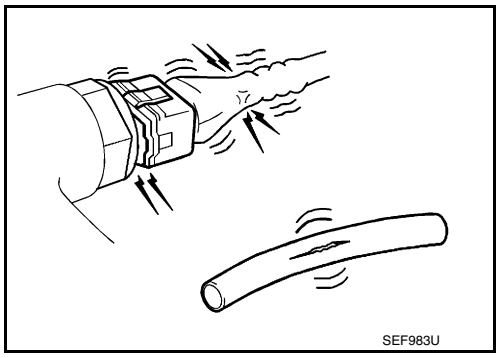
BASIC INSPECTION

Work Procedure

INFOID:0000000012197715

1.INSPECTION START

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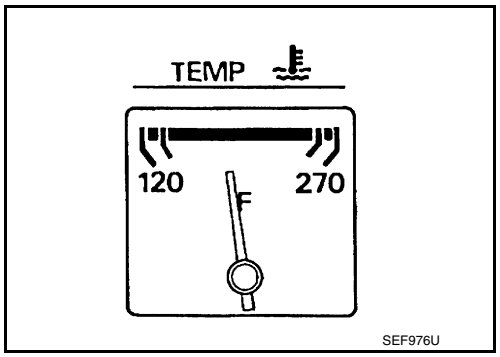

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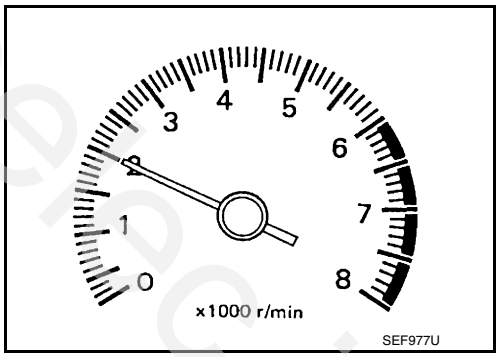
5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT or GST.

Is any DTC detected?

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



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2.REPAIR OR REPLACE

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

>> GO TO 3.

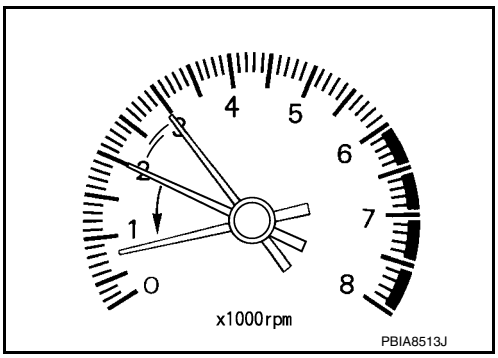
3.CHECK TARGET IDLE SPEED

1. Run engine at about 2,000 rpm for about 2 minutes under no load.

2. Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
3. Check idle speed.
   For procedure, refer to EC-584, "Inspection".
   For specification, refer to EC-591, "Idle Speed".

Is the inspection result normal?

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



4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-160, "Description".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-161, "Description".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-162, "Description".

Is Idle Air Volume Learning carried out successfully?

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

7. CHECK TARGET IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   For procedure, refer to EC-584, "Inspection".
   For specification, refer to EC-591, "Idle Speed".

Is the inspection result normal?

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

8. DETECT MALFUNCTIONING PART

Check the Following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-346, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-343, "DTC Logic".

Is the inspection result normal?

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

9. CHECK ECM FUNCTION

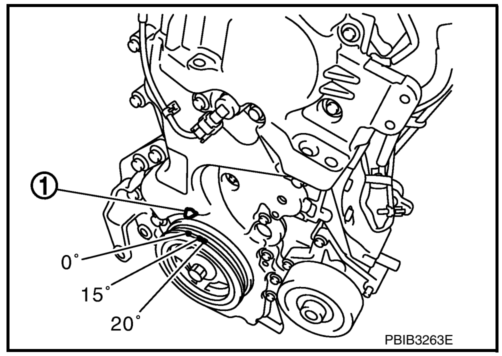
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to SEC-47, "ECM : Description".

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.

2. Check ignition timing with a timing light.
   For procedure, refer to EC-585, "Inspection"
   For specification, refer to EC-591, "Ignition Timing".



1 : Timing indicator

Is the inspection result normal?

YES >> INSPECTION END.
NO >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-160, "Description".

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-161, "Description".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-162, "Description".

Is Idle Air Volume Learning carried out successfully?

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

14. CHECK TARGET IDLE SPEED AGAIN

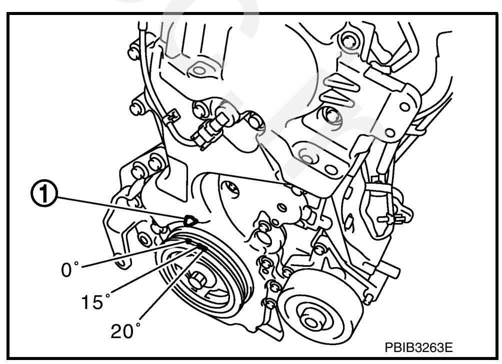
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   For procedure, refer to EC-584, "Inspection".
   For specification, refer to EC-591, "Idle Speed".

Is the inspection result normal?

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

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.
   For procedure, refer to EC-585, "Inspection".
   For specification, refer to EC-591, "Ignition Timing".



1 : Timing indicator

Is the inspection result normal?

YES >> INSPECTION END.
NO >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-76, "Exploded View".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair the timing chain installation. Then GO TO 4.

17. DETECT MALFUNCTIONING PART

Check the following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-346, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-343, "DTC Logic".

Is the inspection result normal?

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

18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to SEC-47, "ECM : Description".

>> GO TO 4.

ADDITIONAL SERVICE WHEN REPLACING ECM

Description

INFOID:0000000012197716

When replacing ECM, the following procedure must be performed. (For details, refer to EC-157, "Work Procedure".)

PROGRAMMING OPERATION

NOTE:

After replacing with a blank ECM, programming is required to write ECM information. Be sure to follow the procedure to perform the programming.

Work Procedure

INFOID:0000000012197717

1.SAVE ECM DATA

With CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Select “SAVING DATA FOR REPLC CPU” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.
5. Follow the instruction of CONSULT display.

NOTE:

- Necessary data in ECM is copied and saved to CONSULT.
- Go to Step 2 regardless of with or without success in saving data.

>> GO TO 2.

2.CHECK ECM PART NUMBER

Check ECM part number to see whether it is blank ECM or not.

NOTE:

- Part number of blank ECM is 23703 - ××××.
- Check part number when ordering ECM or the one included in the label on the container box.

Is the ECM a blank ECM?

YES >> GO TO 3.
NO >> GO TO 5.

3.SAVE ECM PART NUMBER

Read out the part number from the old ECM and save the number, following the programming instructions. Refer to “CONSULT Operation Manual”.

NOTE:

- The ECM part number is saved in CONSULT.
- Even when ECM part number is not saved in CONSULT, go to 4.

>> GO TO 4.

4.PERFORM ECM PROGRAMMING

After replacing ECM, perform the ECM programming. Refer to “CONSULT Operation Manual”.

NOTE:

- Refer to EC-590, "Removal and Installation" for replacement of ECM.
- During programming, maintain the following conditions:

- Ignition switch: ON
- Electric load: OFF
- Brake pedal: Not depressed
- Battery voltage: 12 - 13.5 V (Be sure to check the value of battery voltage by selecting “BATTERY VOLT” in “Data monitor” of CONSULT.)

>> GO TO 6.

5.REPLACE ECM

Replace ECM. Refer to EC-590, "Removal and Installation".

>> GO TO 6.

6.PERFORM INITIALIZATION OF NVIS (NATS) SYSTEM AND REGISTRATION OF ALL NVIS (NATS) IGNITION KEY IDS

Refer to SEC-47, "ECM : Description".

>> GO TO 7.

7.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-160, "Description".

>> GO TO 8.

8.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-161, "Description".

>> GO TO 9.

9.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-162, "Description".

>> GO TO 10.

10.PERFORM G SENSOR CALIBRATION

Refer to EC-164, "Description".

>> END

VIN REGISTRATION

Description

INFOID:0000000012197718

VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced. Refer to EC-159, "Work Procedure".

NOTE:

Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).

Work Procedure

INFOID:0000000012197719

1.CHECK VIN

Check the VIN of the vehicle and note it. Refer to GI-36, "Information About Identification or Model Code".

>> GO TO 2.

2.PERFORM VIN REGISTRATION

With CONSULT

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

>> END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

Description

INFOID:0000000012197720

Accelerator Pedal Released Position Learning is a function of ECM to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected. Refer to EC-160, "Work Procedure".

Work Procedure

INFOID:0000000012197721

1.START

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 2 seconds.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and wait at least 2 seconds.
5. Turn ignition switch OFF and wait at least 10 seconds.

>> END

THROTTLE VALVE CLOSED POSITION LEARNING

Description

INFOID:0000000012197722

Throttle Valve Closed Position Learning is a function of ECM to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time the harness connector of the electric throttle control actuator or ECM is disconnected or electric throttle control actuator inside is cleaned. Refer to EC-161, "Work Procedure".

Work Procedure

INFOID:0000000012197723

1.START

With CONSULT

1. Turn ignition switch ON.
2. Select “CLSD THL POS LEARN” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.
3. Follow the instructions on the CONSULT display.
4. Turn ignition switch OFF and wait at least 10 seconds.
   Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

Without CONSULT

1. Start the engine.
   NOTE:
   Engine coolant temperature is 25°C (77°F) or less before engine starts.
2. Warm up the engine.
   NOTE:
   Raise engine coolant temperature until it reaches 65°C (149°F) or more.
3. Turn ignition switch OFF and wait at least 10 seconds.
   Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

>> END

IDLE AIR VOLUME LEARNING

Description

INFOID:0000000012197724

Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps each engine idle speed within the specific range. It must be performed under any of the following conditions:
- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

Refer to EC-162, "Work Procedure".

Work Procedure

INFOID:0000000012197725

1.PRECONDITIONING

Make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.
- Battery voltage: More than 12.9 V (At idle)
- Engine coolant temperature: 70 - 100°C (158 - 212°F)
- Selector lever : P or N (CVT), Neutral (M/T)
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
  On vehicles equipped with daytime running light systems, set lighting switch to the 1st position to light only small lamps.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up

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

- M/T models
- Drive vehicle for 10 minutes.

Do you have CONSULT?

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

2.IDLE AIR VOLUME LEARNING

With CONSULT
1. Perform Accelerator Pedal Released Position Learning. Refer to EC-160, "Description".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-161, "Description".
3. Start engine and warm it up to normal operating temperature.
4. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode of “ENGINE”.
5. Touch “START” and wait 20 seconds.

Is “CMPLT” displayed on CONSULT screen?

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

3.IDLE AIR VOLUME LEARNING

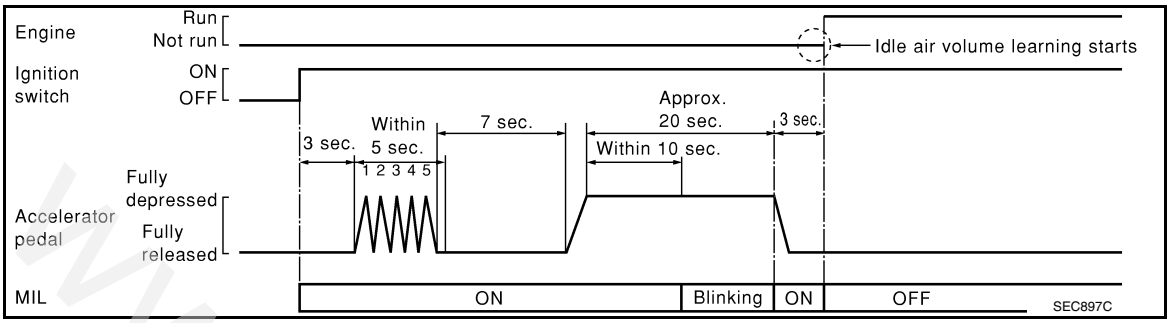
Without CONSULT
NOTE:
- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**

1. Perform Accelerator Pedal Released Position Learning. Refer to EC-160, "Description".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-161, "Description".
3. Start engine and warm it up to normal operating temperature.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
6. Repeat the following procedure quickly five times within 5 seconds.

- Fully depress the accelerator pedal.

- Fully release the accelerator pedal.

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



>> GO TO 4

4. CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications. For specification, refer to EC-591, "Idle Speed" and EC-591, "Ignition Timing".

Is the inspection result normal?

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

5. DETECT MALFUNCTIONING PART

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

Is the inspection result normal?

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

6. DETECT MALFUNCTIONING PART

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.
It is useful to perform “TROUBLE DIAGNOSIS - SPECIFICATION VALUE”. Refer to EC-180, "Description".
If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:
- Engine stalls.
- Erroneous idle.

>> INSPECTION END

G SENSOR CALIBRATION

Description

INFOID:0000000012197726

ECM stores calibration data (inherent characteristic value) of G sensor to provide accurate control. Therefore, it is required to perform calibration of G sensor after the following work is performed. Refer to EC-164, "Work Procedure".

- Removal/installation or replacement of G sensor
- Replacement of ECM

Work Procedure

INFOID:0000000012197727

1.PREPARATION BEFORE CALIBRATION PROCEDURE

1. Park the vehicle on a level surface.
2. Adjust air pressure of all tires to the specified pressure. WT-47, "Tire Air Pressure".

>> GO TO 2.

2.PERFORM CALIBRATION

With CONSULT

1. Turn ignition switch ON.
   CAUTION:
   Never start engine.
2. Select “Work Support” mode in “ENGINE.
3. Select “G SENSOR CALIBRATION”.
4. Touch “Start”.
   CAUTION:
   Never swing the vehicle during “G sensor calibration”.

Is “COMPLETED” displayed?

YES >> END
NO >> Perform steps 1 and 2 again.

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

Description

INFOID:0000000012197728

This describes how to erase the mixture ratio self-learning value. For the actual procedure, follow the instructions in “Diagnosis Procedure”. Refer to EC-165, "Work Procedure".

Work Procedure

INFOID:0000000012197729

1.START

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

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

>> END

FUEL PRESSURE

Work Procedure

INFOID:0000000012197730

FUEL PRESSURE RELEASE

1.FUEL PRESSURE RELEASE

With CONSULT
1. Turn ignition switch ON.
2. Perform “FUEL PRESSURE RELEASE” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.

Without CONSULT
1. Remove fuel pump fuse located in IPDM E/R.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.

>> END

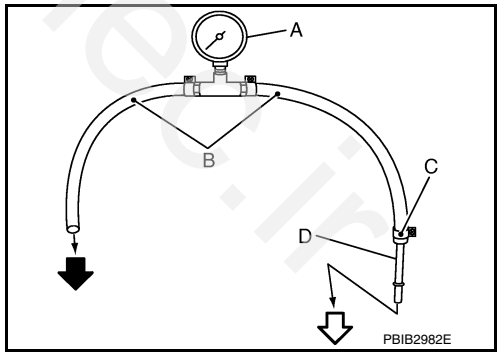
FUEL PRESSURE CHECK

CAUTION:
- **Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.**
- **The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.**
- **Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains sealability with O-rings inside.**
- **Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.**

NOTE:
Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because F15 models do not have fuel return system.

1.FUEL PRESSURE CHECK

1. Release fuel pressure to zero.
2. Prepare fuel hose for fuel pressure check (B) and fuel tube adapter [SST: KV10120000] (D), then connect fuel pressure gauge (A).



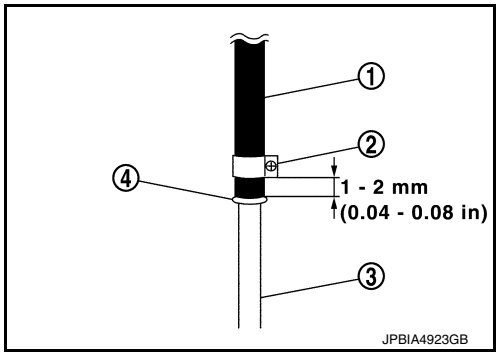
⇦ : To quick connector
⬅ : To high pressure fuel pump
C : Clamp

CAUTION:
- **Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).**
- **To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.**
- **Do not use the fuel hose for checking fuel pressure with damage or cracks on it.**
- **Use Pressure Gauge to check fuel pressure.**

3. Remove fuel hose.

CAUTION:
Do not twist or kink fuel hose because it is plastic hose.

4. Connect fuel hose for fuel pressure check (1) to high pressure fuel pump with clamp (2) as shown in the figure.

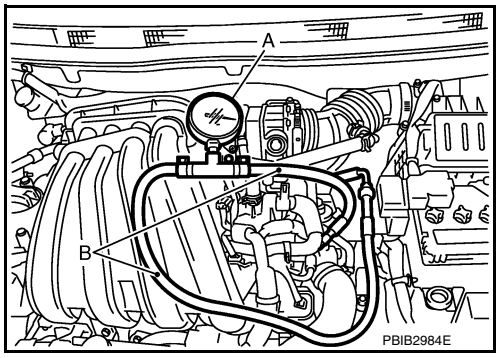


CAUTION:
- **Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.**
- **Apply proper amount of gasoline between top of the high pressure fuel pump (3) and spool (4).**
- **Insert fuel hose for fuel pressure check until it touches the spool on high pressure fuel pump.**
- **Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).**
- **When reconnecting fuel line, always use new clamps.**
- **Use a torque driver to tighten clamps.**

Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

- **Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).**
- **Make sure that clamp screw does not contact adjacent parts.**
- **After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.**

5. Connect fuel tube adapter to quick connector.



A : Fuel pressure gauge
B : Fuel hose for fuel pressure check

6. Turn ignition switch ON and check for fuel leakage.
7. Start engine and check for fuel leakage.
8. Read the indication of fuel pressure gauge.

CAUTION:
- **Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.**
- **During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.**

At idling : Approximately 500 kPa (5.1 kg/cm^2, 73 psi

Is the inspection result normal?

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

2.CHECK FUEL HOSES

1. Check the following.
- Fuel hoses for clogging
- Fuel filter for clogging
- Low pressure fuel pump
- Fuel pressure regulator for clogging

Is the inspection result normal?

YES >> Replace fuel pressure regulator.
NO >> Repair or replace error-detected parts.

HOW TO SET SRT CODE

Description

INFOID:0000000012197731

OUTLINE

In order to set all SRTs, the self-diagnoses as in the “SRT ITEM” table must have been performed at least once. Each diagnosis may require actual driving for a long period of time under various conditions.

SRT ITEM

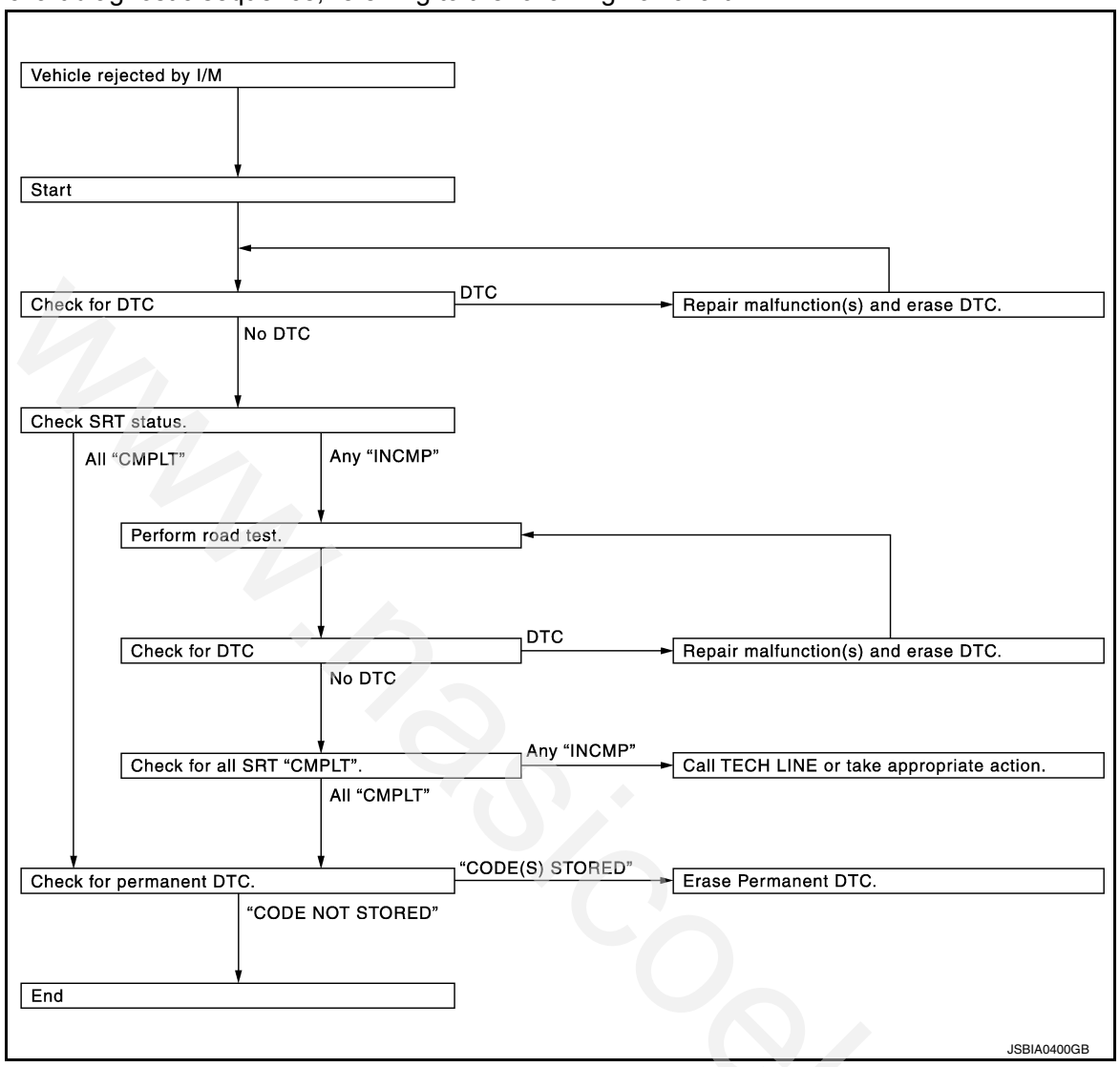
The table below shows required self-diagnostic items to set the SRT to “CMPLT”.

SRT item*1 (CONSULT indication)	Performance Priority*2	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.
CATALYST	1	Three way catalyst function	P0420
EVAP SYSTEM	1	EVAP control system purge flow monitoring	P0441
	1	EVAP control system	P0456
HO2S	1	Air fuel ratio (A/F) sensor 1	P014C, P014D, P015A, P015B
		Heated oxygen sensor 2	P0137
		Heated oxygen sensor 2	P0138
		Heated oxygen sensor 2	P0139
EGR/VVT SYSTEM	2	Intake value timing control function	P0011

*1: Though displayed on the CONSULT screen, “HO2S HTR” is not SRT item.
*2: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT.

SRT SERVICE PROCEDURE

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

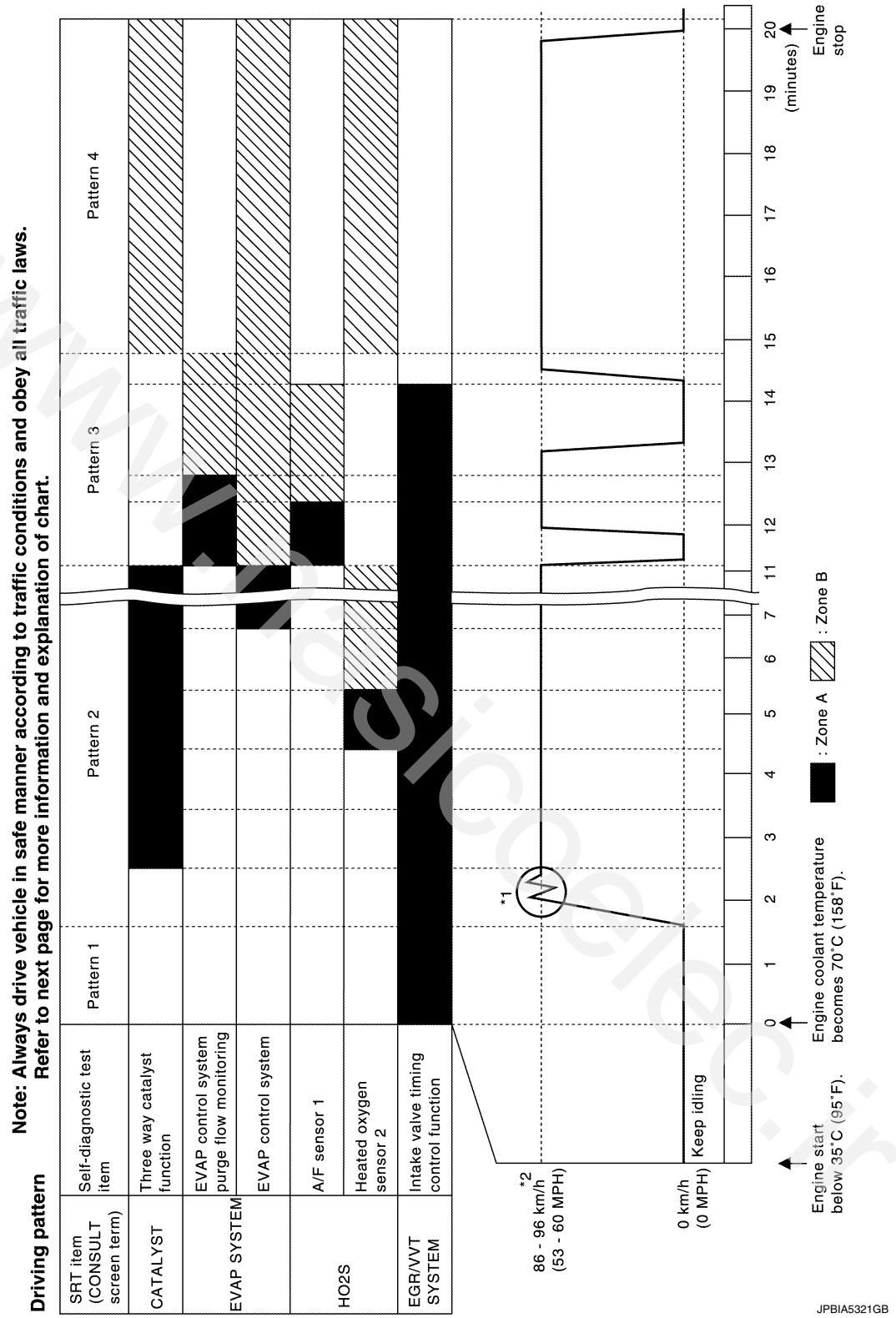


SRT Set Driving Pattern

INFOID:0000000012197732

CAUTION:

Always drive the vehicle in safe manner according to traffic conditions and obey all traffic laws.



*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.

*2: Checking the vehicle speed with GST is advised.

- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
- “Zone A” is the fastest time where required for the diagnosis under normal conditions*. If the diagnosis is not completed within “Zone A”, the diagnosis can still be performed within “Zone B”.

*: Normal conditions
- Sea level
- Flat road
- Ambient air temperature: 20 – 30°C (68 – 86°F)

NOTE:
Diagnosis is performed as quickly as possible under normal conditions. However, under other conditions, diagnosis may also be performed. [For example: ambient air temperature other than 20 – 30°C (68 – 86°F)]

Work Procedure

INFOID:0000000012197733

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-115, "DTC Index".
NO >> GO TO 2.

2.CHECK SRT STATUS

With CONSULT
Select “SRT STATUS” in “DTC & SRT CONFIRMATION” mode with CONSULT.
Without CONSULT
Perform “SRT status” mode with EC-81, "On Board Diagnosis Function".
With GST
Select Service $01 with GST.

Is SRT code(s) set?

YES >> GO TO 11.
NO-1 >> With CONSULT: GO TO 3.
NO-2 >> Without CONSULT: GO TO 4.

3.DTC CONFIRMATION PROCEDURE

1. Select “SRT WORK SUPPORT” in “DTC & SRT CONFIRMATION” mode with CONSULT.
2. For SRT(s) that is not set, perform the corresponding “DTC CONFIRMATION PROCEDURE” according to the “Performance Priority” in the “SRT ITEM” table. Refer to EC-168, "Description".
3. Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-115, "DTC Index".
NO >> GO TO 10.

4.PERFORM ROAD TEST

- Check the “Performance Priority” in the “SRT ITEM” table. Refer to EC-168, "Description".
- Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to EC-169, "SRT Set Driving Pattern".
  In order to set all SRTs, the SRT set driving pattern must be performed at least once.

>> GO TO 5.

5.PATTERN 1

1. Check the vehicle condition;
- Engine coolant temperature is −10 to 35°C (14 to 95°F).
- Fuel tank temperature is more than 0°C (32°F).
2. Start the engine.
3. Keep engine idling until the engine coolant temperature is greater than 70°C (158°F)

NOTE:
ECM terminal voltage is follows;
- Engine coolant temperature
  - −10 to 35°C (14 to 95°F): 3.0 – 4.3 V
  - 70°(158°F): Less than 4.1 V
- Fuel tank temperature: Less than 1.4 V

Refer toEC-96, "Reference Value".

>> GO TO 6.

6.PATTERN 2

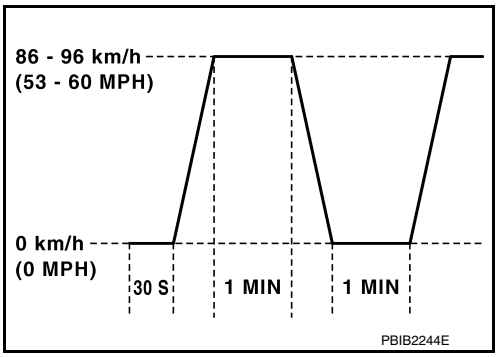
1. Drive the vehicle. And depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds.
2. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again

NOTE:
- Checking the vehicle speed with GST is advised.
- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

>> GO TO 7.

7.PATTERN 3

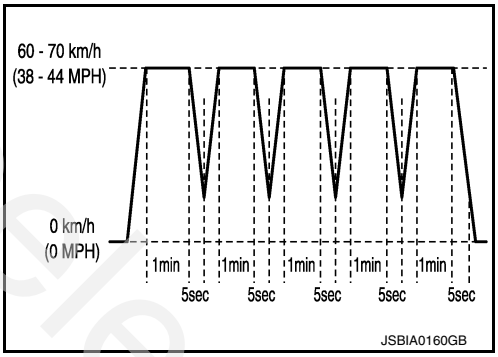
- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during deceleration of vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).



>> GO TO 8.

8.PATTERN 4

- Operate vehicle following the driving pattern shown in the figure.
- Drive the vehicle in a proper gear at 60 km/h (38 MPH) and maintain the speed.
- Release the accelerator pedal fully at least 5 seconds.
- Repeat the above two steps at least 5 times.



>> GO TO 9.

9.PATTERN 5

- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted again.

>> GO TO 10.

10.CHECK SRT STATUS

With CONSULT
Select “SRT STATUS” in “DTC & SRT CONFIRMATION” mode with CONSULT.
Without CONSULT
Perform “SRT status” mode with EC-81, "On Board Diagnosis Function".
With GST
Select Service $01 with GST.

Is SRT(s) set?

YES >> GO TO 11.
NO >> Call TECH LINE or take appropriate action.

11.CHECK PERMANENT DTC

NOTE:
Permanent DTC cannot be checked with a tool other than CONSULT or GST.

With CONSULT
Select “SRT STATUS” in “DTC & SRT CONFIRMATION” mode with CONSULT.

With GST
Select Service $0A with GST.

Is permanent DTC(s) detected?

YES >> Proceed to EC-180, "Description".
NO >> END

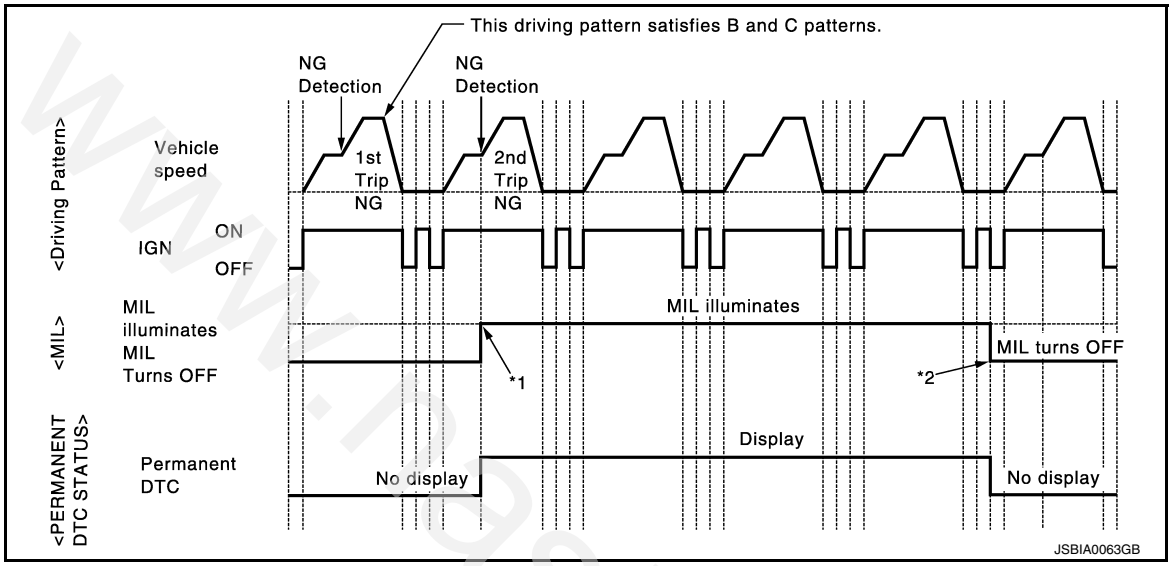
HOW TO ERASE PERMANENT DTC

Description

INFOID:0000000012197734

OUTLINE

When a DTC is stored in ECM
When a DTC is stored in ECM and MIL is ON, a permanent DTC is erased with MIL shutoff if the same malfunction is not detected after performing the driving pattern for MIL shutoff three times in a raw.



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

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

When a DTC is not stored in ECM
The erasing method depends on a permanent DTC stored in ECM. Refer to the following table.

×: Applicable —: Not applicable

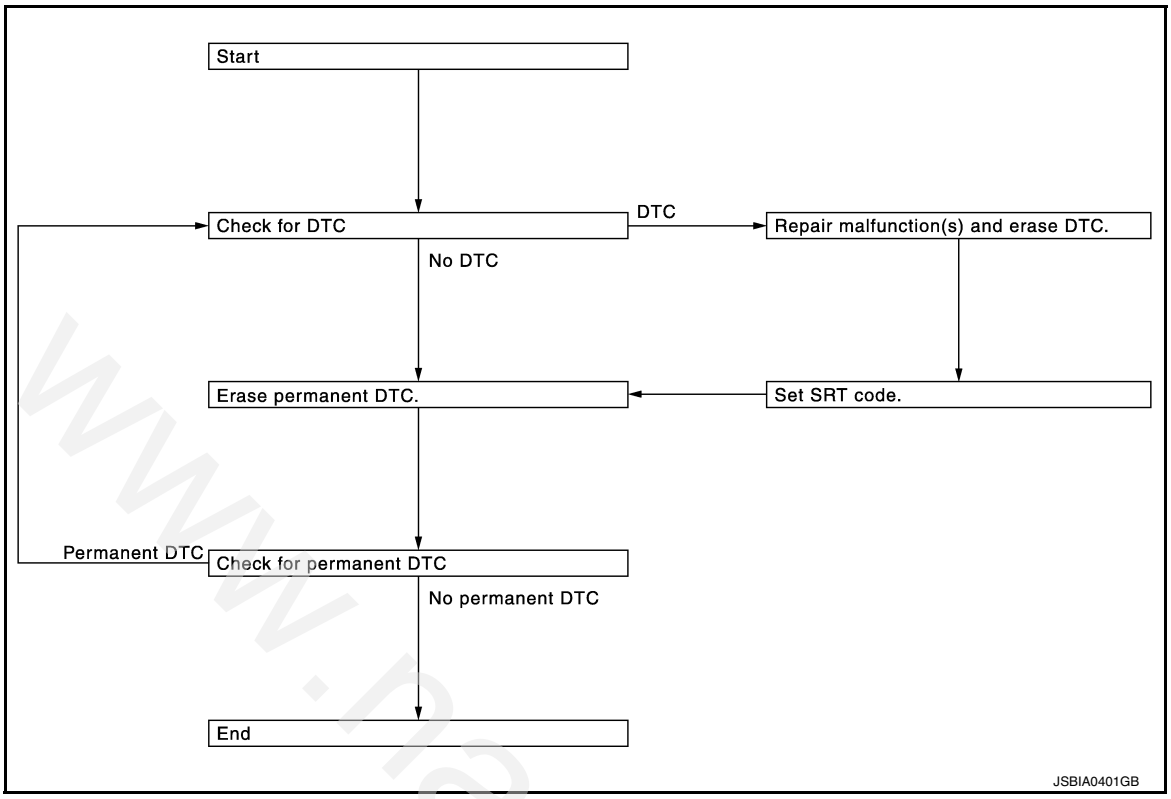
Group*	Perform "DTC CONFIRMATION PROCEDURE" for applicable DTCs.	Driving pattern		Reference
		B	D	
A	×	—	—	EC-175
B	—	×	×	EC-177

*: For group, refer to EC-115, "DTC Index".

PERMANENT DTC ITEM

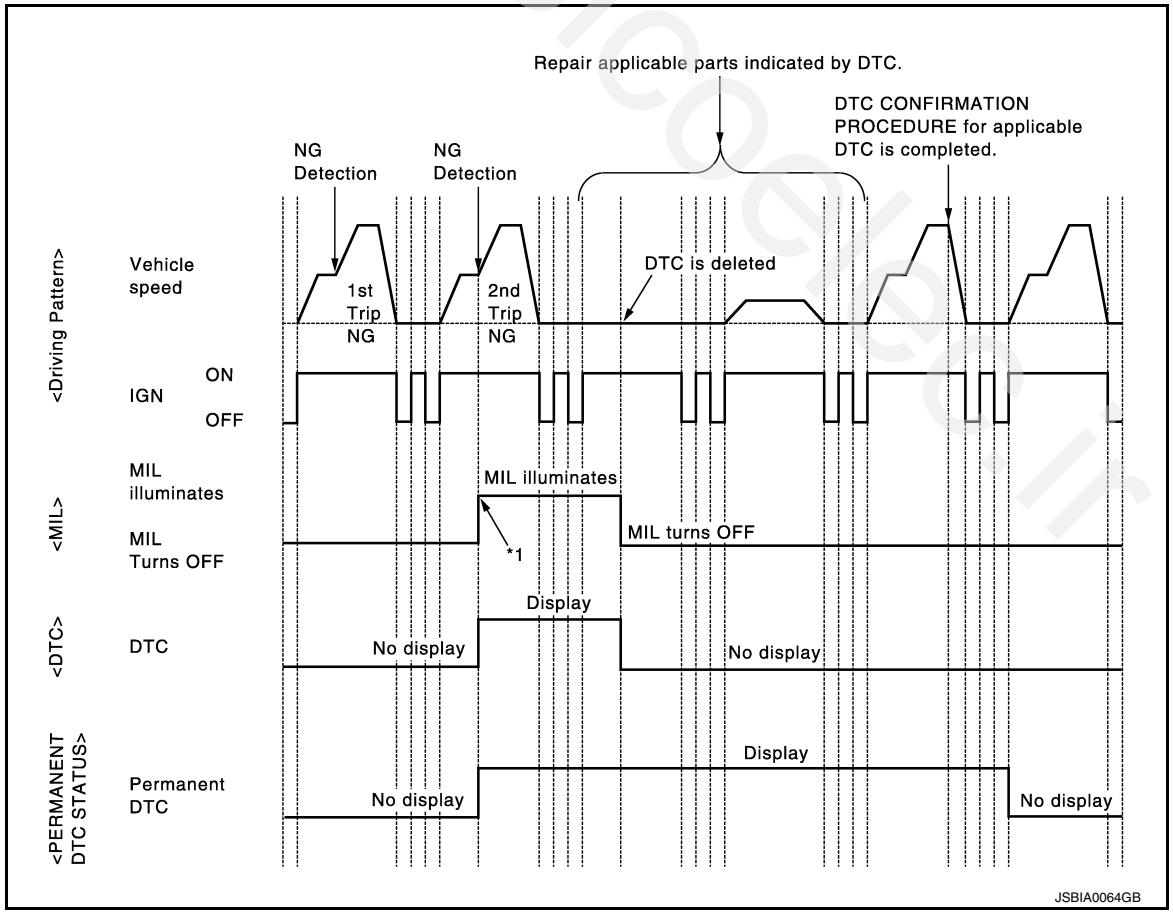
For permanent DTC items, MIL turns ON. Refer to EC-115, "DTC Index".

PERMANENT DTC SERVICE PROCEDURE



Work Procedure (Group A)

INFOID:0000000012197735



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

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-81, "On Board Diagnosis Function", EC-84, "CONSULT Function".

NO >> GO TO 2.

2.CHECK PERMANENT DTC

With CONSULT

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “PERMANENT DTC STATUS” mode with CONSULT.

With GST

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select Service $0A with GST.

Is any permanent DTC detected?

YES >> GO TO 3.

NO >> END

3.PERFORM DTC CONFIRMATION PROCEDURE

Perform “DTC CONFIRMATION PROCEDURE” for DTCs which are the same as permanent DTCs stored in ECM. Refer to EC-115, "DTC Index".

>> GO TO 4.

4.CHECK PERMANENT DTC

With CONSULT

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “PERMANENT DTC STATUS” mode with CONSULT.

With GST

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select Service $0A with GST.

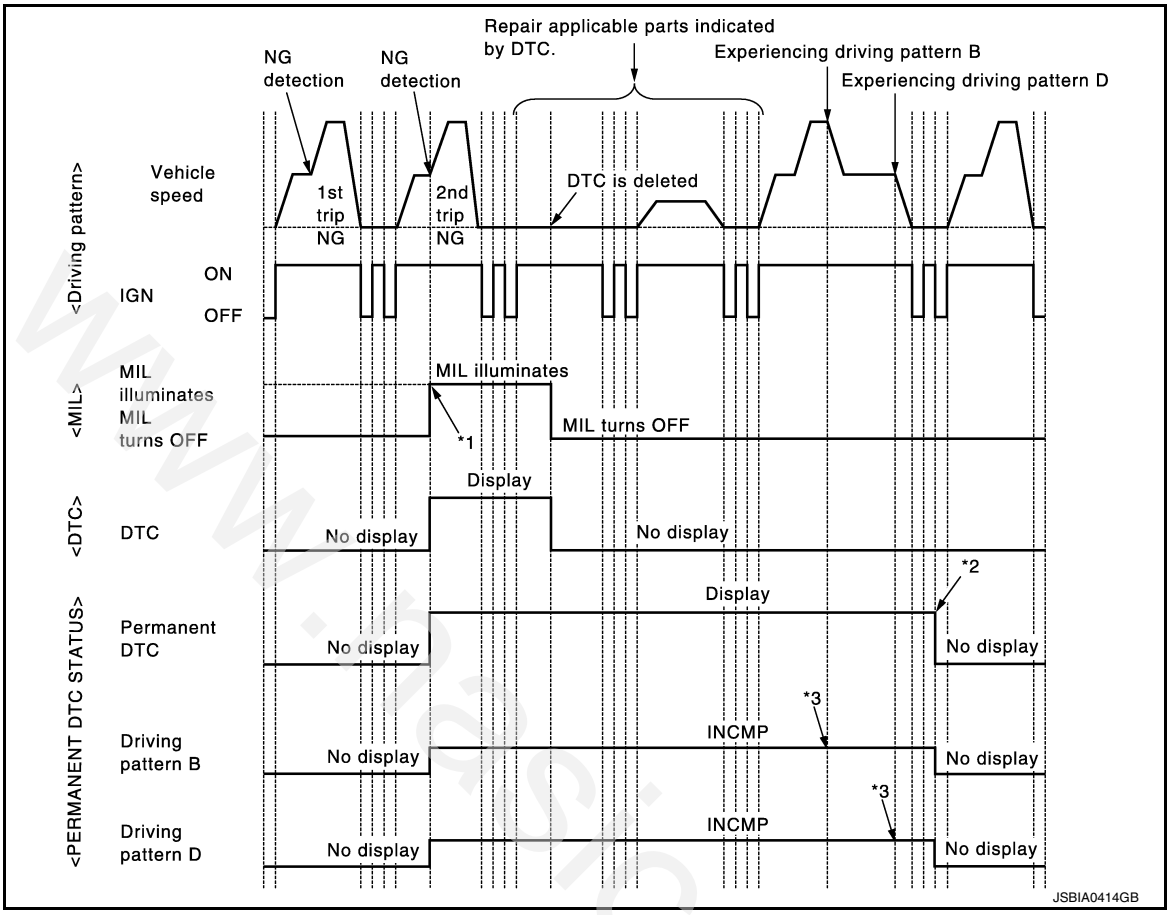
Is any permanent DTC detected?

YES >> GO TO 1.

NO >> END

Work Procedure (Group B)

INFOID:0000000012197736



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

*2: After experiencing driving pattern B and D, permanent DTC is erased.

*3: Indication does not change unless the ignition switch is turned from ON to OFF twice even after experiencing driving pattern B or D.

NOTE:
Drive the vehicle according to only driving patterns indicating “INCMP” in driving patterns B and D on the “PERMANENT DTC STATUS” screen.

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-81, "On Board Diagnosis Function", EC-84, "CONSULT Function".

NO >> GO TO 2.

2.CHECK PERMANENT DTC

With CONSULT

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “PERMANENT DTC STATUS” mode with CONSULT.

With GST

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

4. Turn ignition switch ON.
5. Select Service $0A with GST.

Is any permanent DTC detected?

YES >> GO TO 3.
NO >> END

3. DRIVE DRIVING PATTERN B

CAUTION:
- **Always drive at a safe speed.**
- **Never erase self-diagnosis results.**
- **If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B and D is reset.**

With CONSULT
1. Start engine and warm it up to normal operating temperature.
2. Use “PERMANENT DTC WORK SUPPORT” mode with CONSULT to drive the vehicle according to driving pattern B. Refer to EC-84, "CONSULT Function", EC-78, "DIAGNOSIS DESCRIPTION : Driving Pattern".

With GST
1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle according to driving pattern B. Refer to EC-78, "DIAGNOSIS DESCRIPTION : Driving Pattern".

>> GO TO 4.

4. CHECK PERMANENT DTC

With CONSULT
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “PERMANENT DTC STATUS” mode with CONSULT.

With GST
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select Service $0A with GST.

Is any permanent DTC detected?

YES >> GO TO 5.
NO >> END

5. DRIVE DRIVING PATTERN D

CAUTION:
- **Always drive at a safe speed.**
- **Never erase self-diagnosis results.**
- **If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B and D is reset.**

Drive the vehicle according to driving pattern D. Refer to EC-78, "DIAGNOSIS DESCRIPTION : Driving Pattern".

>> GO TO 6.

6. CHECK PERMANENT DTC

With CONSULT
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.

5. Select “PERMANENT DTC STATUS” mode with CONSULT.

With GST

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select Service $0A with GST.

Is any permanent DTC detected?

YES >> GO TO 1.
NO >> END

DTC/CIRCUIT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:0000000012197737

The specification (SP) value indicates the tolerance of the value that is displayed in “SPEC” of “DATA MONITOR” mode of CONSULT during normal operation of the Engine Control System. When the value in “SPEC” of “DATA MONITOR” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “SPEC” of “DATA MONITOR” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.
The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.
The SP value will be displayed for the following three items:
- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Component Function Check

INFOID:0000000012197738

1.START

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

>> GO TO 2.

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

With CONSULT
NOTE:
Perform “SPEC” in “DATA MONITOR” mode in maximum scale display.
1. Perform EC-153, "Work Procedure".
2. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “SPEC” of “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Make sure that monitor items are within the SP value.

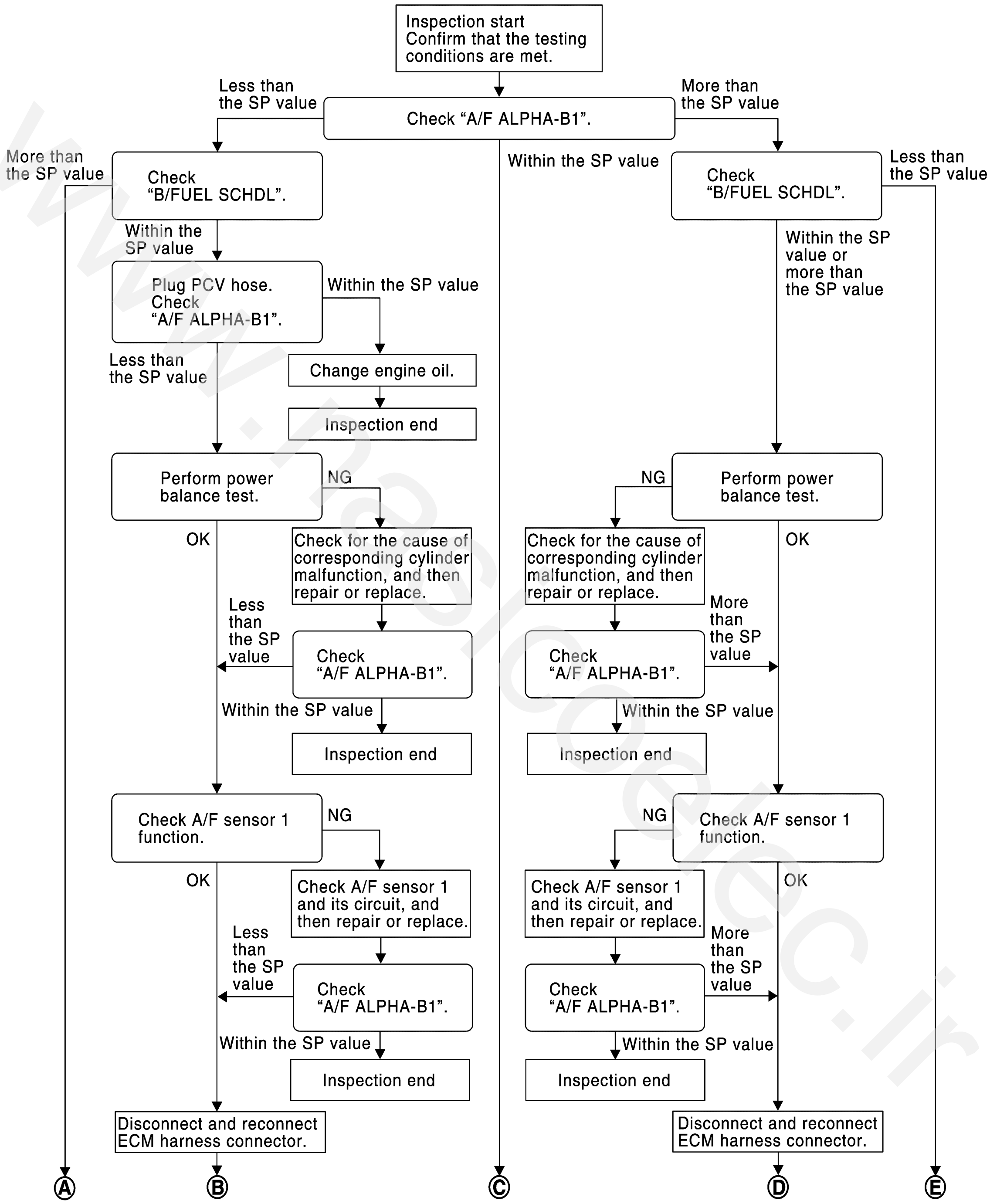
Is the inspection result normal?

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

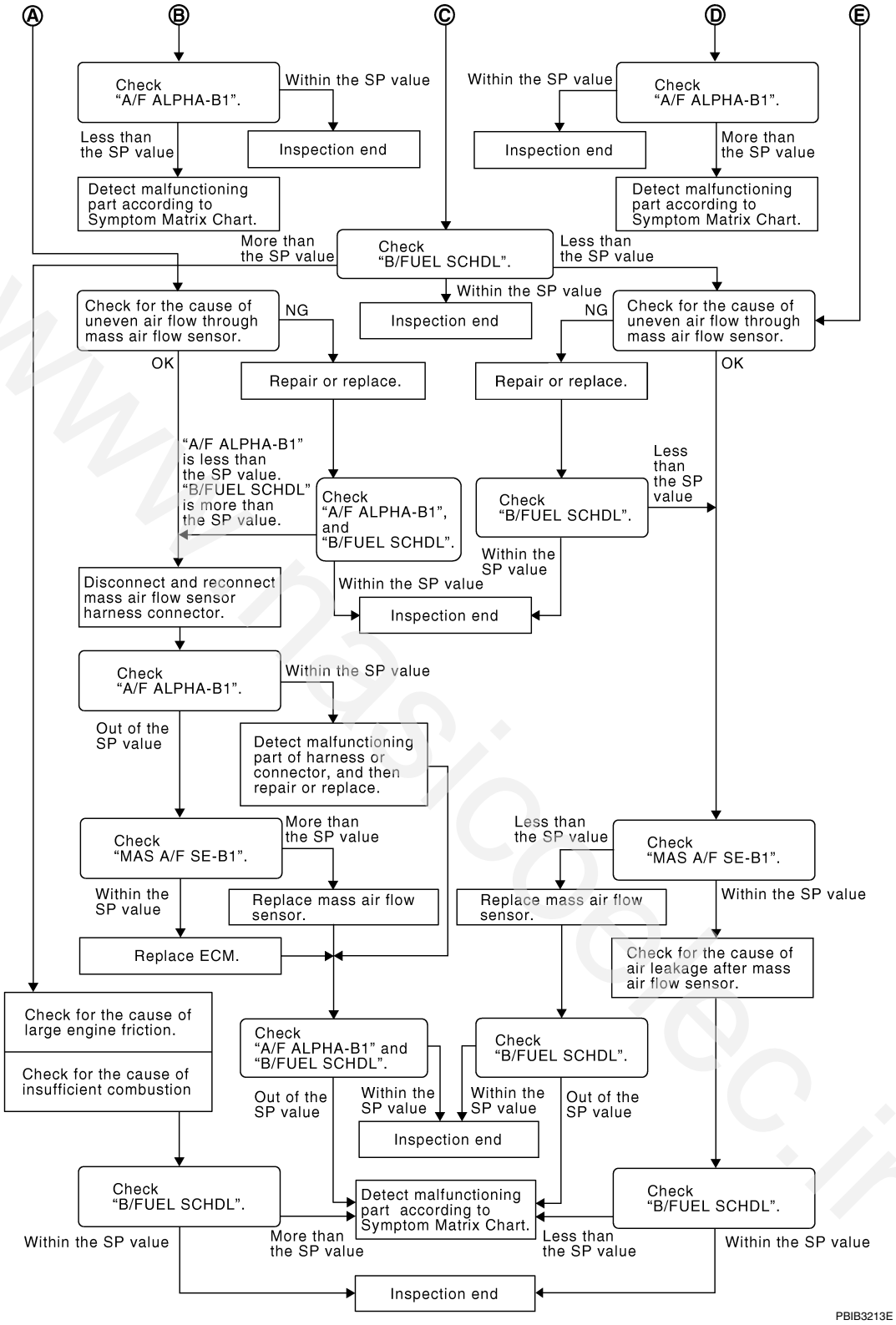
Diagnosis Procedure

INFOID:0000000012197739

OVERALL SEQUENCE



JSBIA1063GB



DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1"

With CONSULT

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-180, "Component Function Check".
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

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

Is the measurement value within the SP value?

YES >> GO TO 14.
NO-1 >> Less than the SP value: GO TO 2.
NO-2 >> More than the SP value: GO TO 3.

2.CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

YES >> GO TO 4.
NO >> More than the SP value: GO TO 16.

3.CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

YES >> GO TO 6.
NO-1 >> More than the SP value: GO TO 6.
NO-2 >> Less than the SP value: GO TO 22.

4.CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

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

5.CHANGE ENGINE OIL

1. Stop the engine.
2. Change engine oil.

NOTE:
This symptom may occur when a large amount of gasoline is mixed with engine oil because of driving conditions (such as when engine oil temperature does not rise enough since a journey distance is too short during winter). The symptom will not be detected after changing engine oil or changing driving condition.

>> **INSPECTION END**

6.PERFORM POWER BALANCE TEST

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.
2. Make sure that the each cylinder produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.
1. Ignition coil and its circuit (Refer to EC-554, "Component Function Check".)
2. Fuel injector and its circuit (Refer to EC-541, "Component Function Check".)
3. Intake air leakage
4. Low compression pressure (Refer to EM-17, "Inspection".)

Is the inspection result normal?

YES >> Replace fuel injector and then GO TO 8.
NO >> Repair or replace malfunctioning part and then GO TO 8.

8. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 9.

9. CHECK A/F SENSOR 1 FUNCTION

Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1.
- For DTC P0130, refer to EC-263, "DTC Logic".
- For DTC P0131, refer to EC-267, "DTC Logic".
- For DTC P0132, refer to EC-270, "DTC Logic".
- For DTC P014C, P014D, P015A, P015B, refer to EC-292, "DTC Logic".

Is any DTC detected?

YES >> GO TO 10.
NO >> GO TO 12.

10. CHECK A/F SENSOR 1 CIRCUIT

Perform DIAGNOSTIC PROCEDURE according to corresponding DTC.

>> GO TO 11.

11. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

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

12. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect ECM harness connector.
3. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 13.

13. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-576, "Symptom Table".

14. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO-1 >> More than the SP value: GO TO 15.
NO-2 >> Less than the SP value: GO TO 22.

15. DETECT MALFUNCTIONING PART

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

>> Repair or replace malfunctioning part, and then GO TO 27.

16. CHECK INTAKE SYSTEM

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

Is the inspection result normal?

YES >> GO TO 21.
NO >> Repair or replace malfunctioning part, and then GO TO 17.

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

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> “B/FUEL SCHDL” is more, “A/F ALPHA-B1” is less than the SP value: GO TO 18.

18. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

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

>> GO TO 19.

19. CHECK “A/F ALPHA-B1”

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

Is the measurement value within the SP value?

YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-238, "DTC Logic". Then GO TO 26.
NO >> GO TO 20.

20. CHECK “MAS A/F SE-B1”

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

Is the measurement value within the SP value?

YES >> GO TO 21.
NO >> More than the SP value: Replace mass air flow sensor, and then GO TO 26.

21. REPLACE ECM

1. Replace ECM. Refer to EC-590, "Removal and Installation".
2. Perform EC-157, "Description".

>> GO TO 26.

22. CHECK INTAKE SYSTEM

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

Is the inspection result normal?

YES >> GO TO 24.
NO >> Repair or replace malfunctioning part, and then GO TO 23.

23. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Less than the SP value: GO TO 24.

24. CHECK “MAS A/F SE-B1”

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

Is the measurement value within the SP value?

YES >> GO TO 25.
NO >> Less than the SP value: Replace mass air flow sensor, and then GO TO 27.

25. CHECK INTAKE SYSTEM

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

>> GO TO 27.

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

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-576, "Symptom Table".

27. CHECK “B/FUEL SCHDL”

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

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-576, "Symptom Table".

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000012197740

1.CHECK FUSE

Check that the following fuse is not blowing.

Location	Fuse No.	Capacity
IPDM E/R	#43	20 A
	#62	15 A

Is the fuse blown (open)?

YES >> If the replaced fuse is blown again. Check IPDM E/R power supply.
NO >> GO TO 2.

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to GI-48, "Circuit Inspection".

Is the inspection result normal?

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

3.CHECK ECM GROUND CIRCUIT

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

+		–	Continuity
ECM			
Connector	Terminal		
F25	1	Ground	Existed
	2		
E18	123		
	124		
	127		

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK ECM POWER SUPPLY (MAIN)-I

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

ECM			Voltage
Connector	+	–	
	Terminal		
E18	121	127	Battery voltage

Is the inspection result normal?

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

5.CHECK ECM POWER SUPPLY (MAIN)-II

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Check the voltage between ECM harness connector terminals as per the following.

ECM			Condition	Voltage (Approx.)
Connector	+	–		
	Terminal			
E18	121	127	After turning ignition switch OFF, battery voltage will exist for a few seconds	Drop to 0 V

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 7.

6. CHECK ECM POWER SUPPLY (MAIN) CIRCUIT

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

+		–		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E18	121	E14	35	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for IPDM E/R power supply circuit.
NO >> Repair or replace error-detected parts.

7. CHECK ECM RELAY CONTROL SIGNAL

Check the voltage between ECM harness connector terminals as per the following.

ECM			Condition	Voltage (Approx.)
Connector	+	–		
	Terminal			
E18	112	127	Ignition switch ON	0 V
			Turn ignition switch OFF and wait at least 10 seconds.	Battery voltage

Is the inspection result normal?

YES >> Check Intermittent Incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 8.

8. CHECK ECM RELAY CONTROL SIGNAL CIRCUIT

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

+		–		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E18	112	E14	41	Existed

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

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-37, "Removal and Installation".
NO >> Repair or replace error-detected parts.

9. CHECK IGNITION SWITCH SIGNAL

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

ECM			Condition	Voltage (Approx.)
Connector	+	–		
	Terminal			
E18	109	127	Ignition switch OFF	0 V
			Ignition switch ON	Battery voltage

Is the inspection result normal?

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

10. CHECK IGNITION SWITCH SIGNAL CIRCUIT

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

+		–		
ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E18	109	E15	62	Existed

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

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

11. CHECK ECM POWER SUPPLY (BACK-UP)

Check the voltage between ECM harness connector terminals.

ECM			Voltage
Connector	+	–	
	Terminal		
E18	106	127	Battery voltage

Is the inspection result normal?

YES >> Check Intermittent Incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 12.

12. CHECK ECM POWER SUPPLY (BACK-UP) CIRCUIT

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

+		–		
ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E18	106	E14	42	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

U0100 DRIVETRAIN CAN COMMUNICATION (ECM)

DTC Description

INFOID:0000000012197741

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms		DTC detecting condition
	DTC (Trouble diagnosis content)	Malfunction type	
U0100	COMMUNICATION ERROR (LOST) (Lost communication with ECM/ PCM “A”)	NO SUBTYPE INFORMATION	FPCM cannot receive the drivetrain CAN communication signal sent from ECM for Approx. 1 second or more.

POSSIBLE CAUSE

- Drivetrain CAN harness or connectors
- ECM

FAIL-SAFE

Not applicable

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check “Self Diagnostic Result” of “FPCM”.

Is DTC “U0100” detected?

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

Diagnosis Procedure

INFOID:0000000012197742

1.CHECK DRIVETRAIN CAN COMMUNICATION HARNESS AND CONNECTORS

1. Turn ignition switch OFF.
2. Check installation condition of ECM and FPCM.
3. Disconnect ECM harness connector and FPCM harness connector.
4. Check the continuity between ECM harness connector and FPCM harness connector.

+		–		Continuity
ECM		FPCM		
Connector	Terminal	Connector	Terminal	
E18	100	B111	3	Existed
	99		4	

5. Also check harness for short.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

With CONSULT

1. Reconnect all harness connector disconnected.
2. Turn ignition switch ON.
3. Erase “Self Diagnostic Result” of “FPCM”.
4. Perform DTC confirmation procedure again. Refer to EC-191, "DTC Description".

Is DTC “U0100” detected again?

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

3.REPLACE FPCM

1. Replace FPCM.
2. Perform DTC confirmation procedure again. Refer to EC-191, "DTC Description".

Is DTC “U0100” detected again?

YES >> Replace ECM. Refer to EC-590, "Removal and Installation".
NO >> INSPECTION END

4.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

U0101 CAN COMM CIRCUIT

Description

INFOID:0000000012197743

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:0000000012197744

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

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

Diagnosis Procedure

INFOID:0000000012197745

Perform the trouble diagnosis for CAN communication system. Refer to LAN-17, "Trouble Diagnosis Flow Chart".

U0122 VEHICLE DYNAMICS CONTROL MODULE

Description

INFOID:0000000012197746

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:0000000012197747

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U0122	VDC MDL (Lost communication with vehicle dynamics control module)	When ECM is not transmitting or receiving CAN communication signal of OBD (emission related diagnosis) with ABS actuator and electric unit (control unit) for 2 seconds or more.	CAN communication line between ECM and ABS actuator and electric unit (control unit) (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to EC-194, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197748

Perform the trouble diagnosis for CAN communication system. Refer to LAN-17, "Trouble Diagnosis Flow Chart".

U1001 CAN COMM CIRCUIT

Description

INFOID:0000000012197749

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:0000000012197750

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:0000000012197751

Perform the trouble diagnosis for CAN communication system. Refer to LAN-17, "Trouble Diagnosis Flow Chart".

P0011 IVT CONTROL

DTC Logic

INFOID:0000000012197752

DTC DETECTION LOGIC

NOTE:
If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for EC-424, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0011	INT/V TIM CONT-B1 (Intake valve timing control performance)	There is a gap between angle of target and phase-control angle degree.	• Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Intake valve control solenoid valve • Accumulation of debris to the signal pick-up portion of the camshaft • Timing chain installation • Foreign matter caught in the oil groove for intake valve timing control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

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

ENG SPEED	1,200 - 2,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	P or N position (CVT) Neutral position (M/T)

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

With GST
Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-197, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

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

ENG SPEED	1,200 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	D position (CVT) 1st or 2nd position (M/T)
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:
Always drive at a safe speed.

2. Check 1st trip DTC.

With GST
Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

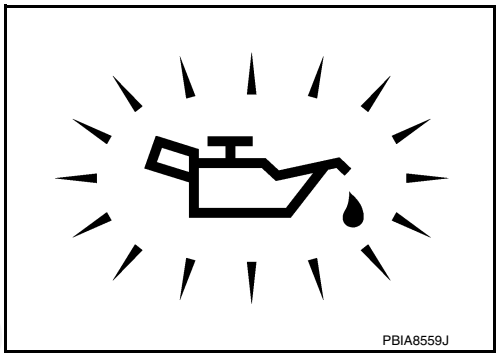
YES >> Proceed to EC-197, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197753

1.CHECK OIL PRESSURE WARNING LAMP

1. Start engine.
2. Check oil pressure warning lamp and confirm it is not illuminated.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Is oil pressure warning lamp illuminated?

YES >> Check the engine oil level. Refer to LU-9, "Inspection".
NO >> GO TO 2.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Check the intake valve timing control solenoid valve. Refer to EC-198, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace intake valve timing control solenoid valve. Refer to EM-76, "Exploded View".

3.CHECK CRANKSHAFT POSITION SENSOR (POS)

Check the crankshaft position sensor (POS). Refer to EC-345, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace crankshaft position sensor (POS). Refer to EM-114, "Exploded View".

4.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Check the camshaft position sensor (PHASE). Refer to EC-348, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace camshaft position sensor (PHASE). Refer to EM-88, "Exploded View".

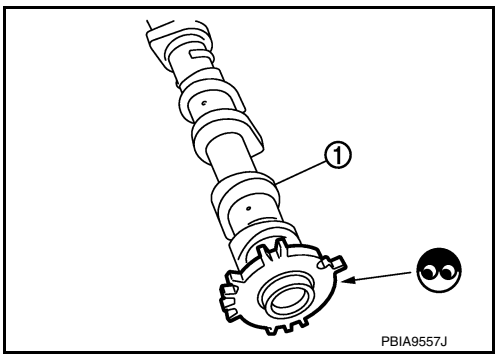
5.CHECK CAMSHAFT (INT)

Check the following.

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-89, "Removal and Installation".



6. CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

YES >> Check timing chain installation. Refer to EM-77, "Removal and Installation".
NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to EM-92, "Inspection", “INSPECTION AFTER INSTALLATION”.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Clean lubrication line.

Component Inspection

INFOID:0000000012197754

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

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

Intake valve timing control solenoid valve		Resistance
+	–	
Terminal		
1	2	6.7 - 7.7 Ω [at 20°C (68°F)]
1	Ground	∞ Ω (Continuity should not exist)
2		

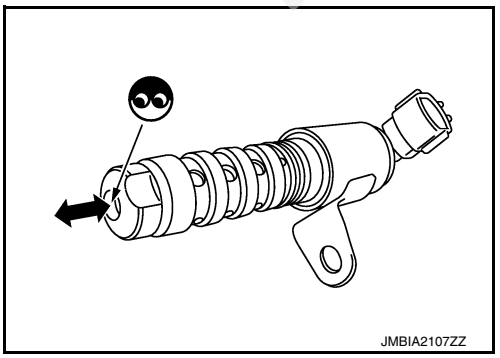
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace intake valve timing control solenoid valve. Refer to EM-76, "Exploded View".

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve. Refer to EM-76, "Exploded View".
2. Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

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



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace intake valve timing control solenoid valve. Refer to EM-76, "Exploded View".

P0014 EVT CONTROL

DTC Logic

INFOID:0000000012197755

DTC DETECTION LOGIC

NOTE:

- **If DTC P0014 is displayed with DTC P0078, first perform trouble diagnosis for DTC P0078. Refer to EC-214, "DTC Logic".**
- **If DTC P0014 is displayed with P1078, first perform trouble diagnosis for P1078. Refer to EC-430, "DTC Logic".**

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0014	EXH/V TIM CONT-B1 (Exhaust valve timing control performance)	There is a gap between angle of target and phase-control angle degree.	• Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Exhaust valve timing control position sensor • Exhaust valve control solenoid valve • Accumulation of debris to the signal pick-up portion of the camshaft • Timing chain installation • Foreign matter caught in the oil groove for exhaust valve timing control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

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

ENG SPEED	1,200 - 2,000 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	P or N position (CVT) Neutral position (M/T)

4. Let engine idle for 10 seconds.
5. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-200, "Diagnosis Procedure"

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT
1. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,700 - 2,950 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 70°C (158°F)
Selector lever	D position (CVT) 1st or 2nd position (M/T)
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:
Always drive at a safe speed.

3. Check 1st trip DTC.

With GST
Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-200, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197756

1.CHECK OIL PRESSURE WARNING LAMP

1. Start engine.
2. Check oil pressure warning lamp and confirm it is not illuminated.

Is oil pressure warning lamp illuminated?

YES >> Check the engine oil level. Refer to LU-9, "Inspection".
NO >> GO TO 2.

2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE

Check the exhaust valve timing control solenoid valve. Refer to EC-198, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-76, "Exploded View".

3.CHECK CRANKSHAFT POSITION SENSOR (POS)

Check the crankshaft position sensor (POS). Refer to EC-345, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace crankshaft position sensor (POS). Refer to EM-114, "Exploded View".

4.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR

Check the exhaust valve timing control position sensor. Refer to EC-348, "Component Inspection".

Is the inspection result normal?

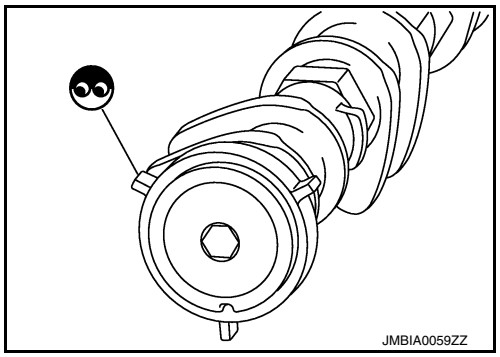
YES >> GO TO 5.
NO >> Replace exhaust valve timing control position sensor. Refer to EM-88, "Exploded View".

5.CHECK CAMSHAFT (EXH)

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-89, "Removal and Installation".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6. CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

YES >> Check timing chain installation. Refer to EM-77, "Removal and Installation".
NO >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to EM-92, "Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Clean lubrication line.

Component Inspection

INFOID:0000000012197757

1. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-I

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

Exhaust valve timing control solenoid valve		Resistance
+	–	
Terminal		
1	2	7.0 - 7.7 Ω [at 20°C (68°F)]
1	Ground	∞ Ω (Continuity should not exist)
2		

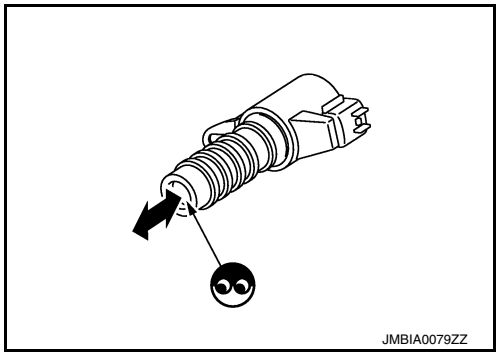
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-76, "Exploded View".

2. CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove exhaust valve timing control solenoid valve. Refer to EM-76, "Exploded View".
2. Provide 12 V DC between exhaust valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.

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

YES >> INSPECTION END

NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-76, "Exploded View".

P0030, P0031, P0032 A/F SENSOR 1 HEATER

DTC Logic

INFOID:0000000012197758

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0030	A/F SEN 1 HTR (B1) (Air fuel ratio (A/F) sensor 1 heater control circuit)	Deterioration in A/F sensor 1 heater performance. (Voltage signal transmitted from A/F sensor 1 heater to ECM is higher/lower than voltage in the normal range.)	• Harness or connectors (A/F sensor 1 heater circuit is open or shorted.) • A/F sensor 1 heater
P0031	A/F SEN 1 HTR (B1) (Air fuel ratio (A/F) sensor 1 heater control circuit low)	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)	
P0032	A/F SEN 1 HTR (B1) (Air fuel ratio (A/F) sensor 1 heater control circuit high)	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)	• Harness or connectors (A/F sensor 1 heater circuit is shorted.) • A/F sensor 1 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-203, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197759

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

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

+		–	Voltage
A/F sensor 1			
Connector	Terminal		
F70	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK A/F SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT

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

+		–		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F70	3	E18	125	Existed

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

Is the inspection result normal?

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

3.CHECK A/F SENSOR 1 HEATER

Check the A/F sensor 1 heater. Refer to EC-204, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 4.

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

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-44, "Exploded View".

CAUTION:

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

>> INSPECTION END

Component Inspection

INFOID:0000000012197760

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

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

A/F sensor 1		Resistance
+	–	
Terminal		
3	4	1.8 - 2.44 Ω [at 20°C (68°F)]
	1	∞ Ω (Continuity should not exist)
	2	
4	1	
	2	

Is the inspection result normal?

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

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

Replace air fuel ratio (A/F) sensor 1. Refer to EM-44, "Exploded View".

CAUTION:

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

>> INSPECTION END

P0037, P0038 HO2S2 HEATER

DTC Logic

INFOID:0000000012197761

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0037	HO2 HTR (B1) (Heated oxygen sensor 2 heater control circuit low)	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	• Harness or connectors (Heated oxygen sensor 2 heater circuit is open or shorted.) • Heated oxygen sensor 2 heater
P0038	HO2 HTR (B1) (Heated oxygen sensor 2 heater control circuit high)	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	• Harness or connectors (Heated oxygen sensor 2 heater circuit is shorted.) • Heated oxygen sensor 2 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

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

With GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:0000000012197762

1.CHECK HO2S2 POWER SUPPLY CIRCUIT

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

+		−	Voltage
HO2S2			
Connector	Terminal		
F69	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK HO2S2 OUTPUT SIGNAL CIRCUIT

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

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F69	3	E18	126	Existed

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

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK HEATED OXYGEN SENSOR 2 HEATER

Check the heated oxygen sensor 2 heater. Refer to EC-207, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 4.

4.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

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

>> INSPECTION END

Component Inspection

INFOID:0000000012197763

1.CHECK HEATED OXYGEN SENSOR 2 HEATER

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

+	–	Resistance
Heated oxygen sensor 2		
Terminal		
2	3	3.3 - 4.4 Ω [at 25°C (77°F)]
1	1	∞ Ω (Continuity should not exist)
	3	
	4	
4	1	
	2	
	3	

Is the inspection result normal?

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

2.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

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

>> INSPECTION END

P0045, P0047, P0048 TC BOOST CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000012197764

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0045	TC BOOST SOL/V (Turbocharger boost control solenoid valve circuit open)	ECM detected the turbocharger boost control solenoid valve circuit is open.	• Harness or connectors (Turbocharger boost control solenoid valve circuit is open or shorted.) • Turbocharger boost control solenoid valve
P0047	TC/SC BOOST CONT A (Turbocharger boost control solenoid valve circuit low input)	ECM detected the turbocharger boost control solenoid valve circuit is short to ground.	
P0048	TC/SC BOOST CONT A (Turbocharger boost control solenoid valve circuit high input)	ECM detected the turbocharger boost control solenoid valve circuit is short to power.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-209, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197765

1.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between turbocharger boost control solenoid valve harness connector and ground.

+		–	Voltage
Turbocharger boost control solenoid valve			
Connector	Terminal		
F54	2	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect IPDM E/R harness connector.
3. Check the continuity between turbocharger boost control solenoid valve harness connector and IPDM E/R harness connector.

+		–		Continuity
Turbocharger boost control solenoid valve		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F54	2	E14	36	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT

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

+		–		Continuity
Turbocharger boost control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F54	1	F26	73	Existed

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

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Check the turbocharger boost control solenoid valve. Refer to EC-210, "Component Inspection".

Is the inspection result normal?

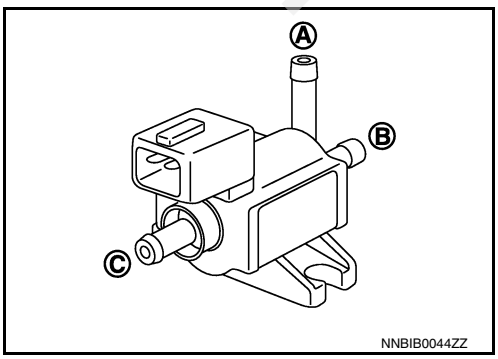
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace turbocharger boost control solenoid valve. Refer to EM-40, "Exploded View".

Component Inspection

INFOID:0000000012197766

1.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

1. Turn ignition switch OFF
2. Disconnect turbocharger boost control solenoid valve harness connector.
3. Disconnect hoses connected to turbocharger boost control solenoid valve.
4. Check air passage continuity of turbocharger boost control solenoid valve as per the following conditions.



Condition	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12 V direct current supply between terminals 1 and 2	Existed	Not existed
No supply	Not existed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace turbocharger boost control solenoid valve. Refer to EM-40, "Exploded View".

P0075 IVT CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000012197767

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name ((Trouble diagnosis content))	DTC detecting condition	Possible cause
P0075	INT/V TIM V/CIR-B1 (Intake valve timing control solenoid valve circuit)	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	• Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) • Intake valve timing control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-211, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197768

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake valve timing (IVT) control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake valve timing control solenoid valve harness connector and ground.

+		–	Voltage
IVT control solenoid valve			
Connector	Terminal		
F41	2	Ground	Battery voltage

Is the inspection result normal?

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

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

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

+		+		
IVT control solenoid valve		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F41	2	E14	36	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE GROUND CIRCUIT

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

+		+		
IVT control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F41	1	F26	81	Existed

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

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Check the intake valve timing control solenoid valve. Refer to EC-212, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace intake valve timing control solenoid valve.

Component Inspection

INFOID:0000000012197769

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

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

Intake valve timing control solenoid valve		Resistance
+	–	
Terminal		
1	2	6.7 - 7.7 Ω [at 20°C (68°F)]
1	Ground	∞ Ω (Continuity should not exist)
2		

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace intake valve timing control solenoid valve. Refer to EM-76, "Exploded View".

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve. Refer to EM-76, "Exploded View".

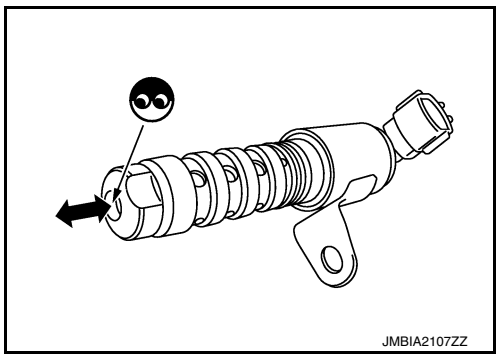
2. Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:

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

NOTE:

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



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake valve timing control solenoid valve. Refer to EM-76, "Exploded View".

P0078 EVT CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000012197770

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0078	EX V/T ACT/CIRC-B1 (Exhaust valve timing control solenoid valve circuit)	An improper voltage is sent to the ECM through exhaust valve timing control solenoid valve.	• Harness or connectors (Exhaust valve timing control solenoid valve circuit is open or shorted.) • Exhaust valve timing control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:0000000012197771

1.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect exhaust valve timing (EVT) control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust valve timing control solenoid valve harness connector and ground.

+		–	Voltage
EVT control solenoid valve			
Connector	Terminal		
F100	2	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between EVT control solenoid valve harness connector and IPDM E/R harness connector.

+		+		
EVT control solenoid valve		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F100	2	E14	36	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE GROUND CIRCUIT

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

+		+		
EVT control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F100	1	F26	85	Existed

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

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE

Check the exhaust valve timing control solenoid valve. Refer to EC-212, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace exhaust valve timing control solenoid valve.

Component Inspection

INFOID:0000000012197772

1.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-I

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

Exhaust valve timing control solenoid valve		Resistance
+	–	
Terminal		
1	2	7.0 - 7.7 Ω [at 20°C (68°F)]
1	Ground	∞ Ω (Continuity should not exist)
2		

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-76, "Exploded View".

2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove exhaust valve timing control solenoid valve. Refer to EM-76, "Exploded View".

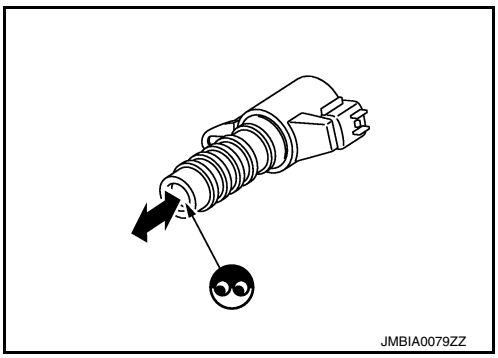
2. Provide 12 V DC between exhaust valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.

CAUTION:

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

NOTE:

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



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-76, "Exploded View".

P0087 FRP CONTROL SYSTEM

DTC Logic

INFOID:0000000012197773

DTC DETECTION LOGIC

NOTE:

- **If DTC P0087 is displayed with DTC P0090 and/or P1197, first perform the trouble diagnosis for DTC P0090 and/or P1197.**
- DTC P0087 may be displayed when running out of gas or air accumulation.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0087	LOW FUEL PRES (High fuel pressure too low)	• Fuel rail pressure does not reach 1.3 MPa (13 bar, 13.3 kg/cm2, 188.5 psi) at engine cold start [water temperature 5°C (41°F) – 40°C (104°F)]. • Fuel rail pressure remains at 8.5 MPa (85 bar, 86.7 kg/cm2, 1232.8 psi) or less for 1 second or more during engine idle condition after cold start [water temperature 5°C (41°F) – 40°C (104°F)]. • The following condition continues for 5 seconds or more after engine start (regardless of water temperature): Target fuel pressure – Actual fuel pressure ≥ 2.7 MPa (27 bar, 27.5 kg/cm2, 392 psi).	• Fuel system • Leakage in fuel line • High pressure fuel pump • Low pressure fuel pump • Damage in lifter

DTC CONFIRMATION PROCEDURE

1.CHECK FUEL LEAKAGE

1. Turn ignition switch ON.
2. Visually check the piping between low pressure fuel pump and fuel injectors for fuel leakage.
3. Start the engine.
4. Visually check the piping between low pressure fuel pump and fuel injectors for fuel leakage.

Is inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**
- **Before performing the following procedure, check that the fuel tank is 1/8 full of fuel.**

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-1

WITH CONSULT

1. Turn ignition switch ON.
2. Select “COOLAN TEMP/S” in “DATA MONITOR” mode of “ENGNE” using CONSULT.
3. Check the following condition;.

COOLAN TEMP/S	**: 5 – 40°C (41 – 104°F)**

WITH GST
Follow the above steps for “WITH CONSULT”.

Is the condition satisfied?

YES >> GO TO 4.
NO >> 1. Satisfy the condition.
2. Retry from step 1.

4.PERFORM DTC CONFIRMATION PROCEDURE-2

WITH CONSULT
1. Start the engine and let it idle for 10 seconds.
2. Check 1st trip DTC.

WITH GST
Follow the above steps for “WITH CONSULT”.

Is 1st trip DTC detected?

YES >> Proceed to EC-218, "Diagnosis Procedure".
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-3

WITH CONSULT
1. Select “COOLAN TEMP/S” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Maintain the following condition for 10 seconds or more at idle.

COOLAN TEMP/S	**: 70°C (104°F) or more**

3. Check 1st trip DTC.

WITH GST
Follow the above steps for “WITH CONSULT”.

Is 1st trip DTC detected?

YES >> Proceed to EC-218, "Diagnosis Procedure".
NO >> INSPECTION END.

Diagnosis Procedure

INFOID:0000000012197774

1.PERFORM THE HIGH PRESSURE FUEL PUMP COMPONENT INSPECTION

Perform the high pressure fuel pump component inspection. Refer to EC-218, "Component Inspection (High Pressure Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace high pressure fuel pump. EM-49, "Removal and Installation".

2.CHECK FUEL LEAKAGE

1. Start the engine.
2. Visually check that the fuel pump, fuel rail, and fuel piping have no fuel leakage.

Is the inspection result normal?

YES >> Check that the fuel system has no breakage, bend, and crush. Refer to FL-5, "Inspection".
NO >> Repair or Replace the error-detected parts.

Component Inspection (High Pressure Fuel Pump)

INFOID:0000000012197775

1.CHECK HIGH PRESSURE FUEL PUMP-1

1. Turn ignition switch OFF.
2. Disconnect high pressure fuel pump harness connector.
3. Check the resistance between high pressure fuel pump terminals.

+	–	Condition		Resistance (Approx.)
High pressure fuel pump Terminal				
1	2	Temperature °C (°F)	20 – 30 (68 - 86)	0.46 - 0.56 Ω

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace high pressure fuel pump. Refer to EM-49, "Removal and Installation".

2.CHECK HIGH PRESSURE FUEL PUMP-2

WITH CONSULT
1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check “FUEL PRES SEN V” in “DATA MONITOR” mode of “ECM” using CONSULT.

Monitor item	Condition	Voltage (Approx.)
FUEL PRES SEN V	Engine speed: idle	1,140 – 1,460 mV
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,140 – 3,060 mV

WITHOUT CONSULT
1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check FRP sensor signal voltage.

ECM			Condition	Value (Approx.)
Connector	+	–		
	Terminal			
F25	18	44	Engine speed: idle	1,140 – 1,460 mV
			Engine speed: Revving engine from idle to 4,000 rpm quickly	1,140 – 3,060 mV

YES >> INSPECTION END
NO >> Replace high pressure fuel pump. Refer to EM-49, "Removal and Installation".

P0088 FRP CONTROL SYSTEM

DTC Logic

INFOID:0000000012197776

DTC DETECTION LOGIC

NOTE:
If DTC P0088 is displayed with DTC P0090, first perform the trouble diagnosis for DTC P0090.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0088	HIGH FUEL PRES (High fuel pressure too high)	• Fuel rail pressure remains at more than 12.5 MPa (125 bar, 127.5 kg/cm2, 1812.5 psi) for 1 second or more during engine idle condition after cold start [water temperature 5°C (41°F) - 40°C (104°F)]. • The following condition continues for 5 seconds or more after engine start (regardless of water temperature): Actual fuel pressure − Target fuel pressure ≥ 2.7 MPa (27 bar, 27.5 kg/cm^2, 392 psi)	• Harness or connector (The high pressure fuel pump circuit is open or shorted) • High pressure fuel pump

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**
- **Before performing the following procedure, check that the fuel tank is 1/8 full of fuel.**

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Warm up the engine to the normal operating temperature and keep the engine speed at idle for 10 seconds.
   NOTE:
   Warm up the engine until “COOLANT TEMP/S” on “DATA MONITOR” mode of “ENGINE” using CONSULTIII reaches at least 70°C (158°F).
2. Check 1st trip DTC.

Is 1st trip DTC detected?

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

3.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Cool the engine until the engine coolant temperature reaches 60°C (140°F) or less.
2. Start the engine and wait at least 40 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:0000000012197777

1.PERFORM THE HIGH PRESSURE FUEL PUMP COMPONENT INSPECTION

Perform the high pressure fuel pump component inspection. Refer to EC-221, "Component Inspection (High Pressure Fuel Pump)".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace high pressure fuel pump. EM-49, "Removal and Installation".

2.CHECK FUEL LEAKAGE

1. Start the engine.
2. Visually check that the fuel pump, fuel rail, and fuel piping have no fuel leakage.

Is the inspection result normal?

YES >> Check that the fuel system has no breakage, bend, and crush. Refer to FL-5, "Inspection".
NO >> Repair or Replace the error-detected parts.

Component Inspection (High Pressure Fuel Pump)

INFOID:0000000012197778

1.CHECK HIGH PRESSURE FUEL PUMP-1

1. Turn ignition switch OFF.
2. Disconnect high pressure fuel pump harness connector.
3. Check the resistance between high pressure fuel pump terminals.

+	–	Condition		Resistance (Approx.)
High pressure fuel pump Terminal				
1	2	Temperature °C (°F)	20 – 30 (68 - 86)	0.46 - 0.56 Ω

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace high pressure fuel pump. Refer to EM-49, "Removal and Installation".

2.CHECK HIGH PRESSURE FUEL PUMP-2

WITH CONSULT

1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check “FUEL PRES SEN V” in “DATA MONITOR” mode of “ECM” using CONSULT.

Monitor item	Condition	Voltage (Approx.)
FUEL PRES SEN V	Engine speed: idle	1,140 – 1,460 mV
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,140 – 3,060 mV

WITHOUT CONSULT

1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check FRP sensor signal voltage.

ECM			Condition	Value (Approx.)
Connector	+	–		
	Terminal			
F25	18	44	Engine speed: idle	1,140 – 1,460 mV
			Engine speed: Revving engine from idle to 4,000 rpm quickly	1,140 – 3,060 mV

YES >> INSPECTION END
NO >> Replace high pressure fuel pump. Refer to EM-49, "Removal and Installation".

P0090 HIGH PRESSURE FUEL PUMP

DTC Logic

INFOID:0000000012197779

DTC DETECTION LOGIC

NOTE:
- If DTC P0090 is displayed with DTC P1197, first perform the trouble diagnosis for DTC P1197.
- DTC P0090 may be displayed when running out of gas.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0090	FUEL PUMP (High pressure fuel pump circuit)	• Fuel rail pressure remains at 1.1 MPa (11 bar, 11.2 kg/ cm^2, 159.5 psi) or less for 5 seconds or more during engine rev. • Fuel rail pressure remains at 18.5 MPa (185 bar, 188.7 kg/ cm^2, 2682.5 psi) or more for 0.3 seconds or more during engine rev.	• Harness or connectors (The fuel pump circuit is open or shorted.) • High pressure fuel pump

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**
- **Before performing the following procedure, check that the fuel tank is 1/8 full of fuel.**

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

WITH CONSULT
1. Start engine.
2. Select “COOLAN TEMP/S” in “DATA MONITOR” mode of “ENGNE” using CONSULT.
3. Maintain the following condition for 5 seconds or more at idle.

COOLAN TEMP/S	**: 70°C (104°F) or more**

4. Check 1st trip DTC.

WITH GST
Follow the above steps for “WITH CONSULT”.

Is 1st trip DTC detected?

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

Diagnosis Procedure

INFOID:0000000012197780

1.CHECK HIGH PRESSURE FUEL PUMP POWER SUPPLY

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

+		–	Voltage
ECM			
Connector	Terminal		
F26	54	Ground	Battery voltage

Is inspection result normal?

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

2.CHECK HIGH PRESSURE FUEL PUMP POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector relay harness connector.
4. Check the continuity between ECM harness connector and high pressure fuel pump relay harness connector.

+		–		Continuity
ECM		High pressure fuel pump relay		
Connector	Terminal	Connector	Terminal	
F26	54	E58	3	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts

3.CHECK HIGH PRESSURE FUEL PUMP RELAY POWER SUPPLY (CONTACT SIDE)

Check the voltage between high pressure fuel pump relay harness connector and ground.

+		–	Voltage
High pressure fuel pump relay			
Connector	Terminal		
E58	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform the trouble diagnosis for power supply circuit.

4.CHECK HIGH PRESSURE FUEL PUMP RELAY POWER SUPPLY (EXCITATION COIL SIDE)

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between high pressure fuel pump relay harness connector and ground.

+		–	Voltage
High pressure fuel pump relay			
Connector	Terminal		
E58	2	Ground	Battery voltage

Is the inspection result normal?

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

5.CHECK HIGH PRESSURE FUEL PUMP RELAY POWER SUPPLY CIRCUIT (EXCITATION COIL SIDE)

1. Turn ignition switch OFF.

2. Disconnect high pressure fuel pump relay harness connector.
3. Disconnect IPDM E/R harness connector.
4. check the continuity between ipdm e/r harness connector and high pressure fuel pump harness connector.

+		–		Continuity
IPDM E/R		High pressure fuel pump relay		
Connector	Terminal	Connector	Terminal	
E14	35	E58	2	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

6.CHECK HIGH PRESSURE FUEL PUMP RELAY GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect high pressure fuel pump relay harness connector.
3. Check the continuity between high pressure fuel pump relay harness connector and ground.

+		–	Continuity
High pressure fuel pump relay			
Connector	Terminal		
E58	1	Ground	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK HIGH PRESSURE FUEL PUMP RELAY

Check the high pressure fuel pump relay. Refer to EC-553, "Component Inspection (High Pressure Fuel Pump Relay)".

Is inspection result normal?

YES >> GO TO 8.
NO >> Replace high pressure fuel pump relay. Refer to PG-9, "Standardized Relay".

8.CHECK HIGH PRESSURE FUEL PUMP CIRCUIT

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

+		–		Continuity
ECM		High pressure fuel pump		
Connector	Terminal	Connector	Terminal	
F26	55	F53	1	Existed
	56		2	

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

Is inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9.CHECK HIGH PRESSURE FUEL PUMP

Check the high pressure fuel pump. Refer to EC-225, "Component Inspection (High Pressure Fuel Pump)".

Is inspection result normal?

YES >> GO TO 10.
NO >> Replace high pressure fuel pump. Refer to EM-49, "Exploded View".

10. CHECK HIGH PRESSURE FUEL PUMP INSTALLATION CONDITION

1. Turn ignition switch OFF.
2. Check that the high pressure fuel pump is installed with no backlash and looseness.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace error-detected parts.

11. CHECK CAMSHAFT

1. Remove camshaft. Refer to EM-88, "Exploded View".
2. Check camshaft. Refer to EM-92, "Inspection".

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace camshaft. Refer to EM-88, "Exploded View".

Component Inspection (High Pressure Fuel Pump)

INFOID:0000000012197781

1. CHECK HIGH PRESSURE FUEL PUMP-1

1. Turn ignition switch OFF.
2. Disconnect high pressure fuel pump harness connector.
3. Check the resistance between high pressure fuel pump terminals.

+	–	Condition		Resistance (Approx.)
High pressure fuel pump Terminal				
1	2	Temperature °C (°F)	20 – 30 (68 - 86)	0.46 - 0.56 Ω

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace high pressure fuel pump. Refer to EM-49, "Removal and Installation".

2. CHECK HIGH PRESSURE FUEL PUMP-2

WITH CONSULT

1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check “FUEL PRES SEN V” in “DATA MONITOR” mode of “ECM” using CONSULT.

Monitor item	Condition	Voltage (Approx.)
FUEL PRES SEN V	Engine speed: idle	1,140 – 1,460 mV
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,140 – 3,060 mV

WITHOUT CONSULT

1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check FRP sensor signal voltage.

ECM			Condition	Value (Approx.)
Connector	+	–		
	Terminal			
F25	18	44	Engine speed: idle	1,140 – 1,460 mV
			Engine speed: Revving engine from idle to 4,000 rpm quickly	1,140 – 3,060 mV

YES >> INSPECTION END
NO >> Replace high pressure fuel pump. Refer to EM-49, "Removal and Installation".

P0096 IAT SENSOR 2

DTC Logic

INFOID:0000000012197782

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0096	IAT SENSOR 2 B1 [Intake air temperature (IAT) sensor 2 circuit range/performance]	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor 1, IAT sensor 2, ECT sensor, FTT sensor, and EOT sensor) shows that the voltage signal of the IAT sensor 2 is higher/lower than that of other temperature sensors when the engine is started with its cold state.	• Harness or connectors (High or low resistance in the IAT sensor 2 circuit) • IAT sensor 2

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

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

2.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-228, "Component Function Check".

NOTE:
Use the component function check to check the overall function of the IAT sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

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

3.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- **Before performing the following procedure, do not add fuel.**
- **Before performing the following procedure, check that fuel level is between 1/4 and 4/4.**
- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 60 minutes.
2. Move the vehicle to a cool place.
   NOTE:
   Cool the vehicle in an environment of ambient air temperature between −10°C (14°F) and 35°C (95°F).
3. Turn ignition switch OFF and soak the vehicle for 12 hours.
   CAUTION:
   Never turn ignition switch ON during soaking.
   NOTE:
   The vehicle must be cooled with the hood open.
4. Start engine and let it idle for 5 minutes or more.
   CAUTION:
   Never turn ignition switch OFF during idling.

5. Check 1st trip DTC.

Is 1st trip DTC detected?

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

Component Function Check

INFOID:0000000012197783

1.CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR 2

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

Turbocharger boost sensor		Condition		Resistance (kΩ)
+	–			
Terminal				
3	4	Temperature [°C (°F)]	25 (77)	1.80 – 2.20

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Proceed to EC-228, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012197784

1.CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR 2

Check intake air temperature sensor 2. Refer to EC-228, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace turbocharger boost sensor (with intake temperature sensor 2). Refer to EM-32, "Exploded View".

Component Inspection

INFOID:0000000012197785

1.CHECK INTAKE AIR TEMPERATURE SENSOR 2

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

Turbocharger boost sensor		Condition		Resistance (kΩ)
+	–			
Terminals				
3	4	Temperature [°C (°F)]	25 (77)	1.80 – 2.20

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace turbocharger boost sensor (with intake air temperature sensor 2). Refer to EM-29, "Exploded View".

P0097, P0098 IAT SENSOR 2

DTC Logic

INFOID:0000000012197786

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0097	IAT SENSOR 2 B1 (Intake air temperature sensor 2 circuit low input)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the intake air temperature sensor 2 is 0.085 V or less.	• Harness or connectors (Intake air temperature sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Crankshaft position sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) • Intake air temperature sensor 2 • Turbocharger boost sensor • Fuel rail pressure sensor • Battery current sensor • G sensor • Crankshaft position sensor • Exhaust valve timing control position sensor • Accelerator pedal position sensor 2 • Engine oil pressure sensor
P0098	IAT SENSOR 2 B1 (Intake air temperature sensor 2 circuit high input)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the intake air temperature sensor 2 is 4.84 V or more.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-229, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197787

1.CHECK INTAKE AIR TEMPERATURE SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.

2. Disconnect turbocharger boost sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between turbocharger boost sensor harness connector terminals.

Turbocharger boost sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
F75	1	3	5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 4.

2.CHECK INTAKE AIR TEMPERATURE SENSOR 2 SIGNAL CIRCUIT

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

+		–		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
F75	4	F26	88	Existed

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

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK INTAKE AIR TEMPERATURE SENSOR 2

Check intake air temperature sensor 2. Refer to EC-231, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace turbocharger boost sensor (with intake air temperature sensor 2). Refer to EM-29, "Exploded View".

4.CHECK INTAKE AIR TEMPERATURE SENSOR 2 POWER SUPPLY CIRCUIT-II

Check the voltage between turbocharger boost sensor harness connector terminal and ground.

+		–	Voltage (Approx.)
Turbocharger boost sensor			
Connector	Terminal		
F75	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 7.

5.CHECK INTAKE AIR TEMPERATURE SENSOR 2 GROUND CIRCUIT

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

+		–		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
F75	3	F25	44	Existed

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
F25	1	Ground	Existed
	2		
E18	123		
	124		
	127		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

7.CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors and each sensor harness connectors
3. Check harness connector for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F25	39	FRP sensor	F5	1
		EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
F26	68	Battery current sensor	F52	1
		G sensor	B32	3
	72	CMP sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

Component Inspection

INFOID:0000000012197788

1.CHECK INTAKE AIR TEMPERATURE SENSOR 2

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

Turbocharger boost sensor		Condition		Resistance (kΩ)
+	–			
Terminals				
3	4	Temperature [°C (°F)]	25 (77)	1.80 – 2.20

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger boost sensor (with intake air temperature sensor 2). Refer to EM-29, "Exploded View".

P0101 MAF SENSOR

DTC Logic

INFOID:0000000012197789

DTC DETECTION LOGIC

NOTE:
If DTC P0101 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0101	MAF SEN/CIRCUIT-B1 [Mass air flow (MAF) sensor circuit range/performance]	• A high voltage from the sensor is sent to ECM under light load driving condition. • A low voltage from the sensor is sent to ECM under heavy load driving condition.	• Harness or connectors (MAF sensor circuit is open or shorted.) • Intake air leaks • MAF sensor • EVAP control system pressure sensor • Intake air temperature sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle for at least 5 seconds under the following conditions:
CAUTION:
Always drive vehicle at safe speed.

Selector lever	Suitable position
Vehicle speed	40 km/h (25 MPH) or more

NOTE:
- The gear must be fixed while driving the vehicle.
- Keep the accelerator pedal as steady as possible during cruising.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-233, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197790

1.CHECK INTAKE SYSTEM

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Reconnect the parts.

2.CHECK MASS AIR FLOW (MAF) SENSOR POWER SUPPLY

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

+		−	Voltage
MAF sensor			
Connector	Terminal		
F4	5	Ground	Battery voltage

Is the inspection result normal?

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

3.CHECK MASS AIR FLOW (MAF) SENSOR POWER SUPPLY CIRCUIT

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

+		−		Continuity
MAF sensor		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F4	5	E14	35	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK MAF SENSOR GROUND CIRCUIT

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

+		−		Continuity
MAF sensor		ECM		
Connector	Terminal	Connector	Terminal	
F4	4	F25	9	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK MAF SENSOR INPUT SIGNAL CIRCUIT

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

+		−		Continuity
MAF sensor		ECM		
Connector	Terminal	Connector	Terminal	
F4	3	F25	13	Existed

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts

6.CHECK INTAKE AIR TEMPERATURE SENSOR 1

Check the intake air temperature sensor 1. Refer to EC-246, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace MAF sensor (with intake air temperature sensor 1). Refer to EM-27, "Exploded View".

7.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to EC-379, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Exploded View".

8.CHECK MAF SENSOR

Check the MAF sensor. Refer to EC-235, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace MAF sensor. Refer to EM-27, "Exploded View".

Component Inspection

INFOID:0000000012197791

1.CHECK MASS AIR FLOW SENSOR-I

With CONSULT

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

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.0 V
	Idle to about 4,000 rpm	0.9 - 1.2 V to Approx. 2.4 V*

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

Without CONSULT

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	13	9	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.0 V
			Idle to about 4,000 rpm	0.9 - 1.2 V to Approx. 2.4 V*

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

Is the inspection result normal?

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

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

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

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

Is the inspection result normal?

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

3.CHECK MASS AIR FLOW SENSOR-II

With CONSULT

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

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.0 V
	Idle to about 4,000 rpm	0.9 - 1.2 V to Approx. 2.4 V*

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

Without CONSULT

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Check the voltage between ECM harness connector and ground.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	13	9	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.0 V
			Idle to about 4,000 rpm	0.9 - 1.2 V to Approx. 2.4 V*

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

Is the inspection result normal?

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

4.CHECK MASS AIR FLOW SENSOR-III

With CONSULT

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

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.0 V
	Idle to about 4,000 rpm	0.9 - 1.2 V to Approx. 2.4 V*

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

⊗Without CONSULT

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector and ground.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	13	9	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.0 V
			Idle to about 4,000 rpm	0.9 - 1.2 V to Approx. 2.4 V*

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Clean or replace mass air flow sensor. Refer to EM-27, "Exploded View".

P0102, P0103 MAF SENSOR

DTC Logic

INFOID:0000000012197792

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0102	MAF SEN/CIRCUIT-B1 (Mass air flow sensor circuit low input)	An excessively low voltage from the mass air flow sensor is sent to ECM.	• Harness or connectors (Mass air flow sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
P0103	MAF SEN/CIRCUIT-B1 (Mass air flow sensor circuit high input)	An excessively high voltage from the mass air flow sensor is sent to ECM.	• Harness or connectors (Mass air flow sensor circuit is open or shorted.) • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

Which DTC is detected?

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

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

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

Is DTC detected?

YES >> Proceed to EC-238, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-I

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

Is DTC detected?

YES >> Proceed to EC-238, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-II

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

Is DTC detected?

YES >> Proceed to EC-238, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197793

1.INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

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

2.CHECK INTAKE SYSTEM

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

Is the inspection result normal?

YES >> GO TO 3.
NO >> Reconnect the parts. Refer to EM-27, "Exploded View".

3.CHECK MAF SENSOR POWER SUPPLY

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

+		–	Voltage
MAF sensor			
Connector	Terminal		
F4	5	Ground	Battery voltage

Is the inspection result normal?

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

4.CHECK MAF SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
MAF sensor		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F4	5	E14	35	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

5.CHECK MAF SENSOR GROUND CIRCUIT

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

+		–		Continuity
MAF sensor		ECM		
Connector	Terminal	Connector	Terminal	
F4	4	F25	9	Existed

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK MAF SENSOR INPUT SIGNAL CIRCUIT

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

+		–		Continuity
MAF sensor		ECM		
Connector	Terminal	Connector	Terminal	
F4	3	F25	13	Existed

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

Is the inspection result normal?

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

7.CHECK MAF SENSOR

Check the MAF sensor. Refer to EC-235, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace mass air flow sensor. Refer to EM-27, "Exploded View".

Component Inspection

INFOID:0000000012197794

1.CHECK MASS AIR FLOW SENSOR-I

With CONSULT

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

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.0 V
	Idle to about 4,000 rpm	0.9 - 1.2 V to Approx. 2.4 V*

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

Without CONSULT

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	13	9	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.0 V
			Idle to about 4,000 rpm	0.9 - 1.2 V to Approx. 2.4 V*

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

Is the inspection result normal?

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

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

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

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

Is the inspection result normal?

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

3.CHECK MASS AIR FLOW SENSOR-II

With CONSULT

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

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.0 V
	Idle to about 4,000 rpm	0.9 - 1.2 V to Approx. 2.4 V*

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

Without CONSULT

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Check the voltage between ECM harness connector and ground.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	13	9	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.0 V
			Idle to about 4,000 rpm	0.9 - 1.2 V to Approx. 2.4 V*

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

Is the inspection result normal?

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

4.CHECK MASS AIR FLOW SENSOR-III

With CONSULT

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.

3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select “DATA MONITOR” mode of “ENGINE”.
5. Select “MAS A/F SE-B1” and check indication.

Monitor item	Condition	MAS A/F SE-B1
MAS A/F SE-B1	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
	Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2 V
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.0 V
	Idle to about 4,000 rpm	0.9 - 1.2 V to Approx. 2.4 V*

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

⊗Without CONSULT
1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Check the voltage between ECM harness connector and ground.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	13	9	Ignition switch ON (Engine stopped.)	Approx. 0.4 V
			Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2 V
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 2.0 V
			Idle to about 4,000 rpm	0.9 - 1.2 V to Approx. 2.4 V*

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Clean or replace mass air flow sensor. Refer to EM-27, "Exploded View".

P0111 IAT SENSOR 1

DTC Logic

INFOID:0000000012197795

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0111	IAT SENSOR 1 B1 [Intake air temperature (IAT) sensor 1 circuit range/performance]	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor 1, IAT sensor 2, ECT sensor, FTT sensor, and EOT sensor) shows that the voltage signal of the IAT sensor 1 is higher/lower than that of other temperature sensors when the engine is started with its cold state.	• Harness or connectors (High or low resistance in the IAT sensor 1 circuit) • IAT sensor 1

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

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

2.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-244, "Component Function Check".

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-244, "Diagnosis Procedure".

3.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- **Before performing the following procedure, do not add fuel.**
- **Before performing the following procedure, check that fuel level is between 1/4 and 4/4.**
- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 60 minutes.
2. Move the vehicle to a cool place.
   NOTE:
   Cool the vehicle in an environment of ambient air temperature between −10°C (14°F) and 35°C (95°F).
3. Turn ignition switch OFF and soak the vehicle for 12 hours.
   CAUTION:
   Never turn ignition switch ON during soaking.
   NOTE:
   The vehicle must be cooled with the hood open.
4. Start engine and let it idle for 5 minutes or more.
   CAUTION:
   Never turn ignition switch OFF during idling.

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-244, "Diagnosis Procedure".
NO >> INSPECTION END

Component Function Check

INFOID:0000000012197796

1.CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR 1

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

Mass air flow sensor		Condition		Resistance (kΩ)
+	–			
Terminal				
1	2	Temperature [°C (°F)]	25 (77)	1.800 – 2.200

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Proceed to EC-244, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012197797

1.CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR 1

Check intake air temperature sensor 1. Refer toEC-244, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace mass air flow sensor (with intake air temperature sensor 1). Refer to EM-27, "Exploded View".

Component Inspection

INFOID:0000000012197798

1.CHECK INTAKE AIR TEMPERATURE SENSOR 1

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.

Mass air flow sensor		Condition		Resistance (kΩ)
+	–			
Terminals				
1	2	Temperature [°C (°F)]	25 (77)	1.800 - 2.200

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace mass air flow sensor (with intake air temperature sensor 1). Refer to EM-27, "Exploded View".

P0112, P0113 IAT SENSOR 1

DTC Logic

INFOID:0000000012197799

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0112	IAT SEN/CIRCUIT- B1 (Intake air temperature sensor 1 circuit low input)	An excessively low voltage from the intake air temperature sensor 1 is sent to ECM.	• Harness or connectors (Intake air temperature sensor 1 circuit is open or shorted.) • Intake air temperature sensor 1
P0113	IAT SEN/CIRCUIT- B1 (Intake air temperature sensor 1 circuit high input)	An excessively high voltage from the intake air temperature sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-245, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197800

1.CHECK INTAKE AIR TEMPERATURE SENSOR 1 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor (with intake air temperature sensor 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between mass air flow sensor harness connector and ground.

+		−	Voltage (Approx.)
MAF sensor			
Connector	Terminal		
F4	2	Ground	5 V

Is the inspection result normal?

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

2.CHECK INTAKE AIR TEMPERATURE SENSOR 1 POWER SUPPLY CIRCUIT

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

+		–		Continuity
MAF sensor		ECM		
Connector	Terminal	Connector	Terminal	
F4	2	F25	17	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK INTAKE AIR TEMPERATURE SENSOR 1 GROUND CIRCUIT

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

+		–		Continuity
MAF sensor		ECM		
Connector	Terminal	Connector	Terminal	
F4	1	F25	9	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK INTAKE AIR TEMPERATURE SENSOR 1

Check the intake air temperature sensor 1. Refer to EC-246, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace mass air flow sensor (with intake air temperature sensor 1). Refer to EM-27, "Exploded View".

Component Inspection

INFOID:0000000012197801

1.CHECK INTAKE AIR TEMPERATURE SENSOR 1

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.

Mass air flow sensor		Condition		Resistance (kΩ)
+	–			
Terminals				
1	2	Temperature [°C (°F)]	25 (77)	1.800 - 2.200

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace mass air flow sensor (with intake air temperature sensor 1). Refer to EM-27, "Exploded View".

P0116 ECT SENSOR

DTC Logic

INFOID:0000000012197802

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0116	ECT SEN/CIRC [Engine coolant temperature (ECT) sensor circuit range/performance]	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor 1, IAT sensor 2, ECT sensor, FTT sensor, and EOT sensor) shows that the voltage signal of the ECT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	• Harness or connectors (High or low resistance in the ECT sensor circuit) • ECT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

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

2.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-248, "Component Function Check".

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-248, "Diagnosis Procedure".

3.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- **Before performing the following procedure, do not add fuel.**
- **Before performing the following procedure, check that fuel level is between 1/4 and 4/4.**
- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 60 minutes.
2. Move the vehicle to a cool place.
   NOTE:
   Cool the vehicle in an environment of ambient air temperature between −10°C (14°F) and 35°C (95°F).
3. Turn ignition switch OFF and soak the vehicle for 12 hours.
   CAUTION:
   Never turn ignition switch ON during soaking.
   NOTE:
   The vehicle must be cooled with the hood open.
4. Start engine and let it idle for 20 minutes or more.
   CAUTION:
   Never turn ignition switch OFF during idling.

5. Check 1st trip DTC.

Is 1st trip DTC detected?

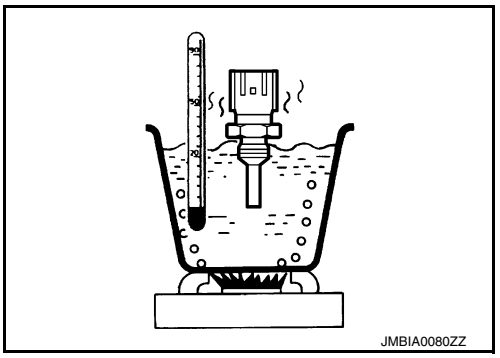
YES >> Proceed to EC-248, "Diagnosis Procedure".
NO >> INSPECTION END

Component Function Check

INFOID:0000000012197803

1.CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

1. Turn ignition switch OFF.
2. Disconnect ECT sensor harness connector.
3. Remove ECT sensor. Refer to CO-25, "Exploded View".
4. Check resistance between ECT sensor terminals by heating with hot water as shown in the figure.



ECT sensor		Condition		Resistance (kΩ)
+	–			
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.37 – 2.63
			50 (122)	0.68 – 1.00
			90 (194)	0.236 – 0.260

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Proceed to EC-248, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012197804

1.CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

Check ECT sensor. Refer to EC-248, "Component Inspection".

Is the inspection result normal?

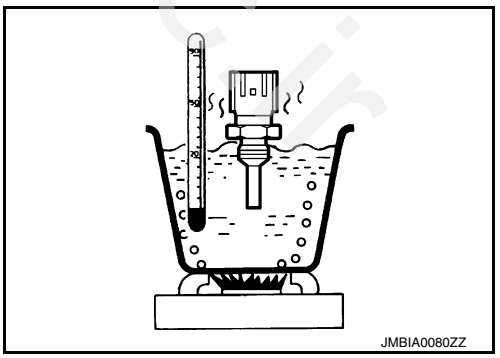
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace ECT sensor. Refer to CO-25, "Exploded View".

Component Inspection

INFOID:0000000012197805

1.CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

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



ECT sensor		Condition		Resistance (kΩ)
+	–			
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63
			50 (122)	0.68 - 1.00
			90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor. Refer to EM-100, "Exploded View".

P0117, P0118 ECT SENSOR

DTC Logic

INFOID:0000000012197806

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0117	ECT SEN/CIRC (Engine coolant temperature sensor circuit low input)	An excessively low voltage from the engine coolant temperature sensor is sent to ECM.	• Harness or connectors (Engine coolant temperature sensor circuit is open or shorted.) • Engine coolant temperature sensor
P0118	ECT SEN/CIRC (Engine coolant temperature sensor circuit high input)	An excessively high voltage from the engine coolant temperature sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to EC-249, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197807

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR POWER SUPPLY

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

+		−	Voltage (Approx.)
ECT sensor			
Connector	Terminal		
F28	1	Ground	5 V

Is the inspection result normal?

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

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
ECT sensor		ECM		
Connector	Terminal	Connector	Terminal	
F28	1	F25	14	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK ENGINE COOLANT TEMPERATURE SENSOR GROUND CIRCUIT

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

+		–		Continuity
ECT sensor		ECM		
Connector	Terminal	Connector	Terminal	
F28	2	F25	10	Existed

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

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check the engine coolant temperature sensor. Refer to EC-248, "Component Inspection".

Is the inspection result normal?

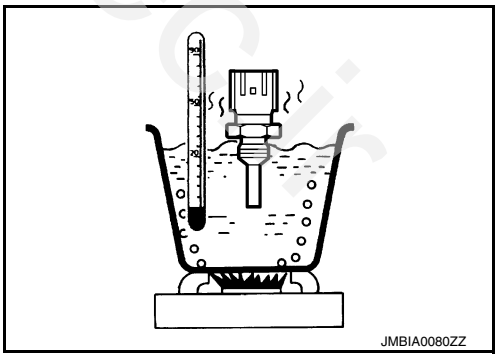
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace engine coolant temperature sensor. Refer to EM-100, "Exploded View".

Component Inspection

INFOID:0000000012197808

1.CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

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



ECT sensor		Condition		Resistance (kΩ)
+	–			
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63
			50 (122)	0.68 - 1.00
			90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor. Refer to EM-100, "Exploded View".

P011C IAT SENSOR

DTC Logic

INFOID:0000000012197809

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P011C	CAT/IAT CRRLTN B1 (Charge air temperature/Intake air temperature correlation)	• ECM detects a state that the temperature difference between intake air temperature sensor 1 and 2 remains 20°C (36°F) or less continuously for 5 seconds or more. • ECM detects a state that the difference between the temperature of intake air temperature sensor 2 and its estimated temperature calculated by ECM from intake air temperature 1 and turbocharger boost sensor remains 106°C (191°F) or more continuously for 5 seconds or more.	• Harness or connectors (High or low resistance in the intake air temperature sensor 1 circuit) (High or low resistance in the intake air temperature sensor 2 circuit) • Intake air temperature sensor 1 • Intake air temperature sensor 2

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-251, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197810

1.CHECK INTAKE AIR TEMPERATURE SENSOR 2

Check intake air temperature sensor 2. Refer to EC-252, "Component Inspection (Intake Air Temperature Sensor 2)".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace turbocharger boost sensor (with intake air temperature sensor 2). Refer to EM-32, "Exploded View".

2.CHECK INTAKE AIR TEMPERATURE SENSOR 1

Check intake air temperature sensor 1. Refer to EC-252, "Component Inspection (Intake Air Temperature Sensor 1)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace mass air flow sensor (with intake air temperature sensor 1). Refer to EM-27, "Exploded View".

Component Inspection (Intake Air Temperature Sensor 1)

INFOID:0000000012197811

1.CHECK INTAKE AIR TEMPERATURE SENSOR 1

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

Mass air flow sensor 1		Condition		Resistance (kΩ)
+	–			
Terminal				
1	2	Temperature [°C (°F)]	25 (77)	1.80 – 2.20

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace mass air flow sensor (with intake air temperature sensor 1). Refer to EM-27, "Exploded View".

Component Inspection (Intake Air Temperature Sensor 2)

INFOID:0000000012197812

1.CHECK INTAKE AIR TEMPERATURE SENSOR 2

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

Turbocharger boost sensor		Condition		Resistance (kΩ)
+	–			
Terminal				
3	4	Temperature [°C (°F)]	25 (77)	1.80 – 2.20

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace turbocharger boost sensor (with intake air temperature sensor 2). Refer to EM-32, "Exploded View".

P0122, P0123 TP SENSOR

DTC Logic

INFOID:0000000012197813

DTC DETECTION LOGIC

NOTE:
If DTC P0122 or P0123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.
Refer to EC-424, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0122	TP SEN 2/CIRC-B1 (Throttle position sensor 2 circuit low input)	An excessively low voltage from the TP sensor 2 is sent to ECM.	• Harness or connectors (TP sensor 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 2)
P0123	TP SEN 2/CIRC-B1 (Throttle position sensor 2 circuit high input)	An excessively high voltage from the TP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to EC-253, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197814

1.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY

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

+		–	Voltage (Approx.)
Electric throttle control actuator			
Connector	Terminal		
F29	1	Ground	5 V

Is the inspection result normal?

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

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

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

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	1	F26	62	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT

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

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	4	F26	74	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT

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

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	3	F26	76	Existed

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

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK THROTTLE POSITION SENSOR

Check the throttle position sensor. Refer to EC-254, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace electric throttle control actuator. Refer to EM-29, "Exploded View".

Component Inspection

INFOID:0000000012197815

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform " Throttle Valve Closed Position Learning". Refer to EC-161, "Description".
4. Turn ignition switch ON.
5. Set selector lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition		Voltage
Connector	+	–			
	Terminal				
F26	75	74	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	76			Fully released	Less than 4.75V
				Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace electric throttle control actuator. Refer to EM-29, "Exploded View".

P0125 ECT SENSOR

DTC Logic

INFOID:0000000012197816

DTC DETECTION LOGIC

NOTE:

- **If DTC P0125 is displayed with P0116, first perform the trouble diagnosis for DTC P0116. Refer to EC-247, "DTC Logic".**
- **If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to EC-249, "DTC Logic".**

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check that “COOLAN TEMP/S” is above 10°C (50°F).

With GST

Follow the procedure “With CONSULT” above.

Is it above 5°C (41°F)?

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

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

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

If “COOLAN TEMP/S” indication increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.

CAUTION:

Be careful not to overheat engine.

With GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-257, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197817

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check the engine coolant temperature sensor. Refer to EC-257, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine coolant temperature sensor. Refer to CO-25, "Exploded View".

2.CHECK THERMOSTAT OPERATION

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

Is the inspection result normal?

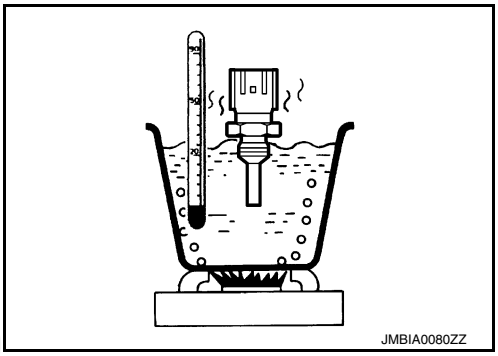
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace thermostat. Refer to CO-23, "Removal and Installation".

Component Inspection

INFOID:0000000012197818

1.CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR

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



ECT sensor		Condition		Resistance (kΩ)
+	–			
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63
			50 (122)	0.68 - 1.00
			90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor. Refer to EM-100, "Exploded View".

P0127 IAT SENSOR

DTC Logic

INFOID:0000000012197819

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0127	IAT SENSOR-B1 (Intake air temperature too high)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	• Harness or connectors (Intake air temperature sensor 1 circuit is open or shorted) • Intake air temperature sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Wait until engine coolant temperature is less than 96°C (205°F)

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

NOTE:

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

2. Turn ignition switch ON.
3. Select “DATA MONITOR” mode of “ENGINE” using CONSULT
4. Start engine.
5. Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.

CAUTION:

Always drive vehicle at a safe speed.

6. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-258, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197820

1.CHECK INTAKE AIR TEMPERATURE SENSOR 1

Check the intake air temperature sensor 1. Refer to EC-259, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".

NO >> Replace mass air flow sensor (with intake air temperature sensor 1). Refer to EM-27, "Exploded View".

Component Inspection

INFOID:0000000012197821

1. CHECK INTAKE AIR TEMPERATURE SENSOR 1

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.

Mass air flow sensor		Condition		Resistance (kΩ)
+	–			
Terminals				
1	2	Temperature [°C (°F)]	25 (77)	1.800 - 2.200

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace mass air flow sensor (with intake air temperature sensor 1). Refer to EM-27, "Exploded View".

P0128 THERMOSTAT FUNCTION

DTC Logic

INFOID:0000000012197822

DTC DETECTION LOGIC

NOTE:

If DTC P0128 is displayed with DTC P0300, P0301, P0302, P0303 or P0304, first perform the trouble diagnosis for P0300, P0301, P0302, P0303, P0304. Refer to EC-335, "DTC Logic".

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough.

This is due to a leak in the seal or the thermostat being stuck open.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0128	THERMSTAT FNCTN [Coolant thermostat (coolant temperature below thermostat regulating temperature)]	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	• Thermostat • Leakage from sealing portion of thermostat • Engine coolant temperature sensor

DTC CONFIRMATION PROCEDURE

NOTE:

Never refuel before and during the following procedure.

1.PRECONDITIONING-I

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PRECONDITIONING-II

With CONSULT

1. Turn ignition switch ON.
2. Check the following conditions:

Ambient temperature	−10°C (14°F) or more
A/C switch	OFF
Blower fan switch	OFF

3. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
4. Check the following conditions:

COOLAN TEMP/S	−10°C – 52°C (14 – 126°F)

Is the condition satisfied?

YES >> GO TO 3.

NO >> 1. Satisfy the condition.
2. GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Start engine.
2. Drive the vehicle until the following condition is satisfied.

CAUTION:

Always drive vehicle at safe speed.

- **STEP 1**

Drive the vehicle under the conditions instructed below until the difference between “COOLAN TEMP/S” and “FUEL T/TMP SE” becomes at least 23°C (41°F).

COOLAN TEMP/S	65°C (149°F) or less
FUEL T/TMP SE	Less than the value calculated by subtracting 23°C (41°F) from “COOLAN TEMP/S”.*

*: Example

COOLAN TEMP/S	FUEL T/TMP SE
70°C (158°F)	47°C (117°F) or less
65°C (149°F)	42°C (108°F) or less
60°C (140°F)	37°C (99°F) or less

- **STEP 2**

Drive the vehicle at 50 km/h (32 MPH) or more with the difference between “COOLAN TEMP/S” and “FUEL T/TMP SE” maintained at 23°C (41°F) or more.

NOTE:

Keep the accelerator pedal as steady as possible during cruising.

- **STEP 3**

Drive the vehicle at 50 km/h (32 MPH) or more until “COOLAN TEMP/S” increases by 6°C (11°F).

NOTE:

Keep the accelerator pedal as steady as possible during cruising.

Is the condition satisfied?

YES >> GO TO 4.
NO >> GO TO 1.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT

1. Drive the vehicle until the following condition is satisfied.

COOLAN TEMP/S	65°C (149°F) or more

CAUTION:

Always drive vehicle at safe speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-261, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197823

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR

Check the engine coolant temperature sensor. Refer to EC-261, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine coolant temperature sensor. Refer to CO-25, "Exploded View".

2.CHECK THERMOSTAT

Check the thermostat. Refer to CO-24, "Inspection".

Is the inspection result normal?

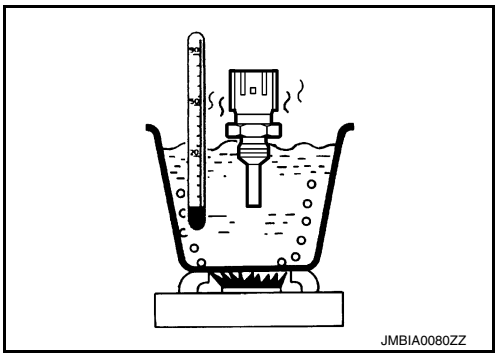
YES >> INSPECTION END
NO >> Replace thermostat. Refer to CO-23, "Removal and Installation".

Component Inspection

INFOID:0000000012197824

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.



Engine coolant temperature sensor		Condition		Resistance (kΩ)
+	–			
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63
			50 (122)	0.68 - 1.00
			90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor. Refer to CO-25, "Exploded View".

P0130 A/F SENSOR 1

DTC Logic

INFOID:0000000012197825

DTC DETECTION LOGIC

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

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition		Possible Cause
P0130	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 circuit]	A)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in the range other than approx. 2.2 V.	• Harness or connectors (A/F sensor 1 circuit is open or shorted.) • A/F sensor 1
		B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

With CONSULT

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

Is 1st trip DTC detected?

YES >> Proceed to EC-264, "Diagnosis Procedure".
NO-1 >> With CONSULT: GO TO 3.
NO-2 >> Without CONSULT: GO TO 7.

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

1. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Check “A/F SEN1 (B1)” indication.

Does the indication fluctuates around 2.2 V?

YES >> GO TO 4.
NO >> Proceed to EC-264, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-I

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

ENG SPEED	1,150 - 3,200 rpm
VHCL SPEED SE	More than 64 km/h (40 mph)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	D position (CVT) 5th position (M/T)

If "TESTING" is not displayed after 20 seconds, retry from step 2.

CAUTION:

Always drive vehicle at a safe speed.

Is "TESTING" displayed on CONSULT screen?

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

5.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-II

Release accelerator pedal fully.

NOTE:

Never apply brake during releasing the accelerator pedal.

Which does "TESTING" change to?

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

6.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-III

Touch "SELF-DIAG RESULT"

Which is displayed on CONSULT screen?

YES >> INSPECTION END
NO >> Proceed to EC-264, "Diagnosis Procedure".

7.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform Component Function Check. Refer to EC-264, "Component Function Check".

NOTE:

Use component function check to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-264, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012197826

1.PERFORM COMPONENT FUNCTION CHECK

With GST

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
3. Shift the selector lever to the D position (CVT) or 5th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (31 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
   NOTE:
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 for five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 for five times.
8. Stop the vehicle.
9. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-264, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197827

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

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

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

+		–	Voltage
A/F sensor 1			
Connector	Terminal		
F70	4	Ground	Battery voltage

Is the inspection result normal?

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

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

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

+		–		Continuity
A/F sensor 1		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F70	4	E14	36	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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

+		–		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F70	1	F25	21	Existed
	2		25	

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

+		–	Continuity
A/F sensor 1			
Connector	Terminal		
F70	1	Ground	Not existed
	2		

+		–	Continuity
ECM			
Connector	Terminal		
F25	21	Ground	Not existed
	25		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK INTERMITTENT INCIDENT

Perform GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

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

Replace air fuel ratio (A/F) sensor 1. Refer to EM-44, "Exploded View".

CAUTION:

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

>> INSPECTION END

P0131 A/F SENSOR 1

DTC Logic

INFOID:0000000012197828

DTC DETECTION LOGIC

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

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0131	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 circuit low voltage]	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0 V.	• Harness or connectors (A/F sensor 1 circuit is open or shorted.) • A/F sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2.CHECK A/F SENSOR FUNCTION

With CONSULT

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

With GST

Follow the procedure “With CONSULT” above.

Is the indication constantly approx. 0 V?

YES >> Proceed to EC-268, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

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

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

NOTE:

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

4. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-268, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197829

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

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor 1 harness connector and ground.

+		–	Voltage
A/F sensor 1			
Connector	Terminal		
F70	4	Ground	Battery voltage

Is the inspection result normal?

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

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

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

+		–		Continuity
A/F sensor 1		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F70	4	E14	36	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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

+		–		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F70	1	F25	21	Existed
	2		25	

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

+		–	Continuity
A/F sensor 1			
Connector	Terminal		
F70	1	Ground	Not existed
	2		

+		–	Continuity
ECM			
Connector	Terminal		
F25	21	Ground	Not existed
	25		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK INTERMITTENT INCIDENT

Perform GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

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

Replace air fuel ratio (A/F) sensor 1. Refer to EM-44, "Exploded View".

CAUTION:

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

>> INSPECTION END

P0132 A/F SENSOR 1

DTC Logic

INFOID:0000000012197830

DTC DETECTION LOGIC

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

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0132	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 circuit high voltage]	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5 V.	• Harness or connectors (A/F sensor 1 circuit is open or shorted.) • A/F sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2.CHECK A/F SENSOR FUNCTION

With CONSULT

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

With GST

Follow the procedure “With CONSULT” above.

Is the indication constantly approx. 5 V?

YES >> Proceed to EC-271, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

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

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

NOTE:

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

4. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC is detected?

YES >> Proceed to EC-271, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197831

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

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor 1 harness connector and ground.

+		–	Voltage
A/F sensor 1			
Connector	Terminal		
F70	4	Ground	Battery voltage

Is the inspection result normal?

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

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

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

+		–		Continuity
A/F sensor 1		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F70	4	E14	36	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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

+		–		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F70	1	F25	21	Existed
	2		25	

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

+		–	Continuity
A/F sensor 1			
Connector	Terminal		
F70	1	Ground	Not existed
	2		

+		–	Continuity
ECM			
Connector	Terminal		
F25	21	Ground	Not existed
	25		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK INTERMITTENT INCIDENT

Perform GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

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

Replace air fuel ratio (A/F) sensor 1. Refer to EM-44, "Exploded View".

CAUTION:

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

>> INSPECTION END

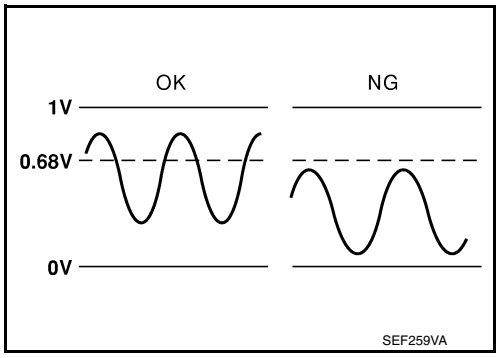
P0137 HO2S2

DTC Logic

INFOID:0000000012197832

DTC DETECTION LOGIC

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



DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0137	HO2S2 (B1) (Heated oxygen sensor 2 circuit low voltage)	The maximum voltage from the heated oxygen sensor 2 is not reached to the specified voltage.	• Harness or connectors (Heated oxygen sensor 2 circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

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

2.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
7. Open engine hood.
8. Select "HO2S2 (B1) P1147" of "HO2S2" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT.

9. Follow the instruction of CONSULT.
NOTE:
It will take at most 10 minutes until “COMPLETED” is displayed.
10. Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT screen?

OK >> INSPECTION END
NG >> Proceed to EC-275, "Diagnosis Procedure".
CAN NOT BE DIAGNOSED>>GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

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

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-274, "Component Function Check".
NOTE:
Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-275, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012197833

1.PERFORM COMPONENT FUNCTION CHECK-I

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	29	33	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

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

2.PERFORM COMPONENT FUNCTION CHECK-II

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	29	33	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

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

3.PERFORM COMPONENT FUNCTION CHECK-III

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	29	33	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-275, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012197834

1.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-165, "Description".
2. Run engine for at least 10 minutes at idle speed.

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

YES >> Perform trouble diagnosis for DTC P0171. Refer to EC-297, "DTC Logic".
NO >> GO TO 2.

2.CHECK HO2S2 GROUND CIRCUIT

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

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F69	1	F25	33	Existed

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK HO2S2 INPUT SIGNAL CIRCUIT

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

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F69	4	F25	29	Existed

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

+		–	Continuity
HO2S2			
Connector	Terminal		
F69	4	Ground	Not existed

+		–	Continuity
ECM			
Connector	Terminal		
F25	29	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK HEATED OXYGEN SENSOR 2

Check the heated oxygen sensor 2. Refer to EC-276, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 5.

5.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

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

>> INSPECTION END

Component Inspection

INFOID:0000000012197835

1.INSPECTION START

Do you have CONSULT?

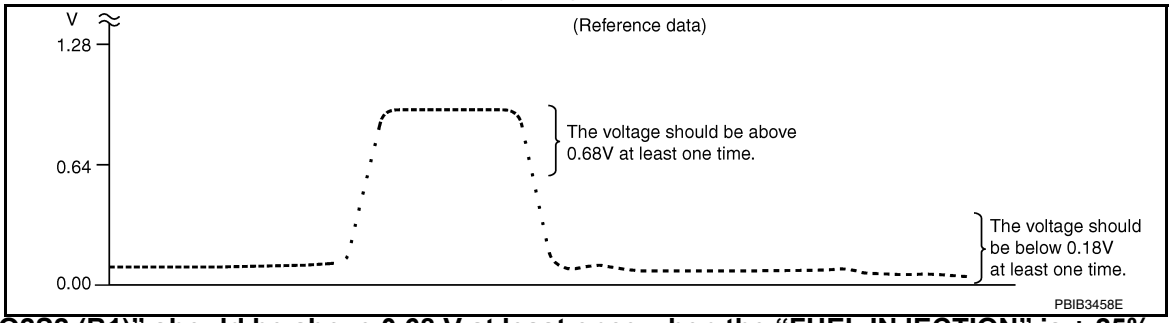
Do you have CONSULT?

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

2.CHECK HEATED OXYGEN SENSOR 2

With CONSULT

1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode of “ENGINE” using CONSULT, and select “HO2S2 (B1)” as the monitor item with CONSULT.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ± 25%.



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

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	29	33	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

4. CHECK HEATED OXYGEN SENSOR 2-II

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	29	33	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

5. CHECK HEATED OXYGEN SENSOR 2-III

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	29	33	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

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

>> INSPECTION END

P0138 HO2S2

DTC Logic

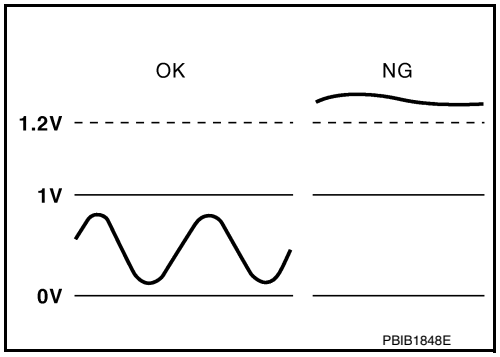
INFOID:0000000012197836

DTC DETECTION LOGIC

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

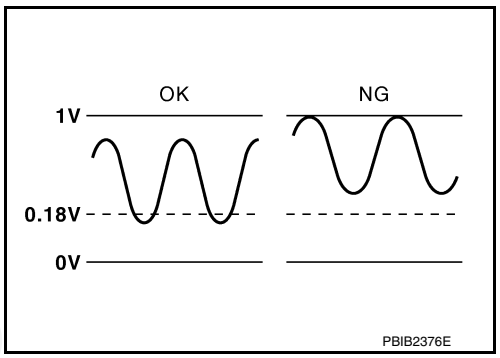
MALFUNCTION A

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



MALFUNCTION B

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



DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition		Possible cause
P0138	HO2S2 (B1) (Heated oxygen sensor 2 circuit high voltage)	A)	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2
		B)	The minimum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

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

Is 1st trip DTC detected?

YES >> Proceed to EC-281, "Diagnosis Procedure".
NO-1 >> With CONSULT: GO TO 3.
NO-2 >> Without CONSULT: GO TO 5.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

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

1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that "COOLAN TEMP/S" indication is more than 70°C (158°F).
   If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
7. Open engine hood.
8. Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT.
9. Follow the instruction of CONSULT.
   NOTE:
   It will take at most 10 minutes until "COMPLETED" is displayed.
10. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT

OK >> INSPECTION END
NG >> Proceed to EC-281, "Diagnosis Procedure".
CAN NOT BE DIAGNOSED>>GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B AGAIN

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

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to EC-281, "Diagnosis Procedure".
NOTE:
Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-281, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012197837

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	29	33	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

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

2.PERFORM COMPONENT FUNCTION CHECK-II

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	29	33	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

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

3.PERFORM COMPONENT FUNCTION CHECK-III

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	29	33	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-281, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012197838

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-279, "DTC Logic".

Which malfunction is detected?

A >> GO TO 2.
B >> GO TO 7.

2.CHECK HO2S2 CONNECTOR FOR WATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK HO2S2 GROUND CIRCUIT

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

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F69	1	F25	33	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT

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

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F69	4	F25	29	Existed

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

+		–	Continuity
HO2S2			
Connector	Terminal		
F69	4	Ground	Not existed

+		–	Continuity
ECM			
Connector	Terminal		
F25	29	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK HEATED OXYGEN SENSOR 2

Check the heated oxygen sensor 2. Refer to EC-284, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

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

>> INSPECTION END

7. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-165, "Description".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0172. Refer to EC-279, "DTC Logic".
NO >> GO TO 8.

8. CHECK HO2S2 GROUND CIRCUIT

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

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F69	1	F25	33	Existed

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

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK HO2S2 INPUT SIGNAL CIRCUIT

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

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F69	4	F25	29	Existed

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

+		–	Continuity
HO2S2			
Connector	Terminal		
F69	4	Ground	Not existed

+		–	Continuity
ECM			
Connector	Terminal		
F25	29	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

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

10. CHECK HEATED OXYGEN SENSOR 2

Check the heated oxygen sensor 2. Refer to EC-284, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 11.

11. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

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

>> INSPECTION END

Component Inspection

INFOID:0000000012197839

1. INSPECTION START

Do you have CONSULT?

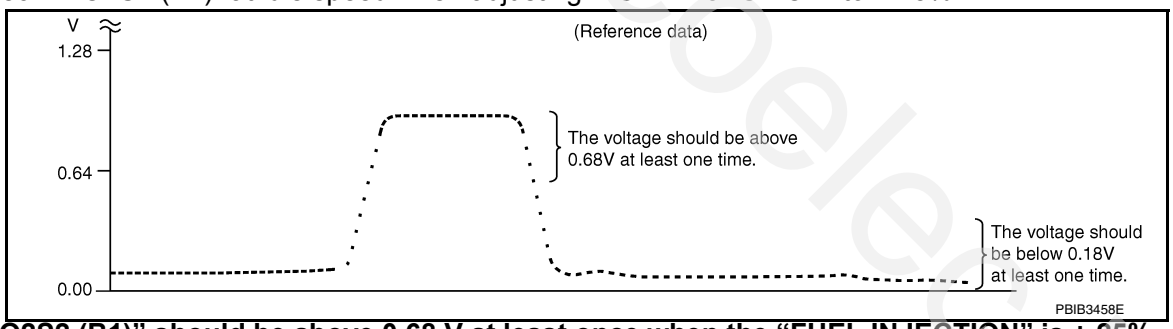
Do you have CONSULT?

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

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT

1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode of “ENGINE” using CONSULT, and select “HO2S2 (B1)” as the monitor item with CONSULT.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ± 25%.



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

Is the inspection result normal?

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

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	29	33	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

4. CHECK HEATED OXYGEN SENSOR 2-II

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	29	33	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

5. CHECK HEATED OXYGEN SENSOR 2-III

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	29	33	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

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

>> INSPECTION END

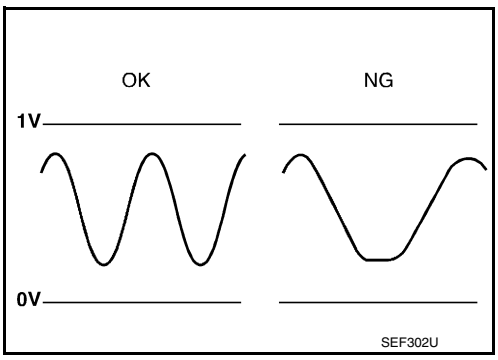
P0139 HO2S2

DTC Logic

INFOID:0000000012197840

DTC DETECTION LOGIC

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



DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0139	HO2S2 (B1) (Heated oxygen sensor 2 circuit slow response)	The switching time between rich and lean of a heated oxygen sensor 2 signal delays more than the specified time computed by ECM.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel system • EVAP system • Intake air system

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 7.

2.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
For better results, perform “DTC WORK SUPPORT” at a temperature of 0 to 30°C (32 to 86°F).

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
7. Let engine idle for 1 minute.
8. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
9. Drive the vehicle in a proper at 60 km/h (38MPH) and maintain the speed.

CAUTION:
Always drive vehicle at a safe speed.

10. Release the accelerator pedal fully at least 5 seconds.
CAUTION:
- **Enable engine brake.**
- **Always drive carefully.**
- **Never apply brake when releasing the accelerator pedal.**

11. Repeat step 9 and 10 at least 8 times.
12. Check the following item of “DATA MONITOR”.

Data monitor item	Status
HO2 S2 DIAG1 (B1)	CMPLT
HO2 S2 DIAG2 (B1)	

Is “CMPLT” displayed on CONSULT screen?

YES >> GO TO 6.
NO-1: “CMPLT” is not displayed on DIAG 1>>Perform DTC confirmation procedure again.
NO-2: “CMPLT” is not displayed on DIAG 2>>GO TO 4.

4.PERFORM DTC WORK SUPPORT

1. Open engine hood.
2. Select “HO2S2 (B1) P0139” in “DTC WORK SUPPORT” mode of “ENGINE” using CONSULT.
3. Start engine and follow the instruction of CONSULT display.
NOTE:
It will take at most 10 minutes until “COMPLETED” is displayed.

Is “COMPLETED” displayed on CONSULT screen?

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

5.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

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

>> GO TO 3.

6.PERFORM SELF-DIAGNOSIS

With CONSULT
Perform ECM self-diagnosis.

Is DTC “P0139” detected?

YES >> Proceed to EC-288, "Diagnosis Procedure".
NO >> INSPECTION END

7.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-287, "Component Function Check".
NOTE:
Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-288, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012197841

1.PERFORM COMPONENT FUNCTION CHECK-I

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	29	33	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

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

2.PERFORM COMPONENT FUNCTION CHECK-II

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	29	33	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

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

3.PERFORM COMPONENT FUNCTION CHECK-III

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	29	33	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-275, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012197842

1.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-165, "Description".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-297, "DTC Logic" or EC-301, "DTC Logic".
NO >> GO TO 2.

2.CHECK HO2S2 GROUND CIRCUIT

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

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F69	1	F25	33	Existed

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK HO2S2 INPUT SIGNAL CIRCUIT

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

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F69	4	F25	29	Existed

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

+		–	Continuity
HO2S2			
Connector	Terminal		
F69	4	Ground	Not existed

+		–	Continuity
ECM			
Connector	Terminal		
F25	29	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK HEATED OXYGEN SENSOR 2

Check the heated oxygen sensor 2. Refer to EC-290, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 5.

5.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

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

>> INSPECTION END

Component Inspection

INFOID:0000000012197843

1.INSPECTION START

Do you have CONSULT?

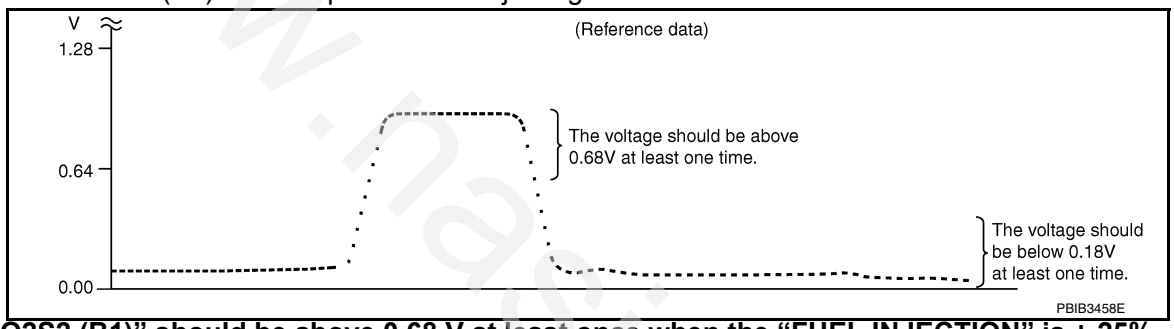
Do you have CONSULT?

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

2.CHECK HEATED OXYGEN SENSOR 2

With CONSULT

1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode of “ENGINE” using CONSULT, and select “HO2S2 (B1)” as the monitor item with CONSULT.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ± 25%.



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

Is the inspection result normal?

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

3.CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT

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

ECM			Condition	Voltage
Connector	+	−		
	Terminal			
F25	29	33	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

4.CHECK HEATED OXYGEN SENSOR 2-II

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	29	33	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

5.CHECK HEATED OXYGEN SENSOR 2-III

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

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F25	29	33	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure. The voltage should be below 0.18 V at least once during this procedure.

Is the inspection result normal?

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

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

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

>> INSPECTION END

P014C, P014D, P015A, P015B A/F SENSOR 1

DTC Logic

INFOID:0000000012197844

DTC DETECTION LOGIC

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

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P014C P014D	Air fuel ratio (A/F) sensor 1 (bank 1) circuit slow response	• The response time of a A/F sensor 1 signal delays more than the specified time computed by ECM.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • A/F sensor 1
P015A P015B	Air fuel ratio (A/F) sensor 1 (bank 1) circuit delayed response		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 6.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
6. Let engine idle for 1 minute.
7. Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds.
8. Fully release accelerator pedal and then let engine idle for about 1 minute.
9. Check the items status of “DATA MONITOR” as follows.

   NOTE:

   If “PRSNT” changed to “ABSNT”, refer to EC-264, "Component Function Check".

Data monitor item	Status
A/F SEN1 DIAG3 (B1)	PRSNT

Is “PRSNT” displayed on CONSULT screen?

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

3.PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

Perform DTC confirmation procedure-1 again.

Is “PRSNT” displayed on CONSULT screen?

YES >> GO TO 4.
NO >> Refer to EC-264, "Component Function Check".

4. PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT
1. Wait for about 20 seconds at idle.
2. Check the items status of “DATA MONITOR” as follows.
   NOTE:
   If “CMPLT” changed to “INCMP”, refer to EC-264, "Component Function Check".

Data monitor item	Status
A/F SEN1 DIAG1 (B1)	CMPLT
A/F SEN1 DIAG2 (B1)	

Is “CMPLT” displayed on CONSULT screen?

YES >> GO TO 5.
NO >> Refer to EC-264, "Component Function Check".

5. PERFORM SELF-DIAGNOSIS

With CONSULT
Check the “SELF-DIAG RESULT”.

Is any DTC detected?

YES >> Proceed to EC-294, "Diagnosis Procedure".
NO >> INSPECTION END

6. CHECK AIR-FUEL RATIO SELF-LEARNING VALUE

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

Is the total percentage within ±15%?

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

7. DETECT MALFUNCTIONING PART

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

>> Repair or replace malfunctioning part.

8. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds.
7. Fully release accelerator pedal and then let engine idle for about 1 minute.
8. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-294, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197845

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection".

Is the inspection result normal?

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

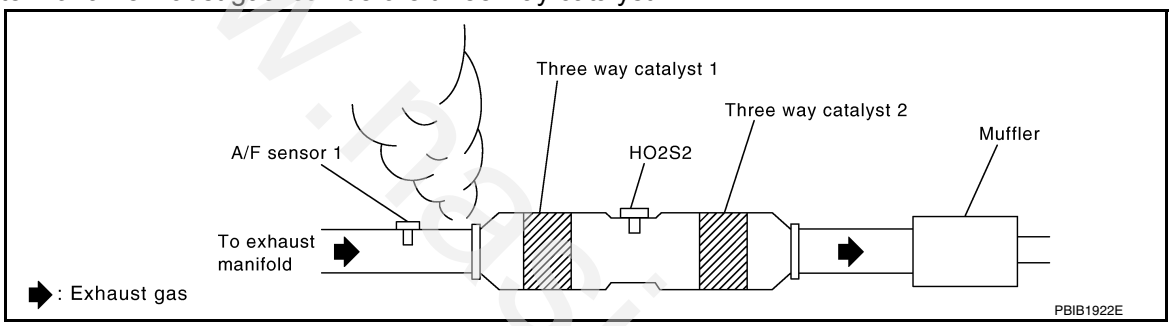
2.RETIGHTEN A/F SENSOR 1

Loosen and retighten the A/F sensor 1. Refer to EM-34, "2WD : Exploded View" (FOR 2WD MODELS), EM-37, "AWD : Exploded View" (FOR AWD MODELS).

>> GO TO 3.

3.CHECK EXHAUST GAS LEAK

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



Is exhaust gas leak detected?

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

4.CHECK FOR INTAKE AIR LEAK

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

Is intake air leak detected?

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

5.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-165, "Description".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171or P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171or P0172. Refer to EC-297, "DTC Logic" or EC-301, "DTC Logic".
NO >> GO TO 6.

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

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor 1		Ground	Voltage
Connector	Terminal		
F70	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.

NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Harness connectors E8, F1
- IPDM E/R harness connector E14
- 20 A fuse (No. 43)
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

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

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

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F70	1	F25	21	Existed
	2		25	

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

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F70	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F25	21	Ground	Not existed
	25		

5. Also check harness for short to power.

Is the inspection result normal?

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

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

Refer to EC-204, "Component Inspection".

Is the inspection result normal?

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

10. CHECK MASS AIR FLOW SENSOR

Check mass air flow sensor.
Refer to EC-235, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace malfunctioning mass air flow sensor. Refer to EM-27, "Exploded View".

11. CHECK PCV VALVE

Refer to EM-60, "Exploded View".

Is the inspection result normal?

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

12. CHECK INTERMITTENT INCIDENT

Perform GI-45, "Intermittent Incident".

Is the inspection result normal?

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

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

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-34, "2WD : Exploded View"(FOR 2WD MODELS), EM-37, "AWD : Exploded View" (FOR AWD MODELS).

CAUTION:

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

>> INSPECTION END

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000012197846

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0171	FUEL SYS-LEAN-B1 (Fuel injection system too lean)	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	• Intake air leaks • A/F sensor 1 • Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor • Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to EC-165, "Description".
2. Start engine.

Is it difficult to start engine?

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

3.RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.
Crank engine while depressing accelerator pedal.
NOTE:
When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Proceed to EC-298, "Diagnosis Procedure".
NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

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

Is 1st trip DTC detected?

YES >> Proceed to EC-298, "Diagnosis Procedure".
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine.
3. Maintain the following conditions for at least 10 consecutive minutes.
   Hold the accelerator pedal as steady as possible.

VHCL SPEED SE	50 - 120 km/h (31 - 75 MPH)

CAUTION:
Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

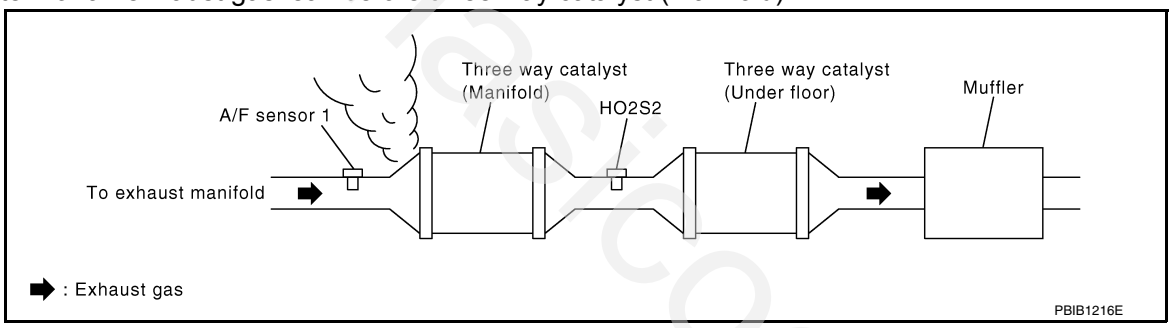
YES >> Proceed to EC-298, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197847

1.CHECK EXHAUST GAS LEAK

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



Is exhaust gas leak detected?

YES >> Repair or replace error-detected parts.
NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAK

1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

Intake air leak detected?

YES >> Repair or replace error-detected parts.
NO >> GO TO 3.

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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

+		–		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F70	1	F25	21	Existed
	2		25	

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

+		–	Continuity
A/F sensor 1			
Connector	Terminal		
F70	1	Ground	Not existed
	2		

+		–	Continuity
ECM			
Connector	Terminal		
F25	21	Ground	Not existed
	25		

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK FUEL PRESSURE

Check fuel pressure. Refer to EC-166, "Work Procedure".

Is the inspection result normal?

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

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging. Refer to EM-54, "Exploded View".

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”. Refer to FL-6, "2WD : Exploded View" (2WD) or FL-10, "AWD : Exploded View" (AWD).
NO >> Repair or replace error-detected parts.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT
1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. For specification, refer to EC-591, "Mass Air Flow Sensor".

With GST
1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.
3. For specification, refer to EC-591, "Mass Air Flow Sensor".

Is the measurement value within the specification?

YES >> GO TO 7.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-238, "DTC Logic".

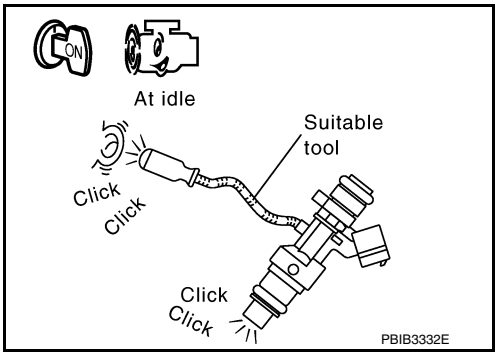
7. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT
1. Let engine idle.

2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".

NO >> Perform trouble diagnosis for “FUEL INJECTOR”, refer to EC-541, "Component Function Check".

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000012197848

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0172	FUEL SYS-RICH-B1 (Fuel injection system too rich)	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• A/F sensor 1 • Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to EC-165, "Description".
2. Start engine.

Is it difficult to start engine?

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

3.RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.
Crank engine while depressing accelerator pedal.

NOTE:
When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Proceed to EC-302, "Diagnosis Procedure".
NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

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

Is 1st trip DTC detected?

YES >> Proceed to EC-302, "Diagnosis Procedure".
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine.
3. Maintain the following conditions for at least 10 consecutive minutes.
   Hold the accelerator pedal as steady as possible.

VHCL SPEED SE	50 - 120 km/h (31 - 75 MPH)

CAUTION:
Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

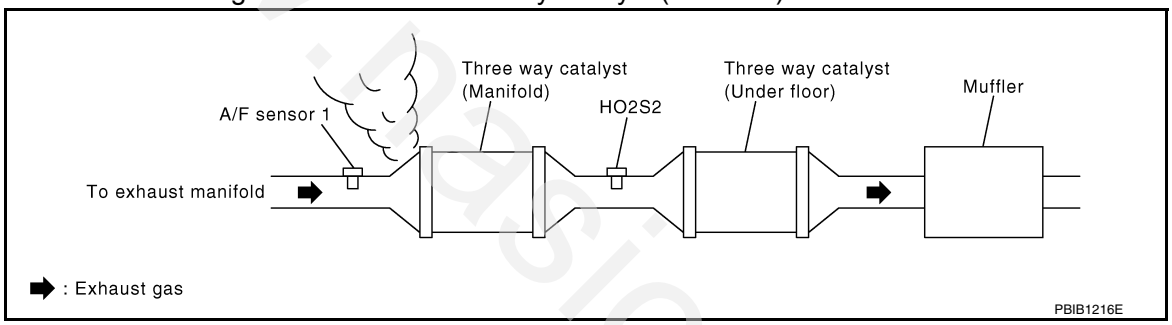
YES >> Proceed to EC-302, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197849

1.CHECK EXHAUST GAS LEAK

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



Is exhaust gas leak detected?

YES >> Repair or replace error-detected parts.
NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAK

1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

Intake air leak detected?

YES >> Repair or replace error-detected parts.
NO >> GO TO 3.

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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

+		–		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F70	1	F25	21	Existed
	2		25	

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

+		–	Continuity
A/F sensor 1			
Connector	Terminal		
F70	1	Ground	Not existed
	2		

+		–	Continuity
ECM			
Connector	Terminal		
F25	21	Ground	Not existed
	25		

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK FUEL PRESSURE

Check fuel pressure. Refer to EC-166, "Work Procedure".

Is the inspection result normal?

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

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging. Refer to EM-54, "Exploded View".

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”. Refer to FL-6, "2WD : Exploded View" (2WD) or FL-10, "AWD : Exploded View" (AWD).
NO >> Repair or replace error-detected parts.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT
1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. For specification, refer to EC-591, "Mass Air Flow Sensor".

With GST
1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.
3. For specification, refer to EC-591, "Mass Air Flow Sensor".

Is the measurement value within the specification?

YES >> GO TO 7.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-238, "DTC Logic".

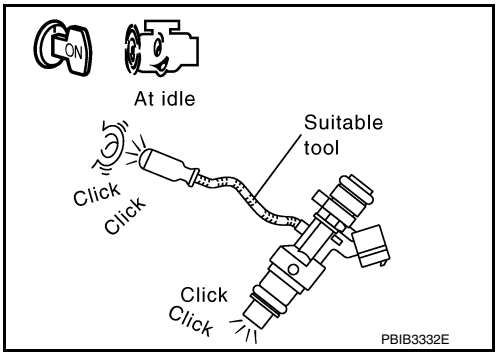
7. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT
1. Let engine idle.

2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".

NO >> Perform trouble diagnosis for “FUEL INJECTOR”, refer to EC-541, "Component Function Check".

P0181 FTT SENSOR

DTC Logic

INFOID:0000000012197850

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition		Possible cause
P0181	FTT SENSOR [Fuel tank temperature (FTT) sensor circuit range/performance]	A)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from ECT sensor and intake air temperature sensor 1.	• Harness or connectors (FTT sensor circuit is open or shorted) • FTT sensor • Combination meter
		B)	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor 1, IAT sensor 2, ECT sensor, EOT sensor, and FTT sensor) shows that the voltage signal of the FTT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	• Harness or connectors (High or low resistance in the FTT sensor circuit) • FTT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 7.
NO >> GO TO 2.

2.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-I

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-307, "Diagnosis Procedure".
NO >> GO TO 4.

4.CHECK ENGINE COOLANT TEMPERATURE

With CONSULT
1. Select “COOLAN TEMP/S” in “DATA MONITOR” of “ENGINE” using CONSULT.
2. Check “COOLAN TEMP/S” value.

With GST
Follow the procedure “With CONSULT” above.

“COOLAN TEMP/S” less than 60°C (140°F)?

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

5.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-II

With CONSULT
1. Cool engine down until “COOLAN TEMP/S” is less than 60°C (140°F).

2. Wait at least 10 seconds.
3. Check 1st trip DTC.

With GST
Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-307, "Diagnosis Procedure".
NO >> GO TO 6.

6.PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)

Perform component function check. Refer to EC-306, "Component Function Check".

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-307, "Diagnosis Procedure".

7.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- **Before performing the following procedure, do not add fuel.**
- **Before performing the following procedure, check that fuel level is between 1/4 and 4/4.**
- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**

>> GO TO 8.

8.PERFORM DTC CONFIRMATION PROCEDURE B

1. Start engine and let it idle for 60 minutes.
2. Move the vehicle to a cool place.
   NOTE:
   Cool the vehicle in an environment of ambient air temperature between −10°C (14°F) and 35°C (95°F).
3. Turn ignition switch OFF and soak the vehicle for 12 hours.
   CAUTION:
   Never turn ignition switch ON during soaking.
   NOTE:
   The vehicle must be cooled with the hood open.
4. Start engine and let it idle for 5 minutes or more.
   CAUTION:
   Never turn ignition switch OFF during idling.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-307, "Diagnosis Procedure".
NO >> INSPECTION END

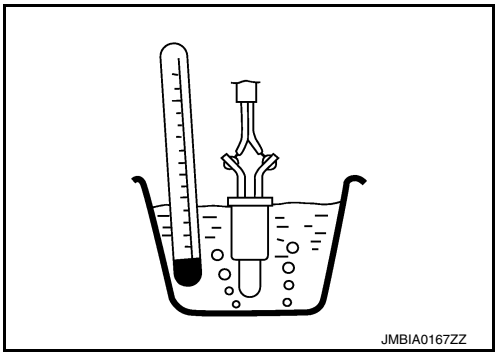
Component Function Check

INFOID:0000000012197851

1.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Remove fuel level sensor unit. Refer to FL-6, "2WD : Exploded View"(2WD), FL-10, "AWD : Exploded View"(AWD).

4. Check resistance between fuel level sensor unit and fuel pump terminals by heating with hot water as shown in the figure.



Fuel level sensor unit and fuel pump		Condition		Resistance (kΩ)
+	–			
Terminal				
4	5	Temperature [°C (°F)]	20 (68)	2.3 – 2.7
			50 (122)	0.79 – 0.90

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Proceed to EC-307, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012197852

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-305, "DTC Logic".

Which malfunction is detected?

A >> GO TO 2.
B >> GO TO 6.

2.CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to MWI-22, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Proceed to MWI-54, "Component Function Check".

3.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR POWER

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel level sensor unit and fuel pump harness connector and ground.

+		–	Voltage (Approx.)
Fuel level sensor unit and fuel pump			
Connector	Terminal		
B46	4	Ground	5 V

Is the inspection result normal?

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

4.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR POWER SUPPLY CIRCUIT

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

+		-		Continuity
Fuel level sensor unit and fuel pump		ECM		
Connector	Terminal	Connector	Terminal	
B46	4	F26	84	Existed

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

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

5.CHECK FTT SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect combination meter harness connector.
3. Check the continuity between fuel level sensor unit and fuel pump harness connector and combination meter harness connector.

+		-		Continuity
Fuel level sensor unit and fuel pump		Combination meter		
Connector	Terminal	Connector	Terminal	
B46	5	M34	24	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR

Check the FTT sensor. Refer to EC-308, "Component Inspection".

Is the inspection result normal?

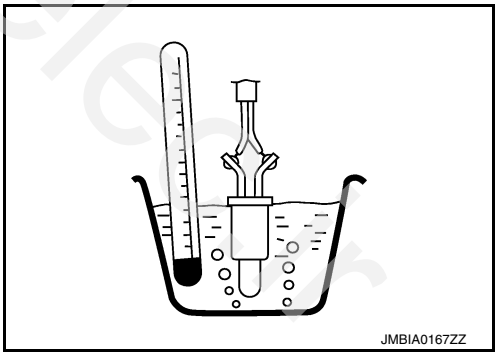
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace fuel level sensor unit and fuel pump. Refer to FL-6, "2WD : Exploded View"(2WD), FL-10, "AWD : Exploded View"(AWD).

Component Inspection

INFOID:0000000012197853

1.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Remove fuel level sensor unit. Refer to FL-6, "2WD : Exploded View"(2WD), FL-10, "AWD : Exploded View"(AWD).
4. Check resistance between fuel level sensor unit and fuel pump terminals by heating with hot water as shown in the figure.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Fuel level sensor unit and fuel pump		Condition		Resistance (kΩ)
+	–			
Terminal				
4	5	Temperature [°C (°F)]	20 (68)	2.3 – 2.7
			50 (122)	0.79 – 0.90

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel level sensor unit and fuel pump. Refer to FL-6, "2WD : Exploded View".

P0182, P0183 FTT SENSOR

DTC Logic

INFOID:0000000012197854

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0182	FTT SEN/CIRCUIT (Fuel tank temperature sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The FTT sensor circuit is open or shorted.) • Fuel tank temperature sensor • Combination meter
P0183	FTT SEN/CIRCUIT (Fuel tank temperature sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-309, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197855

1.CHECK DTC WITH COMBINATION METER

Refer to MWI-22, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Proceed to MWI-54, "Component Function Check".

2.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel level sensor unit and fuel pump harness connector and ground.

+		−	Voltage (Approx.)
Fuel level sensor unit and fuel pump			
Connector	Terminal		
B46	4	Ground	5 V

Is the inspection result normal?

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

3.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
Fuel level sensor unit and fuel pump		ECM		
Connector	Terminal	Connector	Terminal	
B46	4	F26	84	Existed

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

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect combination meter harness connector.
3. Check the continuity between fuel level sensor unit and fuel pump harness connector and combination meter harness connector.

+		–		Continuity
Fuel level sensor unit and fuel pump		Combination meter		
Connector	Terminal	Connector	Terminal	
B46	5	M34	24	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR

Check the FTT sensor. Refer to EC-310, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace “fuel level sensor unit and fuel pump”. Refer to FL-6, "2WD : Exploded View"(2WD), FL-10, "AWD : Exploded View"(AWD).

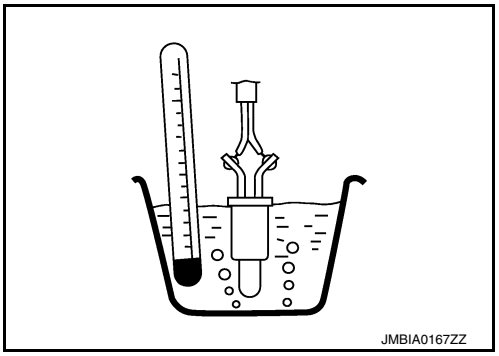
Component Inspection

INFOID:0000000012197856

1.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Remove fuel level sensor unit. Refer to FL-6, "2WD : Exploded View"(2WD), FL-10, "AWD : Exploded View"(AWD).

4. Check resistance between fuel level sensor unit and fuel pump terminals by heating with hot water as shown in the figure.



Fuel level sensor unit and fuel pump		Condition		Resistance (kΩ)
+	–			
Terminal				
4	5	Temperature [°C (°F)]	20 (68)	2.3 – 2.7
			50 (122)	0.79 – 0.90

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel level sensor unit and fuel pump. Refer to FL-6, "2WD : Exploded View".

P0190, P0192, P0193 FRP SENSOR

DTC Logic

INFOID:0000000012197857

DTC DETECTION LOGIC

NOTE:
If DTC P0193 is displayed with DTC P0190 or P119C, perform the trouble diagnosis for DTC P0190 or P119C. Refer to EC-115, "DTC Index".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0190	FUEL PRES SEN/CIRCUIT (Fuel rail pressure sensor circuit low input and high input)	Signal voltage from the fuel rail pressure sensor remains at more than 4.84 V / less than 0.2 V for 5 seconds or more.	• Harness or connectors (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) • Fuel rail pressure sensor • Battery current sensor • G sensor • Camshaft position sensor • Exhaust valve timing control position sensor • Accelerator pedal position sensor 2 • Turbocharger boost sensor • Engine oil pressure sensor
P0192	FRP SEN/CIRC (Fuel rail pressure sensor circuit low input)	Signal voltage from the fuel rail pressure sensor remains at less than 0.37 V for 5 seconds or more.	
P0193	FRP SEN/CIRC (Fuel rail pressure sensor circuit high input)	Signal voltage from the fuel rail pressure sensor remains at more than 4.06 V for 5 seconds or more.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine ON and wait at least 60 seconds.
2. Check DTC or 1st trip DTC.

Is DTC or 1st trip DTC detected?

YES >> Proceed to EC-312, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197858

NOTE:
Turning the ignition switch ON with FRP sensor harness connector disconnected causes ECM to detect DTC P0190. Be sure to erase the DTC when the diagnosis procedure.

1.CHECK FUEL RAIL PRESSURE (FRP) SENSOR POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect FRP sensor connector.
3. Turn ignition switch ON.
4. Check the voltage between FRP sensor harness connector terminals.

FRP sensor			Voltage (Approx.)
Connector	+ terminal	–	
F5	1	3	5 V

Inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK FRP SENSOR POWER SUPPLY-II

Check the voltage between FRP sensor harness connector and the ground.

+		–	Voltage (Approx.)
FRP sensor			
Connector	Terminal		
F5	1	Ground	5 V

Is inspection result normal?

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

3.CHECK SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F25	39	FRP sensor	F5	1
		EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
F26	68	Battery current sensor	F52	1
		G sensor	B32	3
	72	CMP sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK FRP SENSOR GROUND CIRCUIT

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

+		–		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F5	3	F25	44	Existed

4. Also check harness for short to power.

Is inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and the ground.

ECM		Ground	Continuity
Connector	Terminal		
F25	1	Ground	Existed
	2		
E18	123		
	124		
	127		

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

6.CHECK FRP SENSOR SIGNAL CIRCUIT

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

+		–		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F5	2	F25	18	Existed

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

Is inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK FRP SENSOR

Check the FRP sensor. Refer to EC-314, "Component Inspection".

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection

INFOID:0000000012197859

1.CHECK FRP SENSOR

WITH CONSULT

1. Turn ignition switch OFF.
2. Reconnect harness connector disconnected.
3. Start the engine.
4. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.

5. Check that the “FUEL PRES SEN V” indication.

Monitor Item	Condition	Values/Status
FUEL PRES SEN V	Engine speed: Idle	1,140 – 1,460 mV
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,300 – 2,900 mV

⊗WITHOUT CONSULT
1. Turn ignition switch OFF.
2. Reconnect harness connector disconnected.
3. Start the engine.
4. Check FRP sensor signal voltage.

ECM			Condition	Value (Approx.)
Connector	+	–		
	Terminal			
F25	18	44	[Engine is running] • Warm-up condition • Idle speed	1.14– 1.46 V
			[Engine is running] • Warm-up condition • Revving engine from idle to 4,000 rpm quickly	1.3 – 2.9 V

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Replace FRP sensor. Refer to EM-54, "Exploded View".

P0196 EOT SENSOR

DTC Logic

INFOID:0000000012197860

DTC DETECTION LOGIC

NOTE:
If DTC P0196 is displayed with DTC P0197 or P0198, first perform the trouble diagnosis for DTC P0197 or P0198. Refer to EC-320, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition		Possible cause
P0196	EOT SENSOR [Engine oil temperature (EOT) sensor circuit range/performance]	A)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from EOT sensor and intake air temperature sensor 1.	• Harness or connectors (EOT sensor circuit is open or shorted) • EOT sensor
		B)	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor1, IAT sensor 2, ECT sensor, FTT sensor, and EOT sensor) shows that the signal voltage of the EOT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	• Harness or connectors (High or low resistance in the EOT sensor circuit) • EOT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 6.
NO >> GO TO 2.

2.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-I

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and let it idle for 5 minutes and 10 seconds.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-318, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-II

With CONSULT
1. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Check that “COOLAN TEMP/S” indicates above 80°C (176°F).
   If it is above 80°C (176°F), go to the following steps.

If it is below 80°C (176°F), warm engine up until “COOLAN TEMP/S” indicates more than 80°C (176°F). Then perform the following steps.
3. Turn ignition switch OFF and soak the vehicle in a cool place.
4. Turn ignition switch ON.
NOTE:
Do not turn ignition switch OFF until step 8.
5. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
6. Check the following.

COOLAN TEMP/S	Below 40°C (104°F)
INT/A TEMP SE	Below 40°C (104°F)
Difference between “COOLAN TEMP/S” and “INT/A TEMP SE”	Within 6°C (11°F)

If they are within the specified range, perform the following steps.
If they are out of the specified range, soak the vehicle to meet the above conditions. Then perform the following steps.
NOTE:
- **Do not turn ignition switch OFF.**
- **If it is supposed to need a long period of time, do not deplete the battery.**

7. Start engine and let it idle for 5 minutes.
8. Check 1st trip DTC.

With GST
Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-318, "Diagnosis Procedure".
NO >> GO TO 5.

5.PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)

Perform component function check. Refer to EC-318, "Component Function Check".
NOTE:
Use the component function check to check the overall function of the EOT sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-318, "Diagnosis Procedure".

6.PRECONDITIONING

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

TESTING CONDITION:
- **Before performing the following procedure, do not add fuel.**
- **Before performing the following procedure, check that fuel level is between 1/4 and 4/4.**
- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**

>> GO TO 7.

7.PERFORM DTC CONFIRMATION PROCEDURE B

1. Start engine and let it idle for 60 minutes.
2. Move the vehicle to a cool place.
NOTE:
Cool the vehicle in an environment of ambient air temperature between −10°C (14°F) and 35°C (95°F).
3. Turn ignition switch OFF and soak the vehicle for 12 hours.
CAUTION:
Never turn ignition switch ON during soaking.
NOTE:
The vehicle must be cooled with the hood open.

4. Start engine and let it idle for 5 minutes or more.
CAUTION:
Never turn ignition switch OFF during idling.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

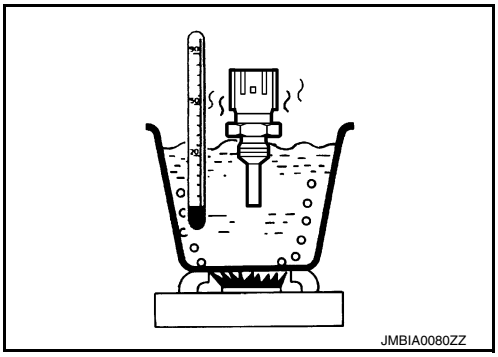
YES >> Proceed to EC-318, "Diagnosis Procedure".
NO >> INSPECTION END

Component Function Check

INFOID:0000000012197861

1.CHECK ENGINE OIL TEMPERATURE (EOT) SENSOR

1. Turn ignition switch OFF.
2. Disconnect EOT sensor harness connector.
3. Remove EOT sensor. Refer to EM-114, "Exploded View".
4. Check resistance between EOT sensor terminals by heating with hot water as shown in the figure.



EOT sensor		Condition		Resistance (kΩ)
+	–			
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.37 – 2.63
			50 (122)	0.68 – 1.00
			90 (194)	0.236 – 0.260

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Proceed to EC-318, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012197862

1.CHECK ENGINE OIL TEMPERATURE (EOT) SENSOR

Check EOT sensor. Refer to EC-318, "Component Inspection".

Is the inspection result normal?

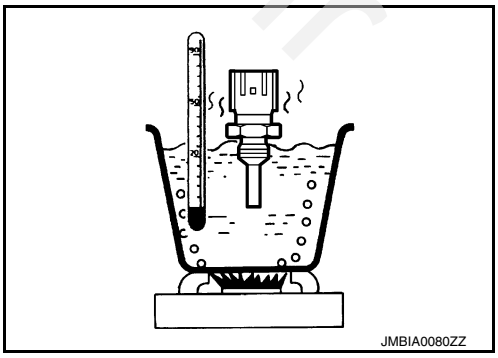
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace EOT sensor. Refer to EM-114, "Exploded View".

Component Inspection

INFOID:0000000012197863

1.CHECK ENGINE OIL TEMPERATURE SENSOR

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



Engine oil temperature sensor		Condition		Resistance (kΩ)
+	–			
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63
			50 (122)	0.68 - 1.00
			90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil temperature sensor. Refer to EM-114, "Exploded View".

P0197, P0198 EOT SENSOR

DTC Logic

INFOID:0000000012197864

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC Detecting Condition	Possible Cause
P0197	EOT SEN/CIRC (Engine oil temperature sensor circuit low input)	An excessively low voltage from the engine oil temperature sensor is sent to ECM.	• Harness or connectors (EOT sensor circuit is open or shorted.) • Engine oil temperature sensor
P0198	EOT SEN/CIRC (Engine oil temperature sensor circuit high input)	An excessively high voltage from the engine oil temperature sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-320, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197865

1.CHECK ENGINE OIL TEMPERATURE SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect engine oil temperature (EOT) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EOT sensor harness connector and ground.

+		−	Voltage (Approx.)
EOT sensor			
Connector	Terminal		
F43	3	Ground	5 V

Is the inspection result normal?

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

2.CHECK ENGINE OIL TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
EOT sensor		ECM		
Connector	Terminal	Connector	Terminal	
F43	3	F25	39	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK EOT SENSOR GROUND CIRCUIT

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

+		–		Continuity
EOT sensor		ECM		
Connector	Terminal	Connector	Terminal	
F43	1	F25	44	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK ENGINE OIL TEMPERATURE SENSOR

Check the engine oil temperature sensor. Refer to EC-318, "Component Inspection".

Is the inspection result normal?

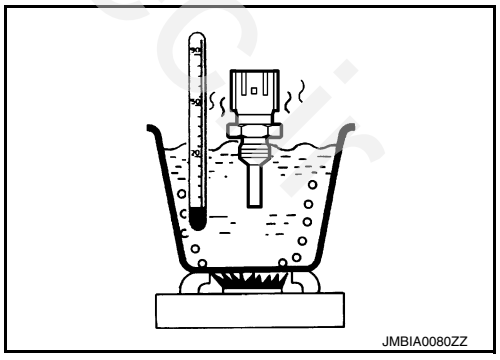
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace engine oil temperature sensor. Refer to EM-114, "Exploded View".

Component Inspection

INFOID:0000000012197866

1.CHECK ENGINE OIL TEMPERATURE SENSOR

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



Engine oil temperature sensor		Condition		Resistance (kΩ)
+	–			
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63
			50 (122)	0.68 - 1.00
			90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine oil temperature sensor. Refer to EM-114, "Exploded View".

P0201, P0202, P0203, P0204 FUEL INJECTOR

DTC Logic

INFOID:0000000012197867

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0201	INJECTOR CIRC-CYL1 (No.1 fuel injector circuit)	ECM detects No. 1 injector circuit is open or shorted.	• The fuel injector circuit is open or shorted • Fuel injector • ECM
P0202	INJECTOR CIRC-CYL2 (No. 2 fuel injector circuit)	ECM detects No. 2 injector circuit is open or shorted.	
P0203	INJECTOR CIRC-CYL3 (No. 3 fuel injector circuit)	ECM detects No. 3 injector circuit is open or shorted.	
P0204	INJECTOR CIRC-CYL4 (No. 4 fuel injector circuit)	ECM detects No. 4 injector circuit is open or shorted.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start the engine and let it idle at least 30 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-322, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197868

1.PERFORM TROUBLE DIAGNOSIS FOR INJECTOR

Perform trouble diagnosis for injector. Refer to EC-541, "Component Function Check".

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P0222, P0223 TP SENSOR

DTC Logic

INFOID:0000000012197869

DTC DETECTION LOGIC

NOTE:
If DTC P0222 or P0223 is displayed with DTC P0643 ,first perform the trouble diagnosis for DTC P0643. Refer to EC-346, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0222	TP SEN 1/CIRC-B1 (Throttle position sensor 1 circuit low input)	An excessively low voltage from the TP sensor 1 is sent to ECM.	• Harness or connectors (TP sensor 1 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1)
P0223	TP SEN 1/CIRC-B1 (Throttle position sensor 1 circuit high input)	An excessively high voltage from the TP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to EC-323, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197870

1.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY

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

+		–	Voltage (Approx.)
Electric throttle control actuator			
Connector	Terminal		
F29	1	Ground	5 V

Is the inspection result normal?

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

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

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

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	1	F26	62	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT

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

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	4	F26	74	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT

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

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	2	F26	75	Existed

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

Is the inspection result normal?

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

5.CHECK THROTTLE POSITION SENSOR

Check the throttle position sensor. Refer to EC-325, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace electric throttle control actuator. Refer to EM-29, "Exploded View".

Component Inspection

INFOID:0000000012197871

1. CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform " Throttle Valve Closed Position Learning". Refer to EC-161, "Description".
4. Turn ignition switch ON.
5. Set selector lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition		Voltage
Connector	+	–			
	Terminal				
F26	75	74	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	76			Fully released	Less than 4.75V
				Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to EM-29, "Exploded View".

P0234 TC SYSTEM

DTC Logic

INFOID:0000000012197872

DTC DETECTION LOGIC

NOTE:
If DTC P0234 is displayed with DTC P0237 or P0238, first perform the trouble diagnosis for DTC P0237 or P0238. Refer to EC-332, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0234	TC SYSTEM-B1 (Turbocharger overboost condition)	Turbocharger boost is higher than the target value.	• Turbocharger boost sensor • Turbocharger boost control solenoid valve • Exhaust manifold and turbocharger assembly • Disconnection, looseness or improper connection of boost control actuator hose

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-326, "Component Function Check".
NOTE:
Use component function check to check the overall function of the turbocharger system circuit. During this check, DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-327, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012197873

1.CHECK BOOST CONTROL ACTUATOR HOSE

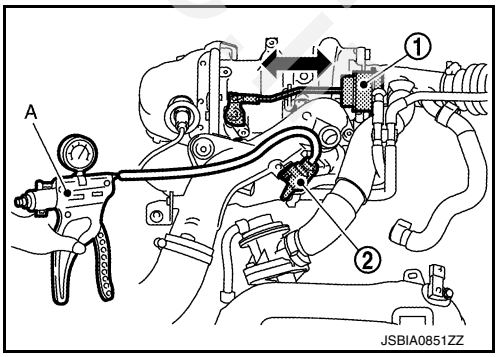
Check disconnection, looseness or improper connection of hose between turbocharger boost control solenoid valve and boost control actuator.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Proceed to EC-327, "Diagnosis Procedure".

2.PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost control solenoid valve harness connector.
3. Disconnect of hose between turbocharger boost control solenoid valve and compressor outlet pipe.
4. Install pressure pump to turbocharger boost control solenoid valve.
5. Check that the rod of the boost control actuator activates when supplying pressure and battery voltage to the turbocharger boost control solenoid valve as per the following conditions.



Turbocharger boost control solenoid valve	Operation
Condition	
Supply pressure [73 kPa (730 mbar, 548 mmHg, 21.56 inHg)] with battery voltage to terminals 1 and 2	Boost control actuator rod operates
Supply pressure [73 kPa (730 mbar, 548 mmHg, 21.56 inHg)] without battery voltage to terminals 1 and 2	Boost control actuator rod not operates

CAUTION:
Do not supply pressure over 83 kPa (830 mbar, 623 mmHg, 24.51 inHg)

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-327, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012197874

1. CHECK BOOST CONTROL ACTUATOR HOSE

Check disconnection, looseness or improper connection of hose between turbocharger boost control solenoid valve and boost control actuator.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between turbocharger boost control solenoid valve harness connector and ground.

+		–	Voltage
Turbocharger boost control solenoid valve			
Connector	Terminal		
F54	2	Ground	Battery voltage

Is the inspection result normal?

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

3. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between turbocharger boost control solenoid valve harness connector and IPDM E/R harness connector.

+		–		Continuity
Turbocharger boost control solenoid valve		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F54	2	E14	36	Existed

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

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT

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

+		–		Continuity
Turbocharger boost control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F54	1	F26	73	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Check the turbocharger boost control solenoid valve. Refer to EC-210, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace turbocharger boost control solenoid valve. Refer to EM-40, "Exploded View".

6.CHECK BOOST CONTROL ACTUATOR

Check the boost control actuator. Refer to EM-41, "Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace exhaust manifold and turbocharger assembly. Refer to EM-40, "Exploded View".

7.CHECK TURBOCHARGER BOOST SENSOR

Check the turbocharger boost sensor. Refer to EC-334, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace turbocharger boost sensor. Refer to EM-32, "Exploded View".

P0235 TC BOOST SENSOR

DTC Logic

INFOID:0000000012197875

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0235	TURBO BOOST SENSOR (Turbocharger/supercharger boost sensor A circuit)	An excessively low voltage from the turbocharger boost sensor is sent to ECM.	• Harness or connectors (Turbocharger boost sensor circuit is open or shorted.) • Turbocharger boost sensor • Sensor power supply 2 circuit

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-329, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197876

1.CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY

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

+		−	Voltage (Approx.)
Turbocharger boost sensor			
Connector	Terminal		
F75	1	Ground	5 V

Is the inspection result normal?

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

2.CHECK SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F25	39	FRP sensor	F5	1
		EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
F26	68	Battery current sensor	F52	1
		G sensor	B32	3
	72	CMP sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected part.

3.CHECK TURBOCHARGER BOOST SENSOR GROUND CIRCUIT

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

+		–		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
F75	3	F25	44	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK TURBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT

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

+		–		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
F75	2	F25	41	Existed

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

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK TURBOCHARGER BOOST SENSOR

Check the turbocharger boost sensor. Refer to EC-330, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace turbocharger boost sensor. Refer to EM-40, "Exploded View".

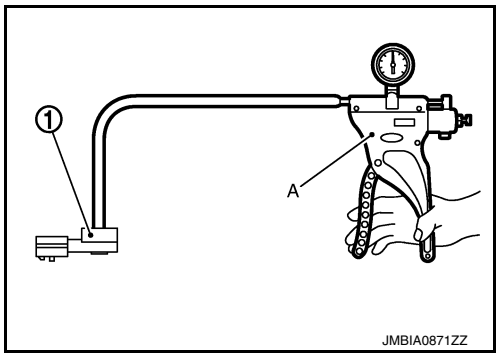
Component Inspection

INFOID:0000000012197877

1.CHECK TURBOCHARGER BOOST SENSOR

1. Turn ignition switch OFF.

2. Remove turbocharger boost sensor with its harness connector.
3. Install pressure pump (A) to turbocharger boost sensor ①.
   CAUTION:
   When insert a pressure pump hose to the sensor, be careful to the damage of the sensor housing.
4. Turn ignition switch ON.
5. Check the voltage between ECM harness connector terminals as per the following conditions.



NOTE:
- Always calibrate the pressure pump gauge when using it.
- Inspection should be done at room temperature [10 - 30°C (50 - 86°F)].

ECM			Condition [Pressure (Relative to atmospheric pressure)]	Voltage (Approx.)
Connector	+	–		
	Terminal			
F25	41	44	0 kPa (0 mbar, 0 mmHg, 0 inHg)	2.03 V
			40 kPa (400 mbar, 300 mmHg, 11.81 inHg)	2.67 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace turbocharger boost sensor. Refer to EM-40, "Exploded View".

P0237, P0238 TC BOOST SENSOR

DTC Logic

INFOID:0000000012197878

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0237	TC BOOST SEN/CIRC-B1 (Turbocharger boost sensor circuit low input)	An excessively low voltage from the turbocharger boost sensor is sent to ECM.	• Harness or connectors (Turbocharger boost sensor circuit is open or shorted.) (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) • Turbocharger boost sensor • Fuel rail pressure sensor • Battery current sensor • G sensor • Camshaft position sensor • Exhaust valve timing control position sensor • Accelerator pedal position sensor 2 • Engine oil pressure sensor
P0238	TC BOOST SEN/CIRC-B1 (Turbocharger boost sensor circuit high input)	An excessively high voltage from the turbocharger boost sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-332, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197879

1.CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY

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

+		–	Voltage (Approx.)
Turbocharger boost sensor			
Connector	Terminal		
F75	1	Ground	5 V

Is the inspection result normal?

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

2.CHECK SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F25	39	FRP sensor	F5	1
		EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
F26	68	Battery current sensor	F52	1
		G sensor	B32	3
	72	CMP sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK TURBOCHARGER BOOST SENSOR GROUND CIRCUIT

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

+		–		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
F75	3	F25	44	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK TURBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT

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

+		–		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
F75	2	F25	41	Existed

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

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK TURBOCHARGER BOOST SENSOR

Check the turbocharger boost sensor. Refer to EC-334, "Component Inspection".

Is the inspection result normal?

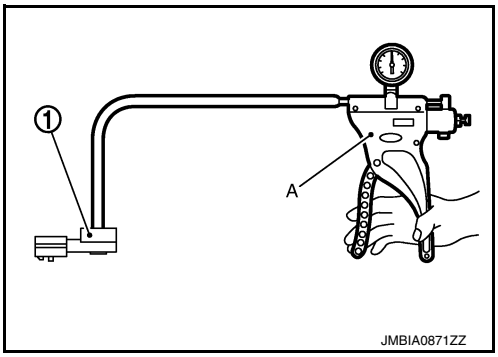
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace turbocharger boost sensor. Refer to EM-40, "Exploded View".

Component Inspection

INFOID:0000000012197880

1. CHECK TURBOCHARGER BOOST SENSOR

1. Turn ignition switch OFF.
2. Remove turbocharger boost sensor with its harness connector.
3. Install pressure pump (A) to turbocharger boost sensor (1).
   CAUTION:
   When insert a pressure pump hose to the sensor, be careful to the damage of the sensor housing.
4. Turn ignition switch ON.
5. Check the voltage between ECM harness connector terminals as per the following conditions.



NOTE:
- Always calibrate the pressure pump gauge when using it.
- Inspection should be done at room temperature [10 - 30°C (50 - 86°F)].

ECM			Condition [Pressure (Relative to atmospheric pressure)]	Voltage (Approx.)
Connector	+	–		
	Terminal			
F25	41	44	0 kPa (0 mbar, 0 mmHg, 0 inHg)	2.03 V
			40 kPa (400 mbar, 300 mmHg, 11.81 inHg)	2.67 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace turbocharger boost sensor. Refer to EM-40, "Exploded View".

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

INFOID:0000000012197881

DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the 1st trip, when a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
   If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0300	MULTI CYL MISFIRE (Multiple cylinder misfire detected)	Multiple cylinder misfire.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • Fuel Injector circuit is open or shorted • Fuel injector • Intake air leak • Ignition signal circuit is open or shorted • Lack of fuel • Signal plate • A/F sensor 1 • Incorrect PCV hose connection
P0301	CYL 1 MISFIRE (No.1 cylinder misfire detected)	No. 1 cylinder misfires.	
P0302	CYL 2 MISFIRE (No. 2 cylinder misfire detected)	No. 2 cylinder misfires.	
P0303	CYL 3 MISFIRE (No. 3 cylinder misfire detected)	No. 3 cylinder misfires.	
P0304	CYL 4 MISFIRE (No. 4 cylinder misfire detected)	No. 4 cylinder misfires.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for about 15 minutes.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-336, "Diagnosis Procedure".

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and drive the vehicle as per the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
   Hold the accelerator pedal as steady as possible.
   The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.
   CAUTION:
   Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).
	When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).

The time to driving varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-336, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197882

1.CHECK GROUND CONNECTION

Check the following.
- Connection condition of the ground F6
- Connection condition of the ground harness between engine assembly and vehicle body (If equipped)

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.
3. Check PCV hose connection.

Is intake air leak detected?

YES >> Discover air leak location and repair.
NO >> GO TO 3.

3.CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 4.
YES-2 >> Without CONSULT: GO TO 5.
NO >> Repair or replace it.

4. PERFORM POWER BALANCE TEST

With CONSULT
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

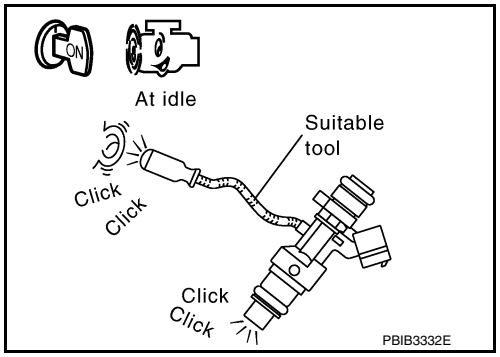
Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 5.

5. CHECK FUNCTION OF FUEL INJECTOR

1. Start engine and let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



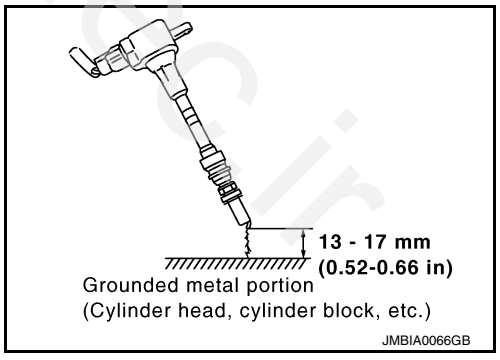
Is the inspection result normal?

YES >> GO TO 6.
NO >> Perform trouble diagnosis for FUEL INJECTOR. Refer to EC-541, "Diagnosis Procedure".

6. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:
- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.**

NOTE:
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

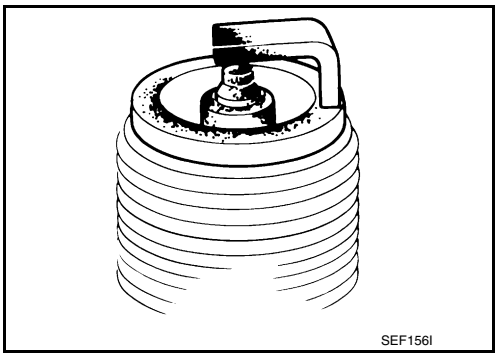
YES >> GO TO 8.
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-554, "Diagnosis Procedure".

8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-25, "Inspection".
NO >> Repair or clean spark plug. Then GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace spark plug(s) with standard type one(s). For spark plug type. Refer to EM-24, "Removal and Installation".

10. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-17, "Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

11. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero.
3. Install fuel pressure gauge and check fuel pressure. Refer to EC-166, "Work Procedure".

At idling: Approximately 500 kPa (5.1 kg/cm^2, 73 psi)

Is the inspection result normal?

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

12. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”. Refer to FL-6, "2WD : Exploded View".
NO >> Repair or replace.

13. CHECK IGNITION TIMING

Check the following items.
For procedure, refer to EC-153, "Work Procedure".
For specification, refer to EC-591, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Follow the EC-153, "Work Procedure".

14. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

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

+		–		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F70	1	F25	21	Existed

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

+		–	Continuity
A/F sensor 1			
Connector	Terminal		
F70	1	Ground	Not existed

+		–	Continuity
ECM			
Connector	Terminal		
F25	21	Ground	Not existed

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK A/F SENSOR 1 HEATER

Check the A/F sensor 1 heater. Refer to EC-204, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace A/F sensor 1. Refer to EM-44, "Exploded View".

16. CHECK MASS AIR FLOW SENSOR

With CONSULT
Check “MASS AIRFLOW” in “DATA MONITOR” mode of “ENGINE” using CONSULT.

1.0 - 4.0 g/s : at idling
2.0 - 10.0 g/s : at 2,500 rpm

With GST
Check mass air flow sensor signal in Service $01 with GST.

1.0 - 4.0 g/s : at idling
2.0 - 10.0 g/s : at 2,500 rpm

Is the measurement value within the specification?

YES >> GO TO 17.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-238, "DTC Logic".

17. CHECK SYMPTOM TABLE

Check items on the rough idle symptom in EC-576, "Symptom Table".

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair or replace error-detected parts.

18. ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-73, "Diagnosis Description".

>> GO TO 19.

19. CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

P0327, P0328 KS

DTC Logic

INFOID:0000000012197883

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detected condition	Possible cause
P0327	KNOCK SEN/CIRC-B1 (Knock sensor circuit low input)	An excessively low voltage from the knock sensor is sent to ECM.	• Harness or connectors (Knock sensor circuit is open or shorted.) • Knock sensor
P0328	KNOCK SEN/CIRC-B1 (Knock sensor circuit high input)	An excessively high voltage from the knock sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-341, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197884

1.CHECK KNOCK SENSOR GROUND CIRCUIT

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

+		–		Continuity
Knock sensor		ECM		
Connector	Terminal	Connector	Terminal	
F12	2	F25	35	Existed

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT

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

+		–		Continuity
Knock sensor		ECM		
Connector	Terminal	Connector	Terminal	
F12	1	F25	36	Existed

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

Is the inspection result normal?

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

3.CHECK KNOCK SENSOR

Check the knock sensor. Refer to EC-342, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace knock sensor. Refer to EM-114, "Exploded View".

Component Inspection

INFOID:0000000012197885

1.CHECK KNOCK SENSOR

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

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

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace knock sensor. Refer to EM-114, "Exploded View".

P0335 CKP SENSOR (POS)

DTC Logic

INFOID:0000000012197886

DTC DETECTION LOGIC

NOTE:
If DTC P0340 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.
Refer to EC-424, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0335	CKP SEN/CIRCUIT [Crankshaft position sensor (POS) circuit]	• The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. • The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	• Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] • Crankshaft position sensor (POS) • Signal plate

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-343, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197887

1.CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY

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

+		−	Voltage (Approx.)
CKP sensor (POS)			
Connector	Terminal		
F107	3	Ground	5 V

Is the inspection result normal?

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

2.CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT

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

+		–		Continuity
CKP sensor (POS)		ECM		
Connector	Terminal	Connector	Terminal	
F107	3	F26	58	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK CKP SENSOR (POS) GROUND CIRCUIT

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

+		–		Continuity
CKP sensor (POS)		ECM		
Connector	Terminal	Connector	Terminal	
F107	2	F26	60	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT

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

+		–		Continuity
CKP sensor (POS)		ECM		
Connector	Terminal	Connector	Terminal	
F107	1	F26	64	Existed

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

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK CRANKSHAFT POSITION SENSOR (POS)

Check the crankshaft position sensor (POS). Refer to EC-345, "Component Inspection".

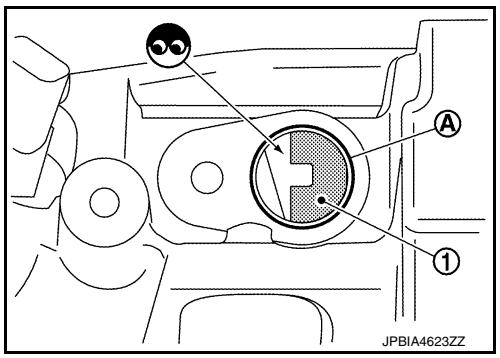
Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace crankshaft position sensor (POS). Refer to EM-114, "Exploded View".

6.CHECK GEAR TOOTH

1. Remove crankshaft position sensor (POS). Refer to EM-114, "Exploded View".

2. Look into the mounting hole (A) of the crankshaft position sensor (POS) to check that there is no missing gear tooth in the signal plate (1).



Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace the signal plate. Refer to EM-114, "Exploded View".

Component Inspection

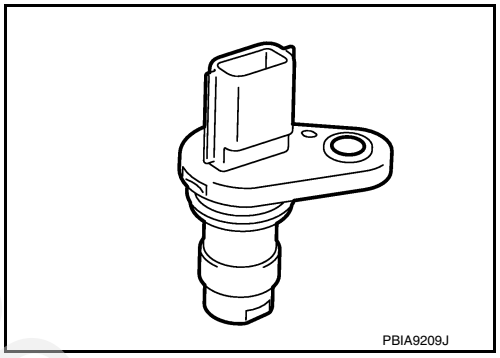
INFOID:0000000012197888

1. CHECK CRANKSHAFT POSITION SENSOR (POS)-I

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace crankshaft position sensor (POS). Refer to EM-114, "Exploded View".



2. CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check the resistance between crankshaft position sensor (POS) terminals as per the following.

Crankshaft position sensor (POS)		Resistance [at 25°C (77°F)]
+	–	
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace crankshaft position sensor (POS). Refer to EM-114, "Exploded View".

P0340 CMP SENSOR (PHASE)

DTC Logic

INFOID:0000000012197889

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0340	CMP SEN/CIRC-B1 [Camshaft position sensor (PHASE) circuit]	• The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. • The cylinder No. signal is not sent to ECM during engine running. • The cylinder No. signal is not in the normal pattern during engine running.	• Harness or connectors (Camshaft position sensor circuit is open or shorted) (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) • Camshaft position sensor • Camshaft (Intake) • Starter motor • Starting system circuit • Dead (Weak) battery • Fuel rail pressure sensor • Battery current sensor • G sensor • Exhaust valve timing control position sensor • Accelerator pedal position sensor 2 • Turbocharger boost sensor • Engine oil pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

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

Is 1st trip DTC detected?

YES >> Proceed to EC-347, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

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

Is 1st trip DTC detected?

YES >> Proceed to EC-347, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197890

1.CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

YES >> GO TO 2.
NO >> Check starting system (Refer to STR-18, "Work Flow (With GR8-1200 NI)" or STR-21, "Work Flow (Without GR8-1200 NI)". For the details of the GR8-1200 NI, refer to STR-4, "Special Service Tools".).

2.CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY

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

+		−	Voltage (Approx.)
CMP sensor (PHASE)			
Connector	Terminal		
F109	1	Ground	5 V

Is the inspection result normal?

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

3.CHECK SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F25	39	FRP sensor	F5	1
		EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
F26	68	Battery current sensor	F52	1
		G sensor	B32	3
	72	CMP sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK CMP SENSOR (PHASE) GROUND CIRCUIT

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

+		–		Continuity
CMP sensor (PHASE)		ECM		
Connector	Terminal	Connector	Terminal	
F109	2	F26	59	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT

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

+		–		Continuity
CMP sensor (PHASE)		ECM		
Connector	Terminal	Connector	Terminal	
F109	3	F26	63	Existed

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Check the camshaft position sensor (PHASE). Refer to EC-348, "Component Inspection".

Is the inspection result normal?

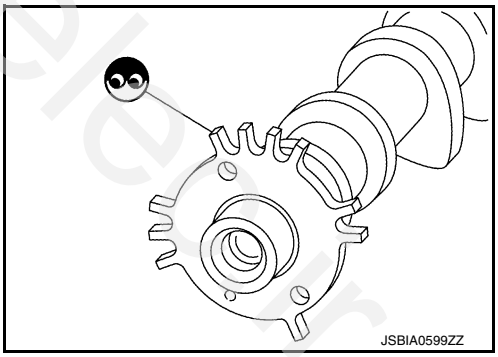
YES >> GO TO 7.
NO >> Replace camshaft position sensor (PHASE). Refer to EM-89, "Removal and Installation".

7.CHECK CAMSHAFT (INT)

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

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-89, "Removal and Installation".



Component Inspection

INFOID:0000000012197891

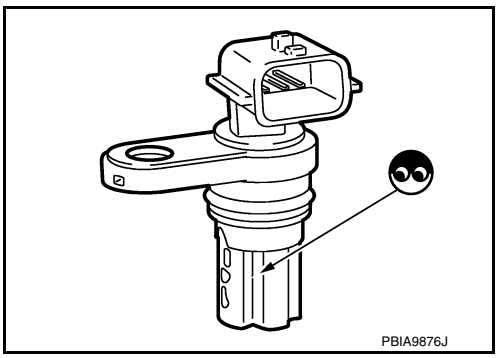
1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

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

5. Visually check the sensor for chipping.

Is the inspection result normal?

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



2. CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check the resistance camshaft position sensor (PHASE) terminals as per the following.

Camshaft position sensor (PHASE)		Resistance [Ω at 25°C (77°F)]
+	–	
Terminals (Polarity)		
1	2	Except 0 or ∞
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace camshaft position sensor (PHASE). Refer to EM-89, "Removal and Installation".

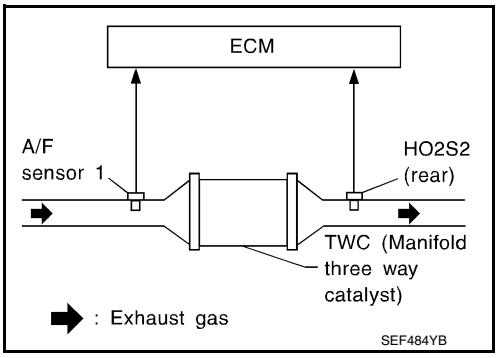
P0420 THREE WAY CATALYST FUNCTION

DTC Logic

INFOID:0000000012197892

DTC DETECTION LOGIC

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2.
A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.
When the frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0420	TW CATALYST SYS-B1 (Catalyst system efficiency below threshold)	• Three way catalyst (manifold) does not operate properly. • Three way catalyst (manifold) does not have enough oxygen storage capacity.	• Three way catalyst (manifold) • Exhaust tube • Intake air leaks • Fuel injector • Fuel injector leaks • Spark plug • Improper ignition timing

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

Will CONSULT be used?

YES >> GO TO 2.
NO >> GO TO 6.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT
TESTING CONDITION:
Do not hold engine speed for more than the specified minutes below.
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
6. Let engine idle for 1 minute.
7. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
8. Check that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
9. Open engine hood.
10. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode of “ENGINE” using CONSULT.
11. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.

12. Check the indication of “CATALYST”.

Which is displayed on CONSULT screen?

CMPLT >> GO TO 5.
INCMP >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Wait 5 seconds at idle.
2. Rev engine up to 2,000 to 3,000 rpm and maintain it until “INCMP” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes).

Does the indication change to “CMPLT”?

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

4. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Stop engine and cool it down to less than 70°C (158°F).
2. Perform DTC confirmation procedure again.

>> GO TO 2.

5. PERFORM DTC CONFIRMATION PROCEDURE-III

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-352, "Diagnosis Procedure".
NO >> INSPECTION END

6. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-351, "Component Function Check".

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

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-352, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012197893

1. PERFORM COMPONENT FUNCTION CHECK

Without CONSULT

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

ECM			Condition	Voltage (V)
Connector	+	–		
	Terminal			
F25	29	33	Keeping engine speed at 2500 rpm constant under no load	The voltage fluctuation cycle takes more than 5 seconds. • 1 cycle: 0.6 - 1.0 → 0 - 0.3 → 0.6 - 1.0

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-352, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012197894

1.CHECK EXHAUST SYSTEM

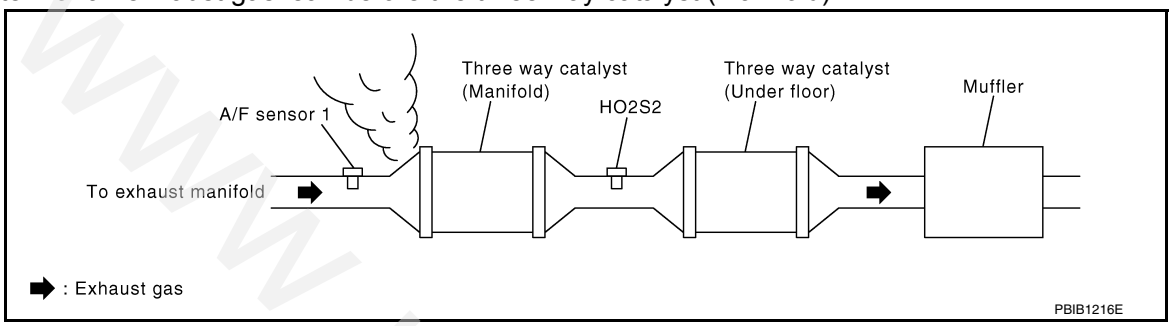
Visually check exhaust tubes and muffler for dent.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK EXHAUST GAS LEAK

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



Is exhaust gas leak detected?

YES >> Repair or replace error-detected parts.
NO >> GO TO 3.

3.CHECK INTAKE AIR LEAK

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

Is intake air leak detected?

YES >> Repair or replace error-detected parts.
NO >> GO TO 4.

4.CHECK IGNITION TIMING AND IDLE SPEED

Check the following items. Refer to EC-153, "Work Procedure".
For specification, refer to EC-591, "Ignition Timing"
For specification, refer to EC-591, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Follow the EC-153, "Work Procedure".

5.CHECK FUEL INJECTOR

Check the fuel injector. Refer to EC-541, "Component Function Check".

Is the inspection result normal?

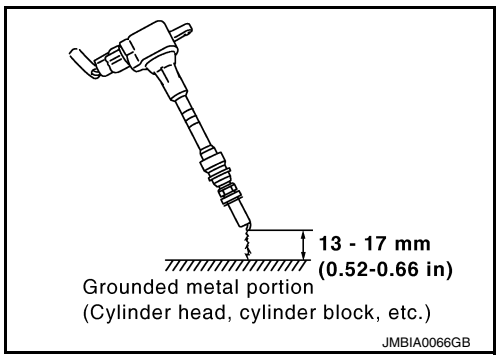
YES >> GO TO 6.
NO >> Perform EC-541, "Diagnosis Procedure".

6.CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.

8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.**

NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

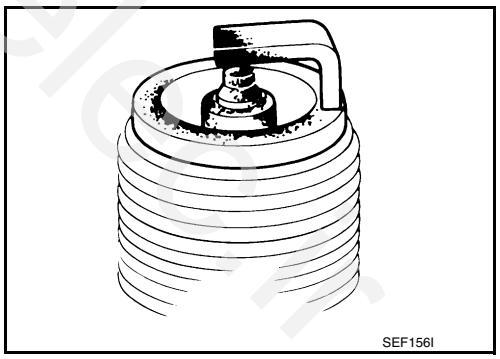
YES >> GO TO 8.
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-554, "Diagnosis Procedure".

8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc. Refer to EM-25, "Inspection".

Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-25, "Inspection".
NO >> Repair or clean spark plug. Refer to EM-60, "Exploded View". Then GO TO 9



9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-24, "Removal and Installation".

10. PERFORM DTC CONFIRMATION PROCEDURE

1. Replace three way catalyst (manifold). Refer to EM-34, "2WD : Removal and Installation" (2WD models) or EM-37, "AWD : Removal and Installation" (AWD models).
2. Perform DTC confirmation procedure. Refer to EC-350, "DTC Logic".

Is DTC P0420 detected again?

YES >> Replace fuel injector. Refer to EM-54, "Removal and Installation".
NO >> INSPECTION END

P0441 EVAP CONTROL SYSTEM

DTC Logic

INFOID:0000000012197895

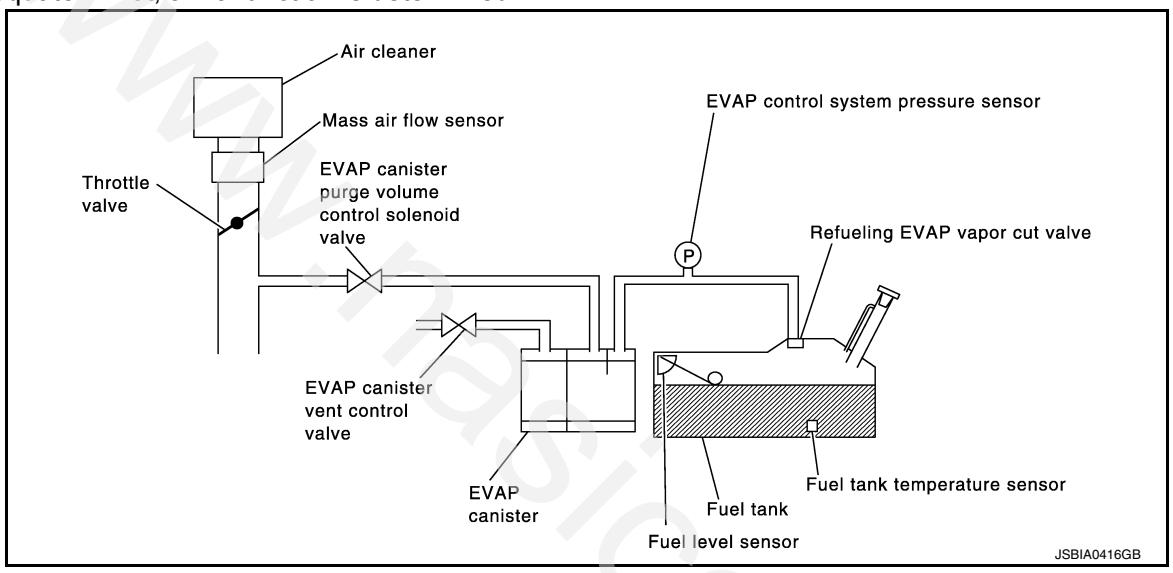
DTC DETECTION LOGIC

NOTE:

If DTC P0441 is displayed with other DTC such as P2122, P2123, P2127, P2128 or P2138, first perform trouble diagnosis for other DTC.

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a malfunction is determined.



DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0441	EVAP PURG FLOW/MON (EVAP control system incorrect purge flow)	EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	• EVAP canister purge volume control solenoid valve stuck closed • EVAP control system pressure sensor and the circuit • Loose, disconnected or improper connection of rubber tube • Blocked rubber tube • Cracked EVAP canister • EVAP canister purge volume control solenoid valve circuit • Accelerator pedal position sensor • Blocked purge port • EVAP canister vent control valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

Will CONSULT be used?

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

2.PERFORM DTC CONFIRMATION PROCEDURE-I

WITH CONSULT
TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and let it idle for at least 70 seconds.
6. Select “PURG FLOW P0441” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode of “ENGINE” using CONSULT.
7. Touch “START”.

Is “COMPLETED” displayed on CONSULT screen?

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

3.PERFORM DTC CONFIRMATION PROCEDURE-II

When the following conditions are met, “TESTING” will be displayed on the CONSULT screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 35 seconds.)

Selector lever	Suitable position
VHCL SPEED SE	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,300 rpm
B/FUEL SCHDL	1.0 - 6.5 msec
COOLAN TEMP/S	More than 0°C (32°F)

CAUTION:
Always drive vehicle at a safe speed.
NOTE:
If “TESTING” does not change for a long time, retry from step 2.

Is “COMPLETED” displayed on CONSULT screen?

YES >> GO TO 4.
NO >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 2.

4.PERFORM DTC CONFIRMATION PROCEDURE-III

Touch “SELF-DIAG RESULTS”.

Which is displayed on CONSULT screen?

OK >> INSPECTION END
NG >> Proceed to EC-357, "Diagnosis Procedure".

5.PERFORM COMPONENT FUNCTION CHECK

WITH GST
Perform component function check. Refer to EC-356, "Component Function Check".
NOTE:
Use component function check to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-357, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012197896

1.PERFORM COMPONENT FUNCTION CHECK

1. Lift up drive wheels.
2. Start engine (VDC switch OFF) and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.

4. Start engine and wait at least 70 seconds.
5. Set voltmeter probes to ECM harness connector terminals as per the following.

ECM		
Connector	+	–
	Terminal	
F25	15	12

6. Check EVAP control system pressure sensor value at idle speed and note it.
7. Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch	ON
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Gear position	Any position other than P, N or R

8. Verify that EVAP control system pressure sensor value stays 0.1 V less than the value at idle speed (measured at step 6) for at least 1 second.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-357, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012197897

1.CHECK EVAP CANISTER

1. Turn ignition switch OFF.
2. Check EVAP canister for cracks.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 2.
YES-2 >> Without CONSULT: GO TO 3.
NO >> Replace EVAP canister. Refer to FL-27, "2WD : Removal and Installation"(2WD), FL-30, "AWD : Removal and Installation"(AWD).

2.CHECK PURGE FLOW

WITH CONSULT

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine and let it idle.
3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
4. Touch “Qd” and “Qu” on CONSULT screen to adjust “PURG VOL CONT/V” opening and check vacuum existence.

PURG VOL CONT/V	Vacuum
100%	Existed
0%	Not existed

Is the inspection result normal?

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

3.CHECK PURGE FLOW

WITHOUT CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.

3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to EC-66, "EVAPORATIVE EMISSION SYSTEM : System Description".
4. Start engine and let it idle.
   Never depress accelerator pedal even slightly.
5. Check vacuum gauge indication before 60 seconds pass after starting engine.

   Vacuum should not exist.

6. Rev engine up to 2,000 rpm after 100 seconds pass after starting engine.

   Vacuum should exist.

Is the inspection result normal?

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

4. CHECK EVAP PURGE LINE

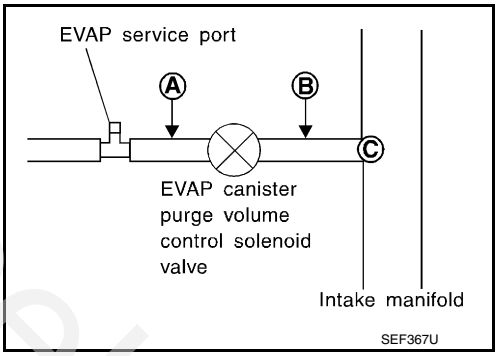
1. Turn ignition switch OFF.
2. Check EVAP purge line for improper connection or disconnection.
   Refer to EC-586, "Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair EVAP purge line.

5. CHECK EVAP PURGE HOSE AND PURGE PORT

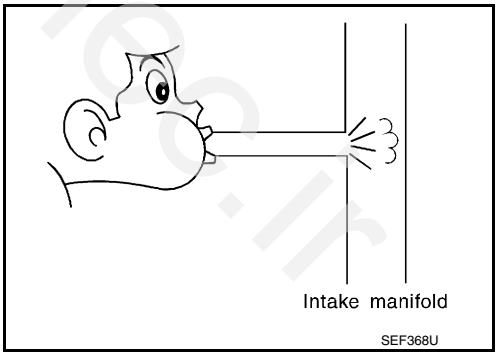
1. Disconnect purge hoses connected to EVAP service port (**A**) and EVAP canister purge volume control solenoid valve (**B**).
2. Blow air into each hose and EVAP purge port (**C**).



3. Check that air flows freely.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 6.
YES-2 >> Without CONSULT: GO TO 7.
NO >> Repair or clean hoses and/or purge port.



6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

WITH CONSULT
1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

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

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Check the EVAP canister purge volume control solenoid valve. Refer to EC-363, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to FL-27, "2WD : Exploded View".

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check that water is not inside connectors.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to EC-380, "DTC Logic" for DTC P0452, EC-383, "DTC Logic" for DTC P0453.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

10. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Clean the rubber tube using an air blower.

11. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the EVAP canister vent control valve. Refer to EC-370, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace EVAP canister vent control valve. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

12. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to EC-587, "Inspection".

Is the inspection result normal?

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

13. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 14.

14. CHECK INTERMITTENT INCIDENT

Perform GI-45, "Intermittent Incident".

>> INSPECTION END

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000012197898

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)		DTC detecting condition	Possible cause
P0443	PURG VOLUME CONT/V (EVAP canister purge volume control solenoid valve)	A	The canister purge flow is detected during the vehicle is stopped while the engine is running, even when EVAP canister purge volume control solenoid valve is completely closed.	• EVAP control system pressure sensor • EVAP canister purge volume control solenoid valve (The valve is stuck open.) • EVAP canister vent control valve • EVAP canister • Hoses (Hoses are connected incorrectly or clogged.)
		B	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- **Perform DTC CONFIRMATION PROCEDURE when the fuel is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 5 to 60°C (41 to 140°F).**
- **Cool the vehicle so that engine coolant temperature becomes same level as ambient temperature.**

Do you have CONSULT

YES >> GO TO 2.
NO >> GO TO 4.

2.PERFORM DTC CONFIRMATION PROCEDURE A

With CONSULT

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check that the following condition are met.
   FUEL T/TMP SE: 0 - 35°C (32 - 95°F)
4. Start the engine and wait at least 60 seconds.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-361, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE B

With CONSULT

1. Start the engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “PURG VOL CN/V P1444” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode of “ENGINE” using CONSULT.
5. Touch “START”.
6. Start the engine and let it idle until “TESTING” on CONSULT changes to “COMPLETED”. (It will take approximately 10 seconds.)
   If “TESTING” is not displayed after 5 minutes, retry from step 2.

7. Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT?

OK >> INSPECTION END
NG >> Proceed to EC-361, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE A

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

+		–	Voltage
ECM			
Connector	Terminal		
F25	15	Ground	3.1 - 4.0 V

3. Start the engine and wait at least 60 seconds.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-361, "Diagnosis Procedure".
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE

With GST
1. Start the engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start the engine and let it idle for at least 20 seconds.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-361, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197899

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

+		–	Voltage
EVAP canister purge volume control solenoid valve			
Connector	Terminal		
F106	2	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and IPDM E/R harness connector.

+		–		
EVAP canister purge volume control solenoid valve		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F106	2	E14	35	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE GROUND CIRCUIT

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

+		–		
EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F106	1	F26	95	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to EC-363, "Component Inspection".

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 6.
YES-2 >> Without CONSULT: GO TO 7.
NO >> Replace EVAP control system pressure sensor. Refrt to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Start the engine.
4. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT. Check that engine speed varies according to the valve opening.

Is the inspection result normal?

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

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Check the EVAP canister purge volume control solenoid valve. Refer to EC-363, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-29, "Exploded View".

8. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Clean the rubber tube using an air blower.

9. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the EVAP canister vent control valve. Refer to EC-370, "Component Inspection".

Is the inspection result normal?

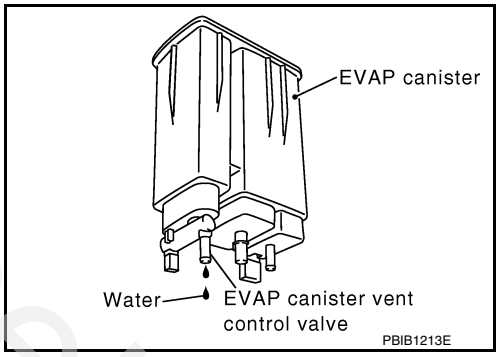
YES >> GO TO 10.
NO >> Replace EVAP canister vent control valve. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

10. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 11.
NO >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".



11. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

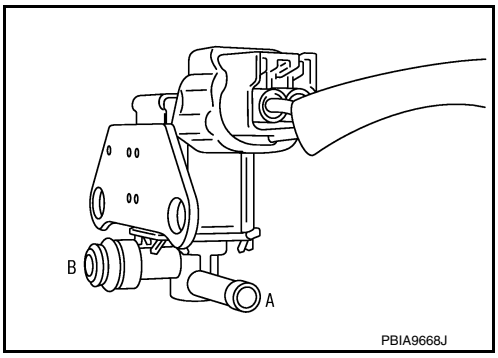
Component Inspection

INFOID:0000000012197900

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT
1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.

3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Start the engine.
5. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
6. Touch “Qd” and “Qu” on CONSULT screen to adjust “PURG VOL C/V” opening and check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.



Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed

⊗Without CONSULT
1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-29, "Exploded View".

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000012197901

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0444	PURG VOLUME CONT/V (EVAP canister purge volume control solenoid valve circuit open)	An excessively low voltage signal is sent to ECM through the EVAP canister purge volume control solenoid valve.	• Harness or connectors (EVAP canister purge volume control solenoid valve circuit is open or shorted.) • EVAP canister purge volume control solenoid valve
P0445	PURG VOLUME CONT/V (EVAP canister purge volume control solenoid valve circuit shorted)	An excessively high voltage signal is sent to ECM through the valve	• Harness or connectors (The solenoid valve circuit is shorted.) • EVAP canister purge volume control solenoid valve

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-365, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197902

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

+		−	Voltage
EVAP canister purge volume control solenoid valve			
Connector	Terminal		
F106	2	Ground	Battery voltage

Is the inspection result normal?

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

2.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and IPDM E/R harness connector.

+		–		Continuity
EVAP canister purge volume control solenoid valve		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F106	2	E14	35	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE GROUND CIRCUIT

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

+		–		Continuity
EVAP canister purge volume control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F106	1	F26	95	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 4.
YES-2 >> Without CONSULT: GO TO 5.
NO >> Repair or replace error-detected parts.

4.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

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

Does engine speed vary according to the valve opening?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 5.

5.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Check the EVAP canister purge volume control solenoid valve. Refer to EC-363, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-29, "Exploded View".

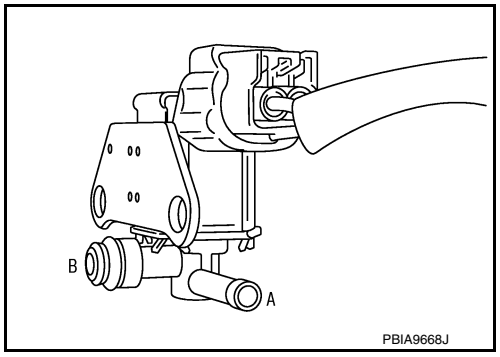
Component Inspection

INFOID:0000000012197903

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT
1. Turn ignition switch OFF.

2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Start the engine.
5. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
6. Touch “Qd” and “Qu” on CONSULT screen to adjust “PURG VOL C/V” opening and check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.



Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed

Without CONSULT
1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-29, "Exploded View".

P0447 EVAP CANISTER VENT CONTROL VALVE

DTC Logic

INFOID:0000000012197904

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0447	VENT CONTROL VALVE (EVAP canister vent control valve circuit open)	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	• Harness or connectors (EVAP canister vent control valve circuit is open or shorted.) • EVAP canister vent control valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 8 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-368, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197905

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

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

2.CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

With CONSULT

1. Turn ignition switch OFF and then turn ON.
2. Select “VENT CONTROL/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Touch “ON/OFF” on CONSULT screen.
4. Check for operating sound of the valve.

Clicking sound should be heard.

Is the inspection result normal?

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

3.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EVAP canister vent control valve harness connector.
3. Turn ignition switch ON.

4. Check the voltage between EVAP canister vent control valve harness connector and ground.

+		–	Voltage
EVAP canister vent control valve			
Connector	Terminal		
B21	1	Ground	Battery voltage

Is the inspection result normal?

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

4. CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between EVAP canister vent control valve harness connector and IPDM E/R harness connector.

+		–		Continuity
EVAP canister vent control valve		IPDM E/R		
Connector	Terminal	Connector	Terminal	
B21	1	E14	36	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

5. CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP canister vent control valve harness connector and ECM harness connector.

+		–		Continuity
EVAP canister vent control valve		ECM		
Connector	Terminal	Connector	Terminal	
B21	2	F26	69	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Clean the rubber tube using an air blower.

7. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the EVAP canister vent control valve. Refer to EC-370, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".

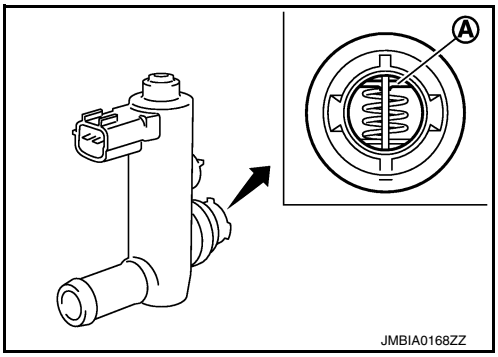
NO >> Replace EVAP canister vent control valve. Refer to FL-27, "2WD : Exploded View"

Component Inspection

INFOID:0000000012197906

1. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Turn ignition switch OFF.
2. Remove EVAP canister vent control valve from EVAP canister.
3. Check portion (A) of EVAP canister vent control valve for being rusted.



Is it rusted?

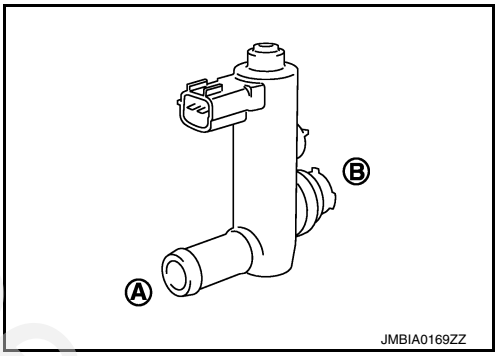
YES >> Replace EVAP canister vent control valve. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

NO >> GO TO 2.

2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
4. Check air passage continuity and operation delay time.
   Make sure new O-ring is installed properly.



Condition (VENT CONT/V)	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT

Check air passage continuity and operation delay time under the following conditions.

Make sure new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> GO TO 3.

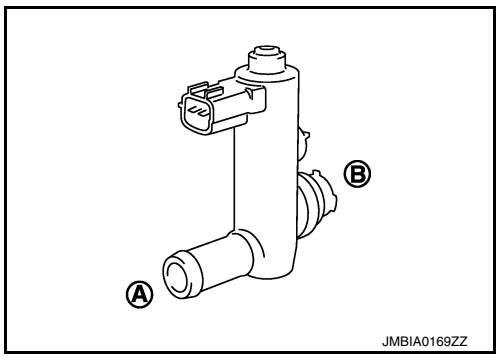
NO >> Replace EVAP canister vent control valve. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

3. CHECK EVAP CANISTER VENT CONTROL VALVE-III

With CONSULT

1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
2. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.

3. Check air passage continuity and operation delay time.
Make sure new O-ring is installed properly.



Condition (VENT CONT/V)	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT

1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
2. Check air passage continuity and operation delay time under the following conditions.
Make sure new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP canister vent control valve. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

P0448 EVAP CANISTER VENT CONTROL VALVE

DTC Logic

INFOID:0000000012197907

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0448	VENT CONTROL VALVE (EVAP canister vent control valve close)	EVAP canister vent control valve remains closed under specified driving conditions.	• EVAP canister vent control valve • EVAP control system pressure sensor and the circuit • Blocked rubber tube to EVAP canister vent control valve • EVAP canister is saturated with water

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT.
4. Start engine and let it idle for at least 1 minute.
5. Repeat next procedures three times.

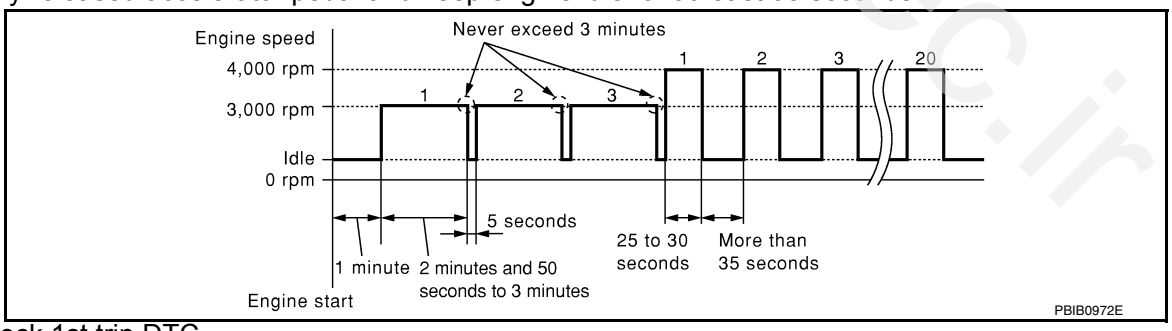
- Increase the engine speed up to 3,000 to 3,500 rpm and keep it for 2 minutes and 50 seconds to 3 minutes.

Never exceed 3 minutes.

- Fully released accelerator pedal and keep engine idle for about 5 seconds.

6. Repeat next procedure 20 times.

- Quickly increase the engine speed up to 4,000 to 4,500 rpm or more and keep it for 25 to 30 seconds.
- Fully released accelerator pedal and keep engine idle for at least 35 seconds.



7. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-373, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197908

1.CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Disconnect rubber tube connected to EVAP canister vent control valve.
3. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Clean rubber tube using an air blower.

2.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the EVAP canister vent control valve. Refer to EC-374, "Component Inspection".

Is the inspection result normal?

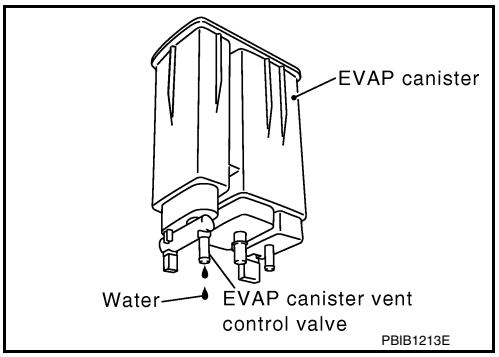
YES >> GO TO 3.
NO >> Replace EVAP canister vent control valve. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

3.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from the EVAP canister.

Does water drain from EVAP canister?

YES >> GO TO 4.
NO >> GO TO 6.



4.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

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

5.DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to EC-379, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

Component Inspection

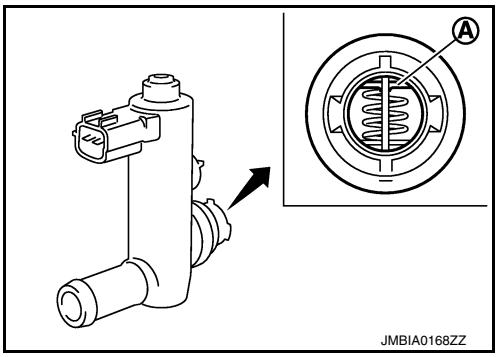
INFOID:0000000012197909

1. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Turn ignition switch OFF.
2. Remove EVAP canister vent control valve from EVAP canister.
3. Check portion (A) of EVAP canister vent control valve for being rusted.

Is it rusted?

YES >> Replace EVAP canister vent control valve. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).
NO >> GO TO 2.



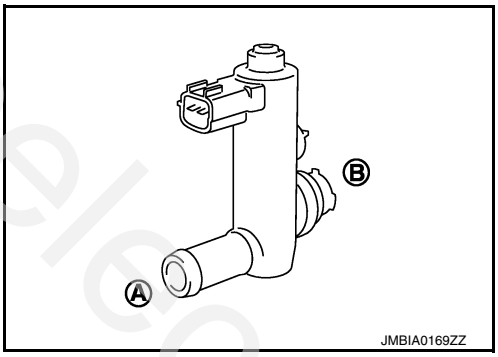
2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
4. Check air passage continuity and operation delay time.
   Make sure new O-ring is installed properly.

Condition (VENT CONT/V)	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.



Without CONSULT

Check air passage continuity and operation delay time under the following conditions.

Make sure new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

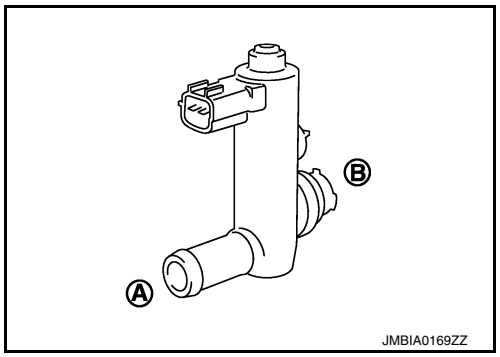
YES >> GO TO 3.
NO >> Replace EVAP canister vent control valve. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

3. CHECK EVAP CANISTER VENT CONTROL VALVE-III

With CONSULT

1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.

2. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Check air passage continuity and operation delay time.
Make sure new O-ring is installed properly.



Condition (VENT CONT/V)	Air passage continuity between (A) and (B)
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT

1. Clean the air passage [portion (A) to (B)] of EVAP canister vent control valve using an air blower.
2. Check air passage continuity and operation delay time under the following conditions.
Make sure new O-ring is installed properly.

Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals (1) and (2)	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP canister vent control valve. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

INFOID:0000000012197910

DTC DETECTION LOGIC

NOTE:
If DTC P0451 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-424, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0451	EVAP SYS PRES SEN (EVAP control system pressure sensor performance)	ECM detects a sloshing signal from the EVAP control system pressure sensor	• Harness or connectors (EVAP control system pressure sensor circuit is shorted.) • EVAP control system pressure sensor

DTC CONFIRMATION PROCEDURE

NOTE:
Never remove fuel filler cap during DTC confirmation procedure.

1. PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

With CONSULT>>GO TO 2.
Without CONSULT>>GO TO 5.

2. PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

1. Start engine and let it idle for least 40 seconds.
   NOTE:
   Do not depress accelerator pedal even slightly.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-377, "Diagnosis Procedure".
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

1. Select “EVAP DIAG READY” in “DATA MONITOR” mode of “ENGINE”.
2. Let it idle until “OFF” of “EVAP DIAG READY” changes to “ON”.
   NOTE:
   It will take at most 2 hours until “OFF” of “EVAP DIAG READY” changes to “ON”.
3. Turn ignition switch OFF and wait at least 90 minutes.
   NOTE:
   Never turn ignition switch ON during 90 minutes.
4. Turn ignition switch ON.
5. Select “EVAP LEAK DIAG” in “DATA MONITOR” mode of “ENGINE”.
6. Check that “EVAP LEAK DIAG” indication.

Which is displayed on CONSULT?

CMPLT >> GO TO 4.
YET >> 1. Perform DTC CONFIRMATION PROCEDURE again.
2. GO TO 1.

4.PERFORM DTC CONFIRMATION PROCEDURE-3

With CONSULT
Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-377, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM DTC CONFIRMATION PROCEDURE-4

With GST
1. Start engine and let it idle for least 40 seconds.
   NOTE:
   Do not depress accelerator pedal even slightly.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-377, "Diagnosis Procedure".
NO >> GO TO 6.

6.PERFORM DTC CONFIRMATION PROCEDURE-5

With GST
1. Let it idle for at least 2 hours.
2. Turn ignition switch OFF and wait at least 90 minutes.
   NOTE:
   Never turn ignition switch ON during 90 minutes.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-377, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197911

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

1. Turn ignition switch OFF.
2. Disconnect EVAP control system pressure sensor harness connector.
3. Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

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

2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

+		−	Voltage (Approx.)
EVAP control system pressure sensor			
Connector	Terminal		
B22	3	Ground	5 V

Is the inspection result normal?

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

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

+		–		Continuity
EVAP control system pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
B22	3	F25	23	Existed

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

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

+		–		Continuity
EVAP control system pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
B22	1	F25	12	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SIGNAL CIRCUIT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

+		–		Continuity
EVAP control system pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
B22	2	F25	15	Existed

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to EC-379, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

Component Inspection

INFOID:0000000012197912

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

ECM			Condition [Applied vacuum kPa (kg/cm^2, psi)]	Voltage
Connector	+	–		
	Terminal			
F25	15	12	Not applied	0.5 - 4.6 V
			-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-0.952 kg/cm^2, -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm^2, 14.69 psi).**

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

INFOID:0000000012197913

DTC DETECTION LOGIC

NOTE:
If DTC P0451 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-424, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0452	EVAP SYS PRES SEN (EVAP control system pressure sensor low input)	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (EVAP control system pressure sensor circuit is shorted.) • EVAP control system pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
5. Make sure that “FUEL T/TMP SE” indication is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
7. Check 1st trip DTC.

With GST

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

ECM			Voltage
Connector	+	–	
	Terminal		
F25	15	12	Less than 4.2 V

3. Make sure that the voltage is less than 4.2 V.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and wait at least 20 seconds.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-381, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197914

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

1. Turn ignition switch OFF.
2. Disconnect EVAP control system pressure sensor harness connector.
3. Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

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

2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

+		–	Voltage (Approx.)
EVAP control system pressure sensor			
Connector	Terminal		
B22	3	Ground	5 V

Is the inspection result normal?

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

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

+		–		Continuity
EVAP control system pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
B22	3	F25	23	Existed

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

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

+		–		Continuity
EVAP control system pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
B22	1	F25	12	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SIGNAL CIRCUIT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

+		–		Continuity
EVAP control system pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
B22	2	F25	15	Existed

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to EC-379, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

Component Inspection

INFOID:0000000012197915

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

ECM			Condition [Applied vacuum kPa (kg/cm^2, psi)]	Voltage
Connector	+	–		
	Terminal			
F25	15	12	Not applied	0.5 - 4.6 V
			-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-0.952 kg/cm^2, -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm^2, 14.69 psi).**

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

INFOID:0000000012197916

DTC DETECTION LOGIC

NOTE:
If DTC P0451 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-424, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0453	EVAP SYS PRES SEN (EVAP control system pressure sensor high input)	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (EVAP control system pressure sensor circuit is shorted.) • EVAP control system pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
5. Make sure that “FUEL T/TMP SE” indication is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
7. Check 1st trip DTC.

With GST
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes to ECM harness connector terminals as per the following.

ECM			Voltage
Connector	+	–	
	Terminal		
F25	15	12	Less than 4.2 V

3. Make sure that the voltage is less than 4.2 V.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and wait at least 20 seconds.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-384, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197917

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

1. Turn ignition switch OFF.
2. Disconnect EVAP control system pressure sensor harness connector.
3. Check sensor harness connector for water.

Water should not exist.

Is the inspection result normal?

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

2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

+		–	Voltage (Approx.)
EVAP control system pressure sensor			
Connector	Terminal		
B22	3	Ground	5 V

Is the inspection result normal?

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

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

+		–		Continuity
EVAP control system pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
B22	3	F25	23	Existed

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

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

+		–		Continuity
EVAP control system pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
B22	1	F25	12	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR SIGNAL CIRCUIT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

+		–		Continuity
EVAP control system pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
B22	2	F25	15	Existed

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK RUBBER TUBE

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Clean the rubber tube using an air blower, repair or replace rubber tube.

7. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-370, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace EVAP canister vent control valve. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-386, "Component Inspection".

Is the inspection result normal?

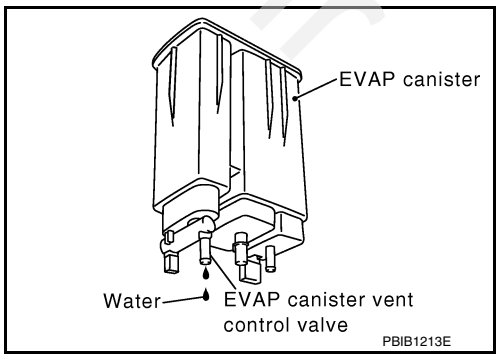
YES >> GO TO 9.
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

9. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from the EVAP canister.

Does water drain from EVAP canister?

YES >> GO TO 10.
NO >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".



10. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

Component Inspection

INFOID:0000000012197918

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

ECM			Condition [Applied vacuum kPa (kg/cm^2, psi)]	Voltage
Connector	+	–		
	Terminal			
F25	15	12	Not applied	0.5 - 4.6 V
			-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-0.952 kg/cm^2, -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm^2, 14.69 psi).**

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

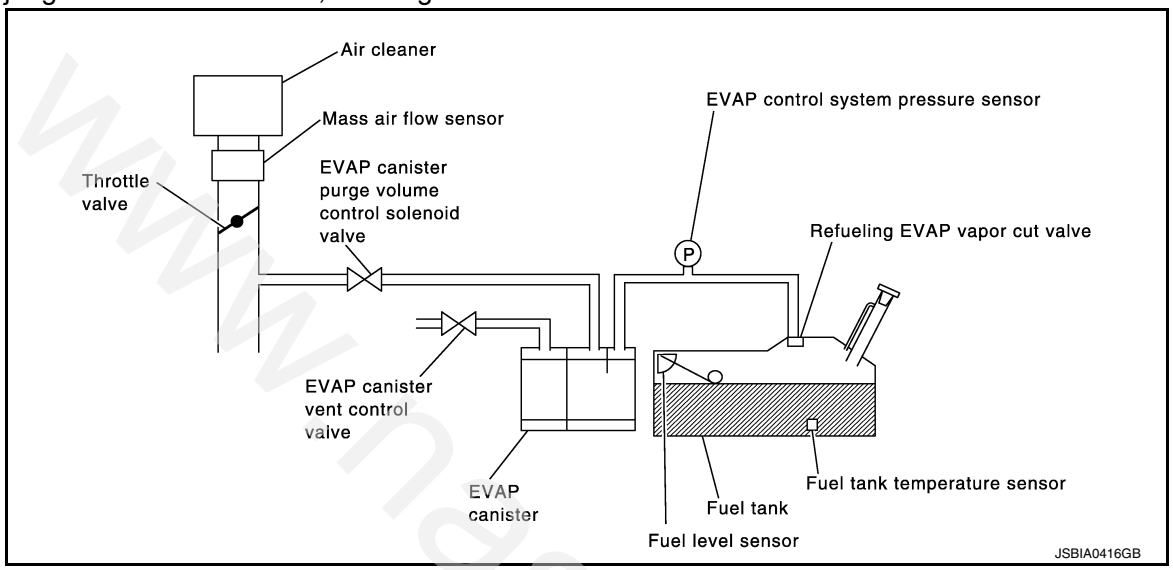
P0456 EVAP CONTROL SYSTEM

DTC Logic

INFOID:0000000012197919

DTC DETECTION LOGIC

This diagnosis detects leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the negative pressure caused by decrease of fuel temperature in the fuel tank after turning ignition switch OFF.
If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0456	EVAP VERY SML LEAK (Evaporative emission control system leak)	• EVAP system has a leak. • EVAP system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or does not close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Fuel tank temperature sensor • O-ring of EVAP canister vent control valve is missing or damaged • EVAP canister is saturated with water • EVAP control system pressure sensor • Refueling EVAP vapor cut valve • ORVR system leaks • Fuel level sensor and the circuit • Foreign matter caught in EVAP canister purge volume control solenoid valve

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.**
- **If the fuel filler cap is not tightened properly, the MIL may illuminate.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 4.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

WITH CONSULT

1. Turn ignition switch ON and select “EVAP DIAG READY” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Start engine and wait at idle until “OFF” of “EVAP DIAG READY” changes to “ON”.
   NOTE:
   It will take at most 2 hours until “OFF” of “EVAP DIAG READY” changes to “ON”.
3. Turn ignition switch OFF and wait at least 90 minutes.
   NOTE:
   Never turn ignition switch ON during 90 minutes.
4. Turn ignition switch ON and select “EVAP LEAK DIAG” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
5. Check that “EVAP LEAK DIAG” indication.

Which is displayed on CONSULT?

CMPLT >> GO TO 3.
YET >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 1.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed toEC-388, "Diagnosis Procedure".
NO >> INSPECTION END.

4.PERFORM DTC CONFIRMATION PROCEDURE

WITH GST

1. Start engine and wait engine idle for at least 2 hours.
2. Turn ignition switch OFF and wait at least 90 minutes.
   NOTE:
   Never turn ignition switch ON during 90 minutes.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-388, "Diagnosis Procedure".
NO >> INSPECTION END.

Diagnosis Procedure

INFOID:0000000012197920

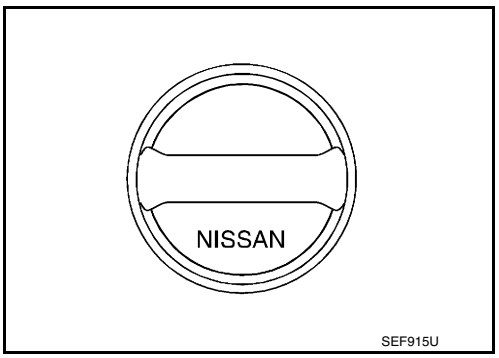
1.CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.

2. Check for genuine NISSAN fuel filler cap design.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace with genuine NISSAN fuel filler cap.



2.CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Then retighten until reteaching sound is heard.

3.CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

Is the inspection result normal?

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

4.CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-392, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace fuel filler cap with a genuine one.

5.CHECK FOR EVAP LEAK

Refer to EC-587, "Inspection".

Is there any leak in EVAP line?

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

6.CHECK EVAP CANISTER VENT CONTROL VALVE

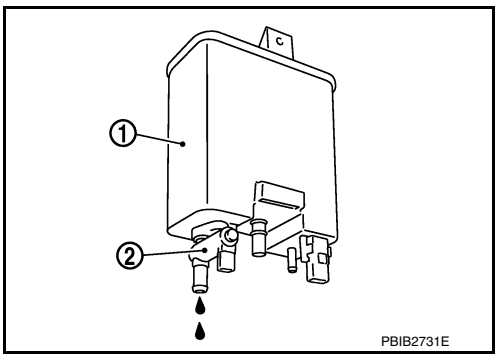
Check the following.
- EVAP canister vent control valve is installed properly.
  Refer to FL-27, "2WD : Exploded View".
- EVAP canister vent control valve.
  Refer to EC-370, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace EVAP canister vent control valve and O-ring. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

7.CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister (1) with EVAP canister vent control valve (2) and EVAP control system pressure sensor attached.
2. Check if water will drain from the EVAP canister.



Does water drain from EVAP canister?

YES >> GO TO 8.
NO-1 >> With CONSULT: GO TO 10.
NO-2 >> Without CONSULT: GO TO 11.

8. CHECK EVAP CANISTER

Weigh the EVAP canister assembly with the EVAP canister vent control valve and EVAP control system pressure sensor attached. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).
The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 10.
YES-2 >> Without CONSULT: GO TO 11.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

10. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT
1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine and let it idle.
3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
4. Touch “Qu” on CONSULT screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

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

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT
1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

Is the inspection result normal?

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

12. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to FL-27, "2WD : Exploded View".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair or reconnect the hose.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Check the EVAP canister purge volume control solenoid valve. Refer to EC-366, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to FL-27, "2WD : Exploded View".

14. CHECK FUEL TANK TEMPERATURE SENSOR

Check the fuel tank temperature sensor. Refer to EC-308, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace fuel level sensor unit. Refer toFL-6, "2WD : Exploded View"(2WD), FL-10, "AWD : Exploded View"(AWD).

15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check the EVAP control system pressure sensor. Refer to FL-27, "2WD : Exploded View".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

16. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to FL-26, "2WD : Hydraulic Layout"(2WD), FL-28, "AWD : Hydraulic Layout"(AWD).

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair or reconnect the hose.

17. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 18.

18. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to FL-26, "2WD : Hydraulic Layout"(2WD), FL-28, "AWD : Hydraulic Layout"(AWD).

Is the inspection result normal?

YES >> GO TO 19.
NO >> Repair or replace hoses and tubes.

19. CHECK RECIRCULATION LINE

Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 20.
NO >> Repair or replace hose, tube or fuel filler tube. Refer to FL-27, "2WD : Exploded View"(2WD), FL-10, "AWD : Exploded View"(AWD).

20. CHECK REFUELING EVAP VAPOR CUT VALVE

Check the refueling EVAP vapor cut valve. Refer to FL-28, "2WD : Inspection"(2WD), FL-31, "AWD : Inspection"(AWD).

Is the inspection result normal?

YES >> GO TO 21.

NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-27, "2WD : Exploded View"(2WD), FL-30, "AWD : Exploded View"(AWD).

21.CHECK FUEL LEVEL SENSOR

Check the fuel level sensor. Refer to MWI-56, "Component Inspection".

Is the inspection result normal?

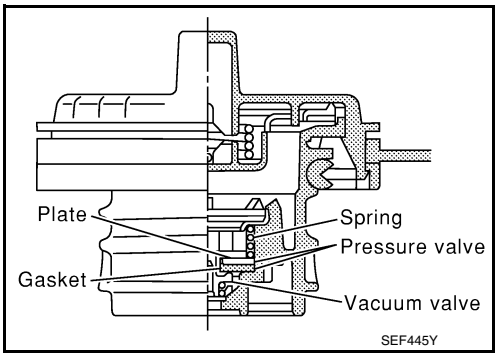
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace fuel level sensor unit. Refer to FL-6, "2WD : Exploded View"(2WD), FL-10, "AWD : Exploded View"(AWD).

Component Inspection

INFOID:0000000012197921

1.CHECK FUEL FILLER CAP

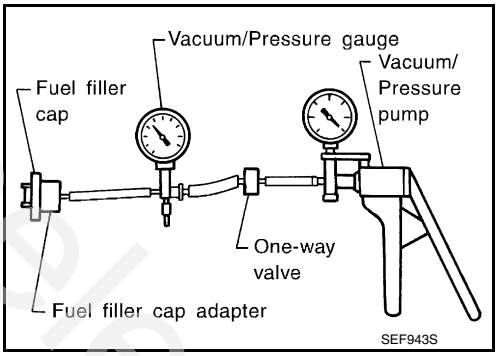
1. Turn ignition switch OFF.
2. Remove fuel filler cap.
3. Wipe clean valve housing.



4. Install fuel filler cap adapter (commercial service tool) to fuel filler cap.
5. Check valve opening pressure and vacuum.

Pressure: **15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)**

Vacuum: **−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)**



Is the inspection result normal?

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

2.REPLACE FUEL FILLER CAP

Replace fuel filler cap.

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.

>> INSPECTION END

P0460 FUEL LEVEL SENSOR

DTC Logic

INFOID:0000000012197922

DTC DETECTION LOGIC

NOTE:

- **If DTC P0460 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P0460 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-419, "DTC Logic".**

When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0460	FUEL LEV SEN SLOSH (Fuel level sensor circuit noise)	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The sensor circuit is open or shorted) • Combination meter • Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait maximum of 2 consecutive minutes.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-393, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197923

1.CHECK COMBINATION METER FUNCTION

Refer to MWI-22, "CONSULT Function".

Is the inspection result normal?

YES >> CHECK INTERMITTENT INCIDENT. Refer to GI-45, "Intermittent Incident".
NO >> Refer to MWI-54, "Component Function Check".

P0461 FUEL LEVEL SENSOR

DTC Logic

INFOID:0000000012197924

DTC DETECTION LOGIC

NOTE:

- **If DTC P0461 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P0461 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-419, "DTC Logic".**

Driving long distances naturally affect fuel gauge level.
This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0461	FUEL LEVEL SENSOR (Fuel level sensor circuit range/performance)	The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The sensor circuit is open or shorted) • Combination meter • Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-394, "Component Function Check".
Use component function check to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-395, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012197925

1.PRECONDITIONING

WARNING:
When performing following procedure, be sure to observe the handling of the fuel. Refer to FL-2, "General Precautions".
TESTING CONDITION:
Before starting component function check, preparation of draining fuel and refilling fuel is required.

Do you have CONSULT?

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

2.PERFORM COMPONENT FUNCTION CHECK

With CONSULT
NOTE:
Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-166, "Work Procedure".
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.
6. Select “FUEL LEVEL SE” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
7. Check “FUEL LEVEL SE” output voltage and note it.

8. Select “FUEL PUMP RELAY” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
9. Touch “ON” and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10. Check “FUEL LEVEL SE” output voltage and note it.
11. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
12. Check “FUEL LEVEL SE” output voltage and note it.
13. Confirm whether the voltage changes more than 0.03 V during step 7 to 10 and 10 to 12.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-395, "Diagnosis Procedure".

3. PERFORM COMPONENT FUNCTION CHECK

Without CONSULT

NOTE:

Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line. Refer to EC-166, "Work Procedure".
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch ON.
6. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
7. Confirm that the fuel gauge indication varies.
8. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
9. Confirm that the fuel gauge indication varies.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-395, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012197926

1. CHECK COMBINATION METER FUNCTION

Refer to MWI-22, "CONSULT Function".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Refer to MWI-54, "Component Function Check"

P0462, P0463 FUEL LEVEL SENSOR

DTC Logic

INFOID:0000000012197927

DTC DETECTION LOGIC

NOTE:

- **If DTC P0462 or P0463 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P0462 or P0463 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-419, "DTC Logic".**

This diagnosis indicates the former, to detect open or short circuit malfunction.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0462	FUEL LEVEL SEN/ CIRC (Fuel level sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (CAN communication line is open or shorted) • Harness or connectors (Fuel level sensor circuit is open or shorted) • Combination meter • Fuel level sensor
P0463	FUEL LEVEL SEN/ CIRC (Fuel level sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 11 V and 16 V at ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-396, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197928

1.CHECK COMBINATION METER FUNCTION

Refer to MWI-22, "CONSULT Function".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Refer to MWI-54, "Component Function Check"

P0500 VSS

EXCEPT FOR M/T MODELS

EXCEPT FOR M/T MODELS : Description

INFOID:0000000012197929

ECM receives vehicle speed signals from two different paths via CAN communication line: One is from the ABS actuator and electric unit (control unit) via the combination unit and the other is from TCM.

EXCEPT FOR M/T MODELS : DTC Logic

INFOID:0000000012197930

DTC DETECTION LOGIC

NOTE:

- If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-419, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0500	VEH SPEED SEN/CIRC (Vehicle speed sensor)	At 20 km/h (13 MPH), ECM detects the following status continuously for 5 seconds or more: The difference between a vehicle speed calculated by a output speed sensor transmitted from TCM to ECM via CAN communication and the vehicle speed indicated on the combination meter exceeds 15km/h (10 MPH).	• Harness or connector (CAN communication line is open or shorted.) • Combination meter • ABS actuator and electric unit (control unit) • Wheel sensor • TCM • Output speed sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is 10 V or more at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. Shift the selector lever to D range and wait at least for 2 seconds.
3. Drive the vehicle at least 5 seconds at 20 km/h (13 MPH) or more.

   CAUTION:

   Always drive vehicle at a safe speed.

   NOTE:

   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-397, "EXCEPT FOR M/T MODELS : Diagnosis Procedure"

NO >> INSPECTION END

EXCEPT FOR M/T MODELS : Diagnosis Procedure

INFOID:0000000012197931

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-203, "DTC Index".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-50, "DTC Index".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble shooting relevant to DTC indicated.

3.CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to MWI-33, "DTC Index".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform trouble shooting relevant to DTC indicated.

4.CHECK OUTPUT SPEED SENSOR

Check output speed sensor. Refer to TM-251, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace or replace error-detected parts.

5.CHECK WHEEL SENSOR

Check wheel sensor. Refer to BRC-88, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace or replace error-detected parts.

M/T MODELS

M/T MODELS : Description

INFOID:0000000012197932

The vehicle speed signal is sent to the combination meter from the “ABS actuator and electric unit (control unit)” via the CAN communication line. The combination meter then sends a signal to the ECM via the CAN communication line.

M/T MODELS : DTC Logic

INFOID:0000000012197933

DTC DETECTION LOGIC

NOTE:

- **If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-419, "DTC Logic".**

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

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

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

2.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 3.

3.CHECK VEHICLE SPEED SIGNAL

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

With CONSULT

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

Is the inspection result normal?

YES >> GO TO 4.
NO >> Proceed to EC-400, "M/T MODELS : Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Warm engine up to normal operating temperature.
3. Maintain the following conditions for at least 50 consecutive seconds.
   CAUTION:
   Always drive vehicle at a safe speed.

ENG SPEED	1,800 - 6,000 rpm
COOLAN TEMP/S	More than 65°C (149°F)
B/FUEL SCHDL	6.25 - 31.8 msec
Selector lever	Except Neutral position
PW/ST SIGNAL	OFF

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-400, "M/T MODELS : Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-399, "M/T MODELS : Component Function Check".
Use component function check to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-400, "M/T MODELS : Diagnosis Procedure".

M/T MODELS : Component Function Check

INFOID:0000000012197934

1.PERFORM COMPONENT FUNCTION CHECK

With GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed signal in Service $01 with GST.

The vehicle speed signal on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-400, "M/T MODELS : Diagnosis Procedure".

M/T MODELS : Diagnosis Procedure

INFOID:0000000012197935

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

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-50, "DTC Index".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to MWI-33, "DTC Index".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Perform trouble shooting relevant to DTC indicated.

P0501, P2159 VEHICLE SPEED SENSOR

Description

INFOID:0000000012197936

ECM receives a rear wheel sensor signal from ABS actuator and electric unit (control unit) via CAN communication to switch combustion for the direct injection gasoline system. For the direct injection gasoline system, refer toEC-51, "DIRECT INJECTION GASOLINE SYSTEM : System Description".

DTC Logic

INFOID:0000000012197937

DTC DETECTION LOGIC

NOTE:
If DTC P0501 or P2159 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to EC-115, "DTC Index".

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0501	VEHICLE SPEED SEN A (Vehicle speed sensor A range/ performance)	ECM detects a rear LH wheel sensor malfunction signal transmitted from the ABS actuator and electric unit (control unit) via CAN communication at least for 5 seconds in a row.	• Harness or connectors (The CAN communication line is open or shorted) • Rear LH wheel sensor • ABS actuator and electric unit (control unit)
P2159	Vehicle speed sensor B (Vehicle speed sensor B range/ performance)	ECM detects a rear RH wheel sensor malfunction signal transmitted from the ABS actuator and electric unit (control unit) via CAN communication at least for 5 seconds in a row.	• Harness or connectors (The CAN communication line is open or shorted) • Rear RH wheel sensor • ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 9 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-401, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197938

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

With CONSULT
Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-39, "CONSULT Function".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Perform Diagnosis Procedure corresponding to DTC indicated.

P0506 ISC SYSTEM

Description

INFOID:0000000012197939

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

INFOID:0000000012197940

DTC DETECTION LOGIC

NOTE:
If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0506	ISC SYSTEM (Idle speed control system RPM lower than expected)	The idle speed is less than the target idle speed by 100 rpm or more.	• Electric throttle control actuator • Intake air leak

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

If the target idle speed is out of the specified value, perform EC-162, "Description", before conducting DTC Confirmation Procedure.
TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.**
- **Always perform the test at a temperature above −10°C (14°F).**

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-402, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197941

1.CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Discover air leak location and repair.

NO >> Replace ECM. Refer to EC-590, "Removal and Installation".

P0507 ISC SYSTEM

Description

INFOID:0000000012197942

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

INFOID:0000000012197943

DTC DETECTION LOGIC

NOTE:
If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0507	ISC SYSTEM (Idle speed control system RPM higher than expected)	The idle speed is more than the target idle speed by 200 rpm or more.	• Electric throttle control actuator • Intake air leak • PCV system

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

If the target idle speed is out of the specified value, perform EC-162, "Description", before conducting DTC Confirmation Procedure.
TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.**
- **Always perform the test at a temperature above −10°C (14°F).**

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-404, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197944

1.CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Discover air leak location and repair.
NO >> Replace ECM. Refer to EC-590, "Removal and Installation".

P050A, P050E COLD START CONTROL

Description

INFOID:0000000012197945

ECM controls ignition timing and engine idle speed when engine is started with pre-warming up condition. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

DTC Logic

INFOID:0000000012197946

DTC DETECTION LOGIC

NOTE:
If DTC P050A, P050B or P050E is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P050A	Cold start idle air control system performance	ECM does not control engine idle speed properly when engine is started with pre-warming up condition.	• Lack of intake air volume • Fuel injection system • ECM
P050E	Cold start engine exhaust temperature too low	The temperature of the catalyst inlet does not rise to the proper temperature when the engine is started with pre-warming up condition.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
4. Check the indication of “COOLAN TEMP/S”.

With GST
Follow the procedure “With CONSULT” above.

Is the value of “COOLAN TEMP/S” between 4°C (39°F) and 36°C (97°F)?

YES >> GO TO 3.
NO-1 [If it is below 4°C (39°F)]>>Warm up the engine until the value of “COOLAN TEMP/S” reaches 4°C (39°F) or more. Retry from step 1.
NO-2 [If it is above 36°C (97°F)]>>Cool engine down to less than 36°C (97°F). Retry from step 1.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT
1. Set the select lever in N range.
2. Start the engine and warm up in idle with the value of “COOLAN TEMP/S” between 5°C (41°F) and 40°C (104°F) for more than 15 seconds.
3. Check 1st trip DTC.

With GST
Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-407, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197947

1.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-162, "Description".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 2.
NO >> Follow the instruction of Idle Air Volume Learning.

2.CHECK INTAKE SYSTEM

Check for the cause of intake air volume lacking. Refer to the following.
- Crushed intake air passage
- Intake air passage clogging
- Clogging of throttle body

Is the inspection result normal?

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

3.CHECK FUEL INJECTION SYSTEM FUNCTION

Perform DTC Confirmation Procedure for DTC P0171. Refer to EC-297, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Proceed to EC-298, "Diagnosis Procedure" for DTC P0171.

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC Confirmation Procedure.
   See EC-406, "DTC Logic".

Is the 1st trip DTC P050A or P050E displayed again?

YES >> Replace ECM. Refer to EC-590, "Removal and Installation",
NO >> INSPECTION END

P0520 EOP SENSOR

DTC Logic

INFOID:0000000012197948

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	Detecting condition	Possible cause
P0520	EOP SENSOR/SWITCH [Engine oil pressure (EOP) sensor circuit]	Signal voltage from the EOP sensor remains at more than 4.9 V / less than 0.26 V for 5 seconds or more.	• Harness or connectors (EOP sensor circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted) (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) • Engine oil level abnormality • EOP sensor • Camshaft position sensor • Fuel rail pressure sensor • Battery current sensor • G sensor • Exhaust valve timing control position sensor • Accelerator pedal position sensor 2 • Turbocharger boost sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-408, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197949

1.CHECK ENGINE OIL

1. Turn ignition switch OFF.
2. Check engine oil level and pressure. Refer to LU-9, "Inspection".

Is inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK EOP SENSOR POWER SUPPLY-I

1. Disconnect EOP sensor connector.
2. Turn ignition switch ON.
3. Check the voltage between EOP sensor harness connector terminals.

EOP sensor			Voltage (Approx.)
Connector	+	–	
	terminal		
F43	3	1	5 V

Inspection result normal?

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

3.CHECK EOP SENSOR POWER SUPPLY-II

Check the voltage between EOP sensor harness connector and the ground.

+		–	Voltage (Approx.)
EOP sensor			
Connector	Terminal		
F43	3	Ground	5 V

Is inspection result normal?

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

4.CHECK SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F25	39	FRP sensor	F5	1
		EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
F26	68	Battery current sensor	F52	1
		G sensor	B32	3
	72	CMP sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

5.CHECK EOP SENSOR GROUND CIRCUIT

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

+		–		Continuity
EOP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F43	1	F25	44	Existed

4. Also check harness for short to power.

Is inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		–	Continuity
ECM			
Connector	Terminal		
F25	1	Ground	Existed
	2		
E18	123		
	124		
	127		

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

7.CHECK EOP SENSOR SIGNAL CIRCUIT

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

+		–		Continuity
EOP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F43	2	F25	43	Existed

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

Is inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8.CHECK EOP SENSOR

Refer to EC-410, "Component Inspection".

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection

INFOID:0000000012197950

1.CHECK EOP SENSOR

1. Turn ignition switch OFF.
2. Disconnect EOP sensor harness connector.
3. Check resistance between EOP sensor connector terminals.

EOP sensor		Condition	Resistance (kΩ)
+	–		
Terminal			
1	2	None	4 kΩ – 10 kΩ
	3		2 kΩ – 8 kΩ
2	1		4 kΩ – 10 kΩ
	3		1 kΩ – 3 kΩ
3	1		2 kΩ – 8 kΩ
	2		1 kΩ – 3 kΩ

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Replace EOP sensor. Refer to EM-114, "Exploded View".

P0524 ENGINE OIL PRESSURE

DTC Logic

INFOID:0000000012197951

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0524	ENGINE OIL PRESSURE (Engine oil pressure too low)	An EOP sensor signal voltage applied to ECM remains lower than the specified value continuously for 10 seconds or more when the engine speed is 1,000 rpm or more.	• Decrease in engine oil pressure • Decrease in engine oil level • Engine oil condition • EOP sensor • Engine body

DTC CONFIRMATION PROCEDURE

CAUTION:

If "EC-413, "Diagnosis Procedure"" is unfinished, be sure to perform Step 3 and 4.

1.PRECONDITIONING-1

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:

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

>> GO TO 2.

2.PRECONDITIONING-2

Is "Diagnosis Procedure" of DTC P0524 finished?

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

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Maintain the following conditions for about 10 consecutive seconds.

Selector lever	P or N position
Engine coolant temperature	70°C (158°F) or more
Engine speed	1,000 rpm or more

NOTE:

With engine speed set around 4,000 rpm, the phenomenon can be reproduced more easily.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-413, "Diagnosis Procedure".
NO >> INSPECTION END

4.CHECK ENGINE OIL LEVEL

Check engine oil pressure. Refer to LU-9, "Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Proceed to EC-413, "Diagnosis Procedure".

5.CHECK ENGINE OIL PRESSURE

With CONSULT

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Start the engine and check that “EOP SENSOR” changes, according to engine speeds.

Monitor item	Condition		Value (Approx.)
EOP SENSOR	• Engine oil temperature: 80°C (176°F) • Selector lever: P or N position • Air conditioner switch: OFF • No load	Engine speed: Idle	1,450 mV or more
		Engine speed: 2,000 rpm	2,850 mV or more

Without CONSULT
Check engine oil level. Refer to LU-9, "Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Proceed to EC-413, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012197952

1.CHECK ENGINE OIL LEVEL

1. Turn ignition switch OFF.
2. Check engine oil level. Refer to LU-9, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 4.

2.CHECK ENGINE OIL PRESSURE

With CONSULT
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Start the engine and check that “EOP SENSOR” changes, according to engine speeds.

Monitor item	Condition		Value (Approx.)
EOP SENSOR	• Engine oil temperature: 80°C (176°F) • Selector lever: P or N position • Air conditioner switch: OFF • No load	Engine speed: Idle	1,450 mV or more
		Engine speed: 2,000 rpm	2,850 mV or more

Without CONSULT
Check engine oil pressure. Refer to LU-9, "Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check oil pump. Refer to LU-18, "Inspection".

3.CHECK EOP SENSOR

Check EOP sensor. Refer to EC-414, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

4.CHECK ENGINE OIL LEAKAGE

Check engine oil leakage. Refer to LU-8, "Engine Lubrication System".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK CAUSE OF ENGINE OIL CONSUMPTION

Check the following item.

Step	Inspection item	Equipment	Standard	Reference
1	PCV valve	EC-589, "Inspection"		
2	Turbocharger	EM-41, "Inspection"		
3	Exhaust front tube	Visual	• No blocking • No abnormal sounds	—
4	Oil pump	Visual	• No blocking • No abnormal sounds	—
4	Oil pump	LU-18, "Inspection"		
5	• Piston • Piston pin • Piston ring	• Piston to piston pin oil clearance • Piston ring side clearance • Piston ring end gap		EM-133, "Description"
6	Cylinder block	• Cylinder block top surface distortion • Piston to cylinder bore clearance		EM-123, "Inspection"

>> Repair or replace error-detected parts.

Component Inspection

INFOID:0000000012197953

1.CHECK EOP SENSOR

1. Turn ignition switch OFF.
2. Disconnect EOP sensor harness connector.
3. Check resistance between EOP sensor connector terminals.

EOP sensor		Condition	Resistance (kΩ)
+	–		
Terminal			
1	2	None	4 kΩ – 10 kΩ
	3		2 kΩ – 8 kΩ
2	1		4 kΩ – 10 kΩ
	3		1 kΩ – 3 kΩ
3	1		2 kΩ – 8 kΩ
	2		1 kΩ – 3 kΩ

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Replace EOP sensor. Refer to EM-114, "Exploded View".

P0603 ECM

DTC Logic

INFOID:0000000012197954

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0603	ECM BACK UP CIRCUIT [Internal control module keep alive memory (KAM) error]	• Malfunction in the internal back up RAM of ECM. • Malfunction in the internal EEP-ROM system of ECM.	• ECM power supply • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Repeat step 1 and 2 for 10 times.
4. Turn ignition switch ON.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-415, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197955

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Perform trouble diagnosis for ECM power supply and ground circuit. Refer to EC-187, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to EC-415, "DTC Logic".

Is the 1st trip DTC P0603 displayed again?

YES >> Replace ECM. Refer to EC-590, "Removal and Installation".
NO >> INSPECTION END

P0604 ECM

DTC Logic

INFOID:0000000012197956

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0604	ECM [Internal control module random access memory (RAM) error]	Malfunction in the internal RAM of ECM.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON (engine stopped) and wait least 20 minutes.
   CAUTION:
   Never start engine during this procedure.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-416, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197957

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to EC-416, "DTC Logic".

Is the 1st trip DTC P0604 displayed again?

YES >> Replace ECM. Refer to EC-590, "Removal and Installation".
NO >> INSPECTION END

P0605 ECM

DTC Logic

INFOID:0000000012197958

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0605	ECM [Internal control module read only memory (ROM) error]	Malfunction in the internal ROM of ECM.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON (engine stopped) and wait least 20 minutes.
   CAUTION:
   Never start engine during this procedure.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-417, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197959

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to EC-417, "DTC Logic".

Is the 1st trip DTC P0605 displayed again?

YES >> Replace ECM. Refer to EC-590, "Removal and Installation".
NO >> INSPECTION END

P0606 ECM

DTC Logic

INFOID:0000000012197960

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0606	CONTROL MODULE (Control module processor)	Malfunction in ECM processor.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Turn ignition switch ON (engine stopped) and wait at least 10 seconds.
   CAUTION:
   Never start engine during this procedure.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-418, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Start engine.
2. Rev up the engine quickly to approximately 3,000 rpm under unloaded condition and completely release the accelerator pedal.
3. Let the engine idle and wait at least 10 seconds.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-418, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197961

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure for 3 times. Refer to EC-418, "DTC Logic".

Is the 1st trip DTC P0606 displayed again?

YES >> Replace ECM. Refer to EC-590, "Removal and Installation".
NO >> INSPECTION END

P0607 ECM

DTC Logic

INFOID:0000000012197962

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0607	ECM (Control module performance)	ECM internal communication system is malfunctioning.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON (engine stopped) and wait least 10 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-419, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197963

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to EC-419, "DTC Logic".

Is the 1st trip DTC P0607 displayed again?

YES >> Replace ECM. Refer to EC-590, "Removal and Installation".
NO >> INSPECTION END

P060A ECM

DTC Logic

INFOID:0000000012197964

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P060A	CONTROL MODULE (Internal control module monitoring processor performance)	ECM internal monitoring processor is malfunctioning.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 10 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Repeat step 1 and 2 for 5 times.
4. Turn ignition switch ON.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-420, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197965

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to EC-420, "DTC Logic".

Is the 1st trip DTC P060A displayed again?

YES >> Replace ECM. Refer to EC-590, "Removal and Installation".
NO >> INSPECTION END

P060B ECM

DTC Logic

INFOID:0000000012197966

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P060B	CONTROL MODULE (Internal control module A/D processing performance)	ECM internal analog/digital conversion processing system is malfunctioning.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON (engine stopped) and wait least 10 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-421, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197967

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to EC-421, "DTC Logic".

Is the 1st trip DTC P060B displayed again?

YES >> Replace ECM. Refer to EC-590, "Removal and Installation".
NO >> INSPECTION END

P0611 ECM PROTECTION

Description

INFOID:0000000012197968

This DTC is detected when the ECM protective function is activated due to an extreme temperature increase in ECM, resulting from severe conditions such as heavy load driving.

DTC Logic

INFOID:0000000012197969

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0611	FIC MODULE (ECM protection)	ECM overheat protection control is activated.	ECM overheated

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

This DTC is displayed as protection function history. If no malfunction is detected after the diagnosis, the customer must be informed of the activation of the protection function.

>> Proceed to EC-422, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012197970

1.INSPECTION START

1. Perform DTC confirmation procedure. Refer to EC-417, "DTC Logic".
2. Check 1st trip DTC.

Is DTC P0605 detected?

YES >> Proceed to EC-417, "Diagnosis Procedure".
NO >> Explain the customer about the activation of the protection function.

P062B ECM

Description

INFOID:0000000012197971

This DTC is detected when the ECM-integrated injector driver unit has a malfunction. For injector driver unit, refer to EC-33, "ECM".

DTC Logic

INFOID:0000000012197972

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P062B	ECM (Internal control module fuel injector control performance)	Injector driver unit is malfunctioning.	• Harness and connectors (Injector circuit is open or shorted) • Battery power supply • ECM (injector driver unit)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and keep the engine speed at idle for 30 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-423, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197973

1.CHECK FUEL INJECTOR

Check fuel injector. Refer toEC-541, "Component Function Check".

Is inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure again. Refer to EC-423, "DTC Logic".
4. Check 1st trip DTC.

Is the DTC P062B displayed again?

YES >> Replace ECM. Refer to EC-590, "Removal and Installation".
NO >> INSPECTION END

P0643 SENSOR POWER SUPPLY

DTC Logic

INFOID:0000000012197974

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0643	SENSOR POWER/ CIRC (Sensor power supply circuit short)	ECM detects a voltage of power source for sensor is excessively low or high.	• Harness or connectors (Refrigerant pressure sensor circuit is open or shorted.) (Crankshaft position sensor circuit is open or shorted) (Accelerator pedal position sensor 1 circuit is open or shorted.) (Throttle position sensor circuit is open or shorted.) (EVAP control pressure sensor circuit is open or shorted.) • Refrigerant pressure sensor • Crankshaft position sensor • Accelerator pedal position sensor 1 • Throttle position sensor • EVAP control pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to EC-424, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197975

1.CHECK SENSOR POWER SUPPLY

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

+		–	Voltage (Approx.)
ECM			
Connector	Terminal		
F25	23	Ground	5 V
F26	58		
	62		
E18	101		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY ROUTING CIRCUIT FOR SHORT

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F25	23	Refrigerant pressure sensor	E49	3
		EVAP control system pressure sensor	B22	3
F26	58	CKP sensor	F107	3
	62	TP sensor	F29	1
E18	101	APP sensor	E101	4

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK COMPONENTS

Check the following.
- Refrigerant pressure sensor
  Refer to EC-568, "Diagnosis Procedure".
- EVAP control system pressure sensor
  Refer to EC-379, "Component Inspection".
- Crankshaft position sensor
  Refer to EC-345, "Component Inspection".
- Throttle position sensor
  Refer to EC-254, "Component Inspection".
- Accelerator pedal position sensor
  Refer to EC-518, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace malfunctioning component.

P0850 PNP SWITCH

Description

INFOID:0000000012197976

For CVT models, transmission range switch is turn ON when the selector lever is P or N.
For M/T models, park/neutral position (PNP) range switch is ON when the selector lever is Neutral position.
ECM detects the position because the continuity of the line (the ON) exists.

DTC Logic

INFOID:0000000012197977

DTC DETECTION LOGIC

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

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

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

2.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 3.

3.CHECK PNP SIGNAL FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode of “ENGINE” using CONSULT. Then check the “P/N POSI SW” signal as per the following conditions.

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

Is the inspection result normal?

YES >> GO TO 4.
NO >> Proceed to EC-427, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Start engine and warm it up to normal operating temperature.

3. Maintain the following conditions for at least 60 consecutive seconds.
CAUTION:
Always drive vehicle at a safe speed.

ENG SPEED	1,400 - 6,375 rpm (CVT) 1,675 - 6,375 rpm (M/T)
COOLAN TEMP/S	More than 65°C (149°F)
B/FUEL SCHDL	1.6 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 mph)
Selector lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-427, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-427, "Component Function Check".
NOTE:
Use component function check the overall function of the transmission range switch circuit (CVT models) or the park/neutral position (PNP) switch circuit (M/T models). During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-427, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012197978

1.PERFORM COMPONENT FUNCTION CHECK

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

ECM			Condition		Voltage (Approx.)
Connector	+	–			
	Terminal				
E18	103	127	Selector lever	P or N (CVT) Neutral (M/T)	0 V
				Except above	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-427, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012197979

1.INSPECTION START

Check which type of transmission the vehicle is equipped with.

Which type of transmission?

CVT >> GO TO 2.
M/T >> GO TO 6.

2.CHECK TRANSMISSION RANGE SWITCH POWER SUPPLY

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

+		–	Voltage
Transmission range switch			
Connector	Terminal		
F27	1	Ground	Battery voltage

Is the inspection result normal?

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

3.CHECK TRANSMISSION RANGE SWITCH POWER SUPPLY CIRCUIT

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

+		–		Continuity
Transmission range switch		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F27	1	E15	58	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK TRANSMISSION RANGE SWITCH SIGNAL CIRCUIT

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

+		–		Continuity
Transmission range switch		ECM		
Connector	Terminal	Connector	Terminal	
F27	2	E18	103	Existed

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

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK TRANSMISSION RANGE SWITCH

Check the transmission range switch. Refer to TM-243, "Component Inspection (Transmission Range Switch)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace transmission range switch. Refer to TM-326, "Removal and Installation".

6.CHECK PARK/NEUTRAL POSITION (PNP) SWITCH POWER SUPPLY

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

+		–	Voltage
PNP switch			
Connector	Terminal		
F56	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.
NO >> Perform the trouble diagnosis for power supply circuit.

7. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT

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

+		–		Continuity
PNP switch		ECM		
Connector	Terminal	Connector	Terminal	
F56	1	E18	103	Existed

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

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8. CHECK PNP SWITCH

Check the PNP switch. Refer to TM-20, "PARK/NEUTRAL POSITION (PNP) SWITCH : Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace PNP switch. Refer to TM-24, "Removal and Installation".

P1078 EVT CONTROL POSITION SENSOR

DTC Logic

INFOID:0000000012197980

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1078	EXH TIM SEN/CIRC-B1 (Exhaust valve timing control position sensor circuit)	An excessively high or low voltage from the sensor is sent to ECM.	• Harness or connectors (Exhaust valve timing control position sensor circuit is open or shorted) (Camshaft position sensor circuit is open or shorted) (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) • Accumulation of debris to the signal pick-up portion of the camshaft • Exhaust valve timing control position sensor • Crankshaft position sensor • Camshaft position sensor • Fuel rail pressure sensor • Battery current sensor • G sensor • Accelerator pedal position sensor 2 • Turbocharger boost sensor • Engine oil pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-430, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197981

1.CHECK EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect exhaust valve timing (EVT) control position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVT control position sensor harness connector and ground.

+		–	Voltage (Approx.)
EVT sensor			
Connector	Terminal		
F110	1	Ground	5 V

Is the inspection result normal?

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

2.CHECK SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F25	39	FRP sensor	F5	1
		EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
F26	68	Battery current sensor	F52	1
		G sensor	B32	3
	72	CMP sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK EVT CONTROL POSITION SENSOR GROUND CIRCUIT

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

+		–		Continuity
EVT control position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F110	2	F26	59	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK EVT CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between EVT control position sensor harness connector and ECM harness connector.

+		–		Continuity
EVT control position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F110	3	F26	67	Existed

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

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK EVT CONTROL POSITION SENSOR

Check the EVT control position sensor. Refer to EC-432, "Component Inspection".

Is the inspection result normal?

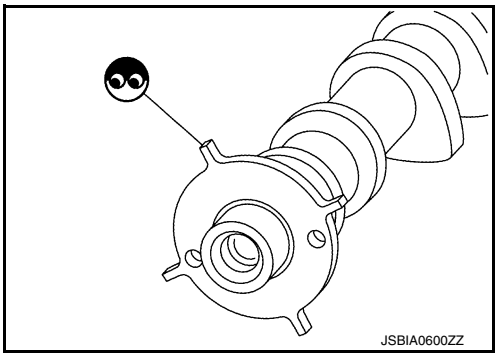
YES >> GO TO 6.
NO >> Replace EVT control position sensor. Refer to EM-89, "Removal and Installation".

6.CHECK CAMSHAFT (EXT)

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

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-89, "Removal and Installation".



Component Inspection

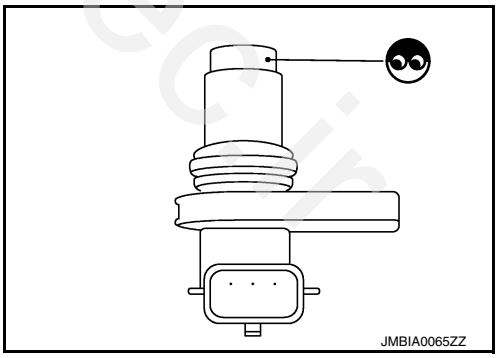
INFOID:0000000012197982

1.EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR-I

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

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace EVT control position sensor. Refer to EM-76, "Exploded View".



2.EVT CONTROL POSITION SENSOR-II

Check resistance EVT control position sensor terminals as shown below.

EVT control position sensor		Resistance
+	–	
Terminal		
1	2	Except 0 or ∞ Ω [at 25°C (77°F)]
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVT control position sensor. Refer to EM-76, "Exploded View".

P1148 CLOSED LOOP CONTROL

DTC Logic

INFOID:0000000012197983

DTC DETECTION LOGIC

NOTE:
DTC P1148 is displayed with DTC for A/F sensor 1.
When the DTC is detected, perform the trouble diagnosis of DTC corresponding to A/F sensor 1.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1148	CLOSED LOOP-B1 (Closed loop control function)	The closed loop control function does not operate even when vehicle is being driven in the specified condition.	• Harness or connectors (A/F sensor 1 circuit is open or shorted.) • A/F sensor 1 • A/F sensor 1 heater

Diagnosis Procedure

INFOID:0000000012197984

DTC P1148 is displayed with DTC for A/F sensor 1.
When the DTC is detected, perform the trouble diagnosis of DTC corresponding to A/F sensor 1.
Refer to EC-115, "DTC Index".

P1197 OUT OF GAS

Description

INFOID:0000000012197985

This diagnosis result is detected when the fuel level of the fuel tank is extremely low and the engine does not run normally.

DTC Logic

INFOID:0000000012197986

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1197	FUEL RUN OUT (Out of gas)	• Fuel rail pressure remains at 1.1 MPa (11 bar, 11.2 kg/cm^2, 159.5 psi) or less for 5 seconds or more with the fuel level too low. • Fuel rail pressure remains 2.7 MPa (27 bar, 27.5 kg/cm^2, 392 psi) lower than a target fuel pressure for 5 seconds or more with the fuel level too low.	• Out of gas • Harness or connectors (Low pressure fuel pump circuit is open or shorted.) • Low pressure fuel pump • Fuel pressure regulator • Low pressure fuel system • Harness or connectors (High pressure fuel pump circuit is shorted.) • High pressure fuel pump • High pressure fuel system • Fuel rail pressure sensor • Disconnection of the fuel hose

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

Start the engine.

Does the engine start?

YES >> GO TO 3.
NO >> Proceed to EC-435, "Diagnosis Procedure".

3.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Warm up the engine to the normal operating temperature.
   NOTE:
   For best results, warm up the engine until “COOLAN TEMP/S” on “DATA MONITOR” mode of “ENGINE” using CONSULT reaches at least 70°C (158°F).
2. Keep the engine speed at 3,500 rpm for 5 seconds and let it idle at least 60 seconds.
3. Check the 1st trip DTC.
   NOTE:
   If the fuel tank has sufficient fuel, this diagnosis result may not be detected.

Is 1st trip DTC detected?

YES >> Proceed to EC-435, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197987

1.REFUEL THE VEHICLE

1. Refuel 10 liter (10 US qt, 8 imp qt).
   CAUTION:
   Never refuel more than 10 liter.
2. Start the engine and keep the engine speed at 3,000 rpm for 30 seconds.
   NOTE:
   For best results, warm up the engine until “COOLAN TEMP/S” on “DATA MONITOR” mode of “ENGINE” using CONSULT reaches at least 70°C (158°F).
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Turn ignition switch ON.
7. Erase the DTC.
8. Start the engine and let it idle at least 60 seconds.
9. Perform DTC confirmation procedure again. Refer to EC-435, "DTC Logic".

Is 1st trip DTC detected?

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

2.CHECK LOW PRESSURE FUEL PUMP

Refer to EC-546, "Component Function Check" .

Is inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK HIGH PRESSURE FUEL PUMP

Refer to EC-549, "Component Function Check".

Is inspection result normal?

YES >> Check the fuel hose for disconnection and looseness.
NO >> Repair or replace error-detected parts.

P119A, P119B FUEL RAIL PRESSURE SENSOR

DTC Logic

INFOID:0000000012197988

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P119A	FUEL PRESSURE SENSOR (Fuel pressure sensor)	All of the following conditions are satisfied: • Battery voltage: 8 V or more • Under engine start condition • Engine coolant temperature at previous ignition switch OFF: 65°C (149°F) or more • Engine coolant temperature: 35°C (65°F) or less • Temperature difference between engine coolant and intake air: Less than 6°C (42°F) • Fuel rail pressure: Less than 1.0 MPa (10.2 kg/cm^2, 145 psi) (calculated by ECM) • Fuel system monitor: Excessively RICH	• Harness or connectors (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) • Fuel rail pressure sensor • Battery current sensor • G sensor • Camshaft position sensor • Exhaust valve timing control position sensor • Accelerator pedal position sensor 2 • Turbocharger boost sensor • Engine oil pressure sensor
P119B	FUEL PRESSURE SENSOR (Fuel pressure sensor)	All of the following conditions are satisfied: • Battery voltage: 8 V or more • Ignition switch: ON (engine stopped) • Engine coolant temperature at previous ignition switch OFF: 65°C (149°F) or more • Engine coolant temperature: 35°C (65°F) or less • Temperature difference between engine coolant and intake air: Less than 6°C (42°F) • Fuel rail pressure: More than 1.5 MPa (15.3 kg/cm^2, 217 psi) (calculated by ECM) • Fuel system monitor: Excessively LEAN	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING-1

If DTC Confirmation Procedure is previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, check that battery voltage is 9 V or more with ignition switch ON.

>> GO TO 2.

2.PRECONDITIONING-2

NOTE:

- When it is certain that the previous driving is performed with the engine warmed up, the next steps can be performed.
- When it is difficult to satisfy the conditions, performing Component Function Check can identify the presence or absence of malfunction in the part/system that may result in a possible cause of this DTC. (Perform DTC Confirmation Procedure as much as possible.)

1. Start the engine and warm it up until engine coolant temperature reaches 70°C (158°F) or more.
2. Stop the engine and leave the vehicle in a cool place (soak the engine) until the engine coolant temperature reaches 35°C (95°F) or less.

CAUTION:

- **The difference between air temperature and engine coolant temperature must be 5°C (9°F) or less.**
- **Never turn ignition switch ON during soak the engine.**

Are the conditions satisfied?

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

3. COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch OFF.
2. Start the engine.
3. On CONSULT screen, select “DATA MONITOR” mode of “ENGINE”.
4. Check the value of “FUEL PRES SEN V” under the following conditions.

Monitor Item	Condition	Values/Status
FUEL PRES SEN V	Engine speed: Idle	1,140 – 1,460 mV
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,300 – 2,900 mV

Without CONSULT

1. Turn ignition switch OFF.
2. Start the engine.
3. Check fuel rail pressure sensor signal voltage.

ECM			Condition	Value (Approx.)
Connector	+	–		
	Terminal			
F5	2	3	[Engine is running] • Warm-up condition • Idle speed	1.14 – 1.46 V
			[Engine is running] • Warm-up condition • Revving engine from idle to 4,000 rpm quickly	1.3 – 2.9 V

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Proceed to EC-438, "Diagnosis Procedure".

4. PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

1. Turn ignition switch ON (engine stopped).
2. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “COOLAN TEMP/S” and “INT/A TEMP SE”.
3. Check that the indicated value of “COOLAN TEMP/S” is less than 35°C (95°F).
4. Check that the difference between “INT/A TEMP SE” and “COOLAN TEMP/S” is 5°C (9°F) or less.
5. Check “Self-diagnostic result” of “ENGINE”.

Is the DTC detected?

YES >> Proceed to EC-438, "Diagnosis Procedure".
NO-1 (Conditions satisfied)>>GO TO 5.
NO-2 (Conditions not satisfied)>>GO TO 2.

5. PERFORM DTC CONFIRMATION PROCEDURE-2

1. Start the engine (or cranking) at least 1 second.
2. Check “Self-diagnostic result” of “ENGINE”.

Is the DTC detected?

YES >> Proceed to EC-438, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-45, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000012197989

NOTE:

Turning the ignition switch ON with FRP sensor harness connector disconnected causes ECM to detect DTC P119A and P119B. Be sure to erase the DTC when the diagnosis procedure.

1.CHECK FUEL RAIL PRESSURE (FRP) SENSOR POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect FRP sensor connector.
3. Turn ignition switch ON.
4. Check the voltage between FRP sensor harness connector terminals.

FRP sensor			Voltage (Approx.)
Connector	+ terminal	–	
F5	1	3	5 V

Inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FRP SENSOR POWER SUPPLY-2

Check the voltage between FRP sensor harness connector and the ground.

+		–	Voltage (Approx.)
FRP sensor			
Connector	Terminal		
F5	1	Ground	5 V

Is inspection result normal?

YES >> GO TO 5.
NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F5	1	F25	39	Existed

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

Is inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F25	39	FRP sensor	F5	1
		EOP sensor	F43	3
		Turbocharger boost sensor	F75	1

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F26	68	Battery current sensor	F52	1
		G sensor	B32	3
	72	CMP sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected part.

5.CHECK FRP SENSOR GROUND CIRCUIT

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

+		–		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F5	3	F25	44	Existed

4. Also check harness for short to power.

Is inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and the ground.

ECM		Ground	Continuity
Connector	Terminal		
F25	1	Ground	Existed
	2		
E18	123		
	124		
	127		

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

7.CHECK FRP SENSOR SIGNAL CIRCUIT

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

+		–		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F5	2	F25	18	Existed

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

Is inspection result normal?

YES >> Replace fuel rail pressure sensor. Refer to EM-54, "Exploded View".
NO >> Repair or replace error-detected parts.

P119C FUEL RAIL PRESSURE SENSOR

DTC Logic

INFOID:0000000012197990

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P119C	FUEL PRESSURE SENSOR (Fuel pressure sensor)	All of the following conditions are satisfied: • Battery voltage: 8 V or more • Engine speed: 50 rpm or more • Engine coolant temperature: With a background of 65°C (149°F) or more during the trip • Remaining fuel amount: 15% or more • Fuel cut: No • Rail pressure between MAX and MIN differs more than 0.05 MPa (0.51 kg/cm^2, 7.25 psi).	• Harness or connectors (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) • Fuel rail pressure sensor • Battery current sensor • G sensor • Camshaft position sensor • Exhaust valve timing control position sensor • Accelerator pedal position sensor 2 • Turbocharger boost sensor • Engine oil pressure sensor

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P119C is displayed with DTC P0190, first perform the confirmation procedure (trouble diagnosis) for DTC P0190.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to EC-312, "DTC Logic".
NO >> GO TO 2.

2.PRECONDITIONING-1

If DTC Confirmation Procedure is previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- **Before performing the following procedure, check that battery voltage is 9 V or more with ignition switch ON.**
- **Remaining fuel amount must be 15% or more.**

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and warm it up until the engine coolant temperature reaches 70°C (158°F) or more.
2. Drive the vehicle and accelerate 3 consecutive seconds or more with the engine speed 1,500 rpm or more.
3. Check “Self-diagnostic result” of “ENGINE”.

Is the DTC detected?

YES >> Proceed to EC-443, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-45, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000012197991

NOTE:
Turning the ignition switch ON with FRP sensor harness connector disconnected causes ECM to detect DTC P119C. Be sure to erase the DTC when the diagnosis procedure.

1.CHECK DTC PRIORITY

If DTC P119C is displayed with DTC P0190, first perform the confirmation procedure (trouble diagnosis) for DTC P0190.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to EC-312, "DTC Logic".
NO >> GO TO 2.

2.CHECK FUEL RAIL PRESSURE (FRP) SENSOR POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect FRP sensor connector.
3. Turn ignition switch ON.
4. Check the voltage between FRP sensor harness connector terminals.

FRP sensor			Voltage (Approx.)
Connector	+ terminal	–	
F5	1	3	5 V

Inspection result normal?

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

3.CHECK FRP SENSOR POWER SUPPLY-2

Check the voltage between FRP sensor harness connector and the ground.

+		–	Voltage (Approx.)
FRP sensor			
Connector	Terminal		
F5	1	Ground	5 V

Is inspection result normal?

YES >> GO TO 6.
NO >> GO TO 4.

4.CHECK SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F5	1	F25	39	Existed

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

Is inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F25	39	FRP sensor	F5	1
		EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
F26	68	Battery current sensor	F52	1
		G sensor	B32	3
	72	CMP sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected part.

6.CHECK FRP SENSOR GROUND CIRCUIT

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

+		–		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F5	3	F25	44	Existed

4. Also check harness for short to power.

Is inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and the ground.

ECM		Ground	Continuity
Connector	Terminal		
F25	1	Ground	Existed
	2		
E18	123		
	124		
	127		

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

8.CHECK FRP SENSOR SIGNAL CIRCUIT

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

+		–		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F5	2	F25	18	Existed

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

Is inspection result normal?

YES >> Replace fuel rail pressure sensor. Refer to EM-54, "Exploded View".
NO >> Repair or replace error-detected parts.

P1212 TCS COMMUNICATION LINE

Description

INFOID:0000000012197992

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

DTC Logic

INFOID:0000000012197993

DTC DETECTION LOGIC

NOTE:
- **If DTC P1212 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-195, "DTC Logic".**
- **If DTC P1212 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-419, "DTC Logic".**

Freeze frame data is not stored in the ECM for this self-diagnosis.

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-446, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197994

Perform the trouble diagnosis for TCS. Refer to BRC-59, "Work Flow".
NOTE:
If DTC P1212 is displayed with DTC UXXXX and/or P0607, perform the following trouble diagnosis.
- Trouble diagnosis for DTC UXXXX Refer to EC-115, "DTC Index".
- Trouble diagnosis for DTC P0607 Refer to EC-419, "DTC Logic".

P1217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000012197995

DTC DETECTION LOGIC

NOTE:

- **If DTC P1217 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P1217 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-419, "DTC Logic".**

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1217	ENG OVER TEMP [Engine over temperature (Overheat)]	• Cooling fan does not operate properly (Overheat). • Cooling fan system does not operate properly (Overheat). • Engine coolant was not added to the system using the proper filling method. • Engine coolant is not within the specified range.	• Harness or connectors (Cooling fan circuit is open or shorted.) • IPDM E/R • Cooling fan control module • Cooling fan motor • Radiator hose • Radiator • Radiator cap • Reservoir tank • Water pump • Thermostat • Water control valve

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to CO-10, "Draining". Also, replace the engine oil. Refer to CO-11, "Refilling".

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-13, "Anti-Freeze Coolant Mixture Ratio".**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-447, "Component Function Check".

NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-448, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012197996

1.PERFORM COMPONENT FUNCTION CHECK-I

WARNING:

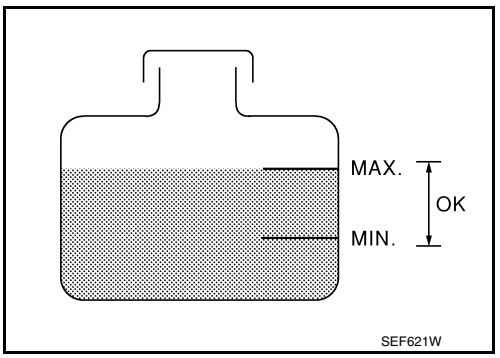
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

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

Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.

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

YES >> Proceed to EC-448, "Diagnosis Procedure".
NO >> GO TO 2.



2.PERFORM COMPONENT FUNCTION CHECK-II

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

YES >> Proceed to EC-448, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

With CONSULT
1. Turn ignition switch ON.
2. Perform “FAN DUTY CONTROL” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Check that cooling fan speed varies according to the percentage.

Without CONSULT
1. Activate IPDM E/R auto active test and check cooling fan motors operation. Refer to PCS-12, "Diagnosis Description".
2. Check that cooling fan operates.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-448, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012197997

1.CHECK COOLING FAN OPERATION

With CONSULT
1. Turn ignition switch ON.
2. Perform “FAN DUTY CONTROL” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Check that cooling fan speed varies according to the percentage.

Without CONSULT
1. Activate IPDM E/R auto active test and check cooling fan motors operation. Refer to PCS-12, "Diagnosis Description".
2. Check that cooling fan operates.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Proceed to EC-560, "Diagnosis Procedure".

2.CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-10, "Inspection".

Is leakage detected?

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

3.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak.
- Hose (Refer to CO-10, "Inspection".)
- Radiator (Refer to CO-14, "RADIATOR : Inspection".)
- Water pump (Refer to CO-21, "Inspection".)

>> Repair or replace malfunctioning part.

4. CHECK RADIATOR CAP

Check radiator cap. Refer to CO-14, "RADIATOR CAP : Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace radiator cap. Refer to CO-16, "Exploded View".

5. CHECK THERMOSTAT

Check thermostat. Refer to CO-24, "Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace thermostat. Refer to CO-23, "Removal and Installation".

6. CHECK WATER CONTROL VALVE

Check water control valve. Refer to CO-26, "Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace water control valve. Refer to CO-25, "Exploded View".

7. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-248, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace engine coolant temperature sensor. Refer to CO-25, "Exploded View".

8. OVERHEATING CAUSE ANALYSIS

If the cause cannot be isolated, check the CO-8, "Troubleshooting Chart".

>> INSPECTION END

P1225 TP SENSOR

DTC Logic

INFOID:0000000012197998

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1225	CTP LEARNING-B1 [Closed throttle position learning performance]	Closed throttle position learning value is excessively low.	Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-450, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012197999

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct. Refer to EM-27, "Exploded View".
3. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

YES >> Replace electric throttle control actuator. Refer to EM-29, "Exploded View".
NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to EC-161, "Description".

P1226 TP SENSOR

DTC Logic

INFOID:0000000012198000

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1226	CTP LEARNING-B1 (Closed throttle position learning performance)	Closed throttle position learning is not performed successfully, repeatedly.	Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF, wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 2 and 3 for 32 times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-451, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198001

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct. Refer to EM-27, "Exploded View".
3. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

YES >> Replace electric throttle control actuator. Refer to EM-29, "Exploded View".
NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to EC-161, "Description".

P1423, P1424 COLD START CONTROL

Description

INFOID:0000000012198002

ECM controls fuel injection timing and fuel injection quantity when engine is started with the engine cold. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

DTC Logic

INFOID:0000000012198003

DTC DETECTION LOGIC

NOTE:

- **If DTC P1423 or P1424 is displayed with other DTC, first perform the trouble diagnosis for other DTC.**

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1423	COLD START CONTROL (Cold start emission reduction strategy monitoring)	ECM does not control fuel injection timing properly when engine is started with the engine cold.	ECM
P1424	COLD START CONTROL (Cold start emission reduction strategy monitoring)	ECM does not control fuel injection quantity properly when engine is started with the engine cold.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
4. Check that “COOLAN TEMP/S”.

- If it is between 5°C (41°F) and 40°C (104°F) go to the following steps.
- If it is below 5°C (41°F) warm engine up to more than 5°C (41°F) and retry from step 1.
- If it is above 40°C (104°F) cool engine down to less than 40°C (104°F) and retry from step 1.

5. Start engine and let it idle for 5 minutes.
6. Check 1st trip DTC.

WITH GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-452, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198004

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to EC-452, "DTC Logic".
4. Check 1st trip DTC.

Is the 1st trip DTC P1423 or P1424 displayed again?

YES >> Replace ECM. Refer to EC-590, "Removal and Installation".
NO >> INSPECTION END

P1451 PRESSURE SENSOR

DTC Logic

INFOID:0000000012198005

DTC DETECTION LOGIC

NOTE:
If DTC P1451 is displayed with DTC P0452 or P0453, first perform the trouble diagnosis for DTC P0452 or P0453. Refer to EC-380, "DTC Logic" or EC-383, "DTC Logic".

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1451	TC/SC PRES-EVAP PRES (EVAP control system pressure sensor/turbocharger boost sensor correlation)	ECM detects a state that the pressure difference remains −13.0 kPa (−98 mmHg, −3.83 inHg) or less/13.5 kPa (102 mmHg, 3.99 inHg) or more for continuously for 5 seconds or more under the condition that the pressure of the EVAP control system pressure sensor and that of the turbocharger boost sensor are equal.	• EVAP control system pressure sensor • Turbocharger boost sensor • Clogging, crushing, or damage in hose or piping

DTC CONFIRMATION PROCEDURE

NOTE:
Never refuel before and during the following procedure.

1.PRECONDITIONING

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start the engine. Wait at least for 15 seconds after the start of idle running.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-454, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198006

1.CHECK HOSE AND PIPING

1. Turn ignition switch OFF.
2. Check the following.

- Blockage, crush, or damage in the hose and the piping of EVAP purge line between fuel tank and intake manifold.
- Blockage, crush, or damage in the hose and the piping of intake air passage between inlet air duct and intake manifold.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts

2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check EVAP control system pressure sensor. Refer to EC-455, "Component Inspection (EVAP Control System Pressure Sensor)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Exploded View".

3.CHECK TURBOCHARGER BOOST SENSOR

Check turbocharger boost sensor. Refer to EC-455, "Component Inspection (Turbocharger Boost Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace turbocharger boost sensor (with intake temperature sensor 2). Refer to EM-32, "Exploded View".

Component Inspection (EVAP Control System Pressure Sensor)

INFOID:0000000012198007

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

ECM			Condition [Applied vacuum kPa (kg/cm^2, psi)]	Voltage
Connector	+	–		
	Terminal			
F25	15	12	Not applied	0.5 - 4.6 V
			-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-0.952 kg/cm^2, -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm^2, 14.69 psi).**

Is the inspection result normal?

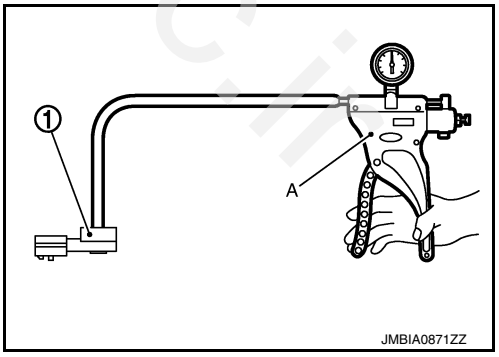
YES >> INSPECTION END
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Exploded View".

Component Inspection (Turbocharger Boost Sensor)

INFOID:0000000012198008

1.CHECK TURBOCHARGER BOOST SENSOR

1. Turn ignition switch OFF.
2. Remove turbocharger boost sensor with its harness connector.
3. Install pressure pump (A) to turbocharger boost sensor (1).
   CAUTION:
   When insert a pressure pump hose to the sensor, be careful to the damage of the sensor housing.
4. Turn ignition switch ON.
5. Check the voltage between ECM harness connector terminals as per the following conditions.



NOTE:
- Always calibrate the pressure pump gauge when using it.
- Inspection should be done at room temperature [10 - 30°C (50 - 86°F)].

ECM			Condition [Pressure (Relative to atmospheric pressure)]	Voltage (Approx.)
Connector	+	–		
	Terminal			
F25	41	44	0 kPa (0 mbar, 0 mmHg, 0 inHg)	2.03 V
			40 kPa (400 mbar, 300 mmHg, 11.81 inHg)	2.67 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger boost sensor. Refer to EM-40, "Exploded View".

P1550 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000012198009

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1550	BAT CURRENT SENSOR (Battery current sensor circuit range/performance)	The output voltage of the battery current sensor remains within the specified range while engine is running.	• Harness or connectors (Battery current sensor circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted) (Fuel rail pressure sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) • Battery current sensor • Camshaft position sensor • Camshaft (Intake) • Starter motor • Starting system circuit • Dead (Weak) battery • Fuel rail pressure sensor • G sensor • Exhaust valve timing control position sensor • Accelerator pedal position sensor 2 • Turbocharger boost sensor • Engine oil pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-457, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198010

1.CHECK BATTERY CURRENT SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect battery current sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between battery current sensor harness connector and ground.

+		-	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
F52	1	Ground	5 V

Is the inspection result normal?

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

2.CHECK SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F25	39	FRP sensor	F5	1
		EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
F26	68	Battery current sensor	F52	1
		G sensor	B32	3
	72	CMP sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT

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

+		–		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	3	F26	87	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		–		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	4	F26	80	Existed

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

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts

5.CHECK BATTERY CURRENT SENSOR

Check the battery current sensor. Refer to EC-459, "Component Inspection".

Is the inspection result normal?

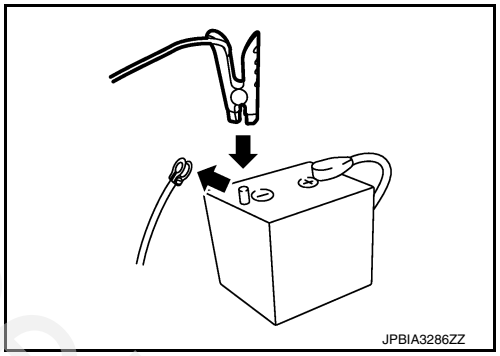
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace battery negative cable assembly. Refer to PG-106, "Exploded View".

Component Inspection

INFOID:0000000012198011

1.CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between ECM harness connector and ground.



ECM			Voltage (Approx.)
Connector	+	-	
	Terminal		
F26	80	87	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-97, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly. Refer to PG-106, "Exploded View".

P1551, P1552 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000012198012

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1551	BAT CURRENT SENSOR (Battery current sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (Battery current sensor circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted) (Fuel rail pressure sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) • Battery current sensor • Camshaft position sensor • Camshaft (Intake) • Starter motor • Starting system circuit • Dead (Weak) battery • Fuel rail pressure sensor • G sensor • Exhaust valve timing control position sensor • Accelerator pedal position sensor 2 • Turbocharger boost sensor • Engine oil pressure sensor
P1552	BAT CURRENT SENSOR (Battery current sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V with ignition switch ON

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-461, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198013

1.CHECK BATTERY CURRENT SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect battery current sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between battery current sensor harness connector and ground.

+		-	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
F52	1	Ground	5 V

Is the inspection result normal?

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

2.CHECK SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F25	39	FRP sensor	F5	1
		EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
F26	68	Battery current sensor	F52	1
		G sensor	B32	3
	72	CMP sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT

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

+		–		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	3	F26	87	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		–		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	4	F26	80	Existed

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

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts

5.CHECK BATTERY CURRENT SENSOR

Check the battery current sensor. Refer to EC-459, "Component Inspection".

Is the inspection result normal?

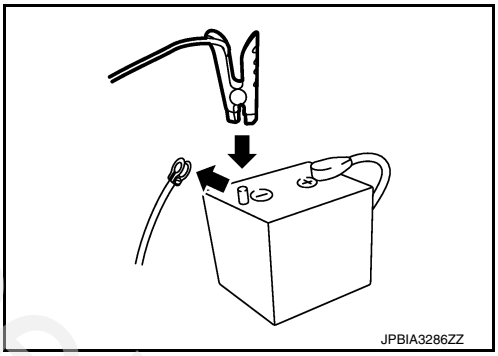
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace battery negative cable assembly. Refer to PG-106, "Exploded View".

Component Inspection

INFOID:0000000012198014

1.CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between ECM harness connector and ground.



ECM			Voltage (Approx.)
Connector	+	-	
	Terminal		
F26	80	87	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-97, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly. Refer to PG-106, "Exploded View".

P1553 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000012198015

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1553	BAT CURRENT SENSOR (Battery current sensor performance)	The signal voltage transmitted from the sensor to ECM is higher than the amount of the maximum power generation.	• Harness or connectors (Battery current sensor circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted) (Fuel rail pressure sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) • Battery current sensor • Camshaft position sensor • Camshaft (Intake) • Starter motor • Starting system circuit • Dead (Weak) battery • Fuel rail pressure sensor • G sensor • Exhaust valve timing control position sensor • Accelerator pedal position sensor 2 • Turbocharger boost sensor • Engine oil pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-463, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198016

1.CHECK BATTERY CURRENT SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect battery current sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between battery current sensor harness connector and ground.

+		-	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
F52	1	Ground	5 V

Is the inspection result normal?

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

2.CHECK SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F25	39	FRP sensor	F5	1
		EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
F26	68	Battery current sensor	F52	1
		G sensor	B32	3
	72	CMP sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT

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

+		–		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	3	F26	87	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		–		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	4	F26	80	Existed

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

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts

5.CHECK BATTERY CURRENT SENSOR

Check the battery current sensor. Refer to EC-459, "Component Inspection".

Is the inspection result normal?

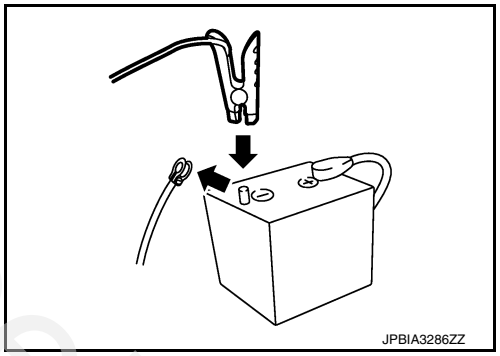
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace battery negative cable assembly. Refer to PG-106, "Exploded View".

Component Inspection

INFOID:0000000012198017

1.CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between ECM harness connector and ground.



ECM			Voltage (Approx.)
Connector	+	-	
	Terminal		
F26	80	87	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-97, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly. Refer to PG-106, "Exploded View".

P1554 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000012198018

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1554	BAT CURRENT SENSOR (Battery current sensor performance)	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.	• Harness or connectors (Battery current sensor circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted) (Fuel rail pressure sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) • Battery current sensor • Camshaft position sensor • Camshaft (Intake) • Starter motor • Starting system circuit • Dead (Weak) battery • Fuel rail pressure sensor • G sensor • Exhaust valve timing control position sensor • Accelerator pedal position sensor 2 • Turbocharger boost sensor • Engine oil pressure sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-466, "Component Function Check".

NOTE:

Use component function check to check the overall function of the battery current sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-467, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012198019

1.PRECONDITIONING

TESTING CONDITION:

- **Before performing the following procedure, confirm that battery voltage is more than 12.8 V at idle.**
- **Before performing the following procedure, confirm that all load switches and A/C switch are turned OFF.**

>> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK

With CONSULT

1. Start engine and let it idle.
2. Select “BAT CUR SEN” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check “BAT CUR SEN” indication for 10 seconds.
   “BAT CUR SEN” should be above 2,300 mV at least once.

Without CONSULT
1. Start engine and let it idle.
2. Check the voltage between ECM harness connector and ground.

ECM			Voltage
Connector	+	-	
	Terminal		
F26	80	87	Above 2.3 V at least once

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-467, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198020

1.CHECK BATTERY CURRENT SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect battery current sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between battery current sensor harness connector and ground.

+		-	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
F52	1	Ground	5 V

Is the inspection result normal?

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

2.CHECK SENSOR POWER SUPPLY CIRCUIT

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

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F25	39	FRP sensor	F5	1
		EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
F26	68	Battery current sensor	F52	1
		G sensor	B32	3
	72	CMP sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT

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

+		–		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	3	F26	87	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		–		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	4	F26	80	Existed

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

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts

5.CHECK BATTERY CURRENT SENSOR

Check the battery current sensor. Refer to EC-459, "Component Inspection".

Is the inspection result normal?

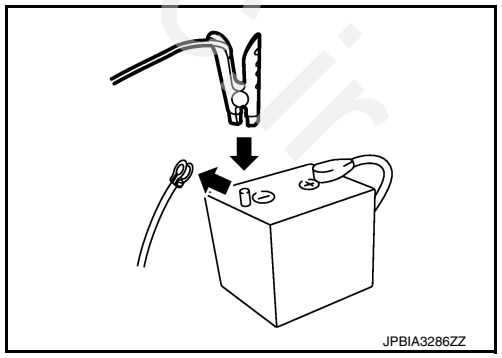
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace battery negative cable assembly. Refer to PG-106, "Exploded View".

Component Inspection

INFOID:0000000012198021

1.CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between ECM harness connector and ground.



ECM			Voltage (Approx.)
Connector	+	-	
	Terminal		
F26	80	87	2.5 V

Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-97, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly. Refer to PG-106, "Exploded View".

P1556, P1557 BATTERY TEMPERATURE SENSOR

DTC Logic

INFOID:0000000012198022

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1556	BAT TMP SEN/CIRC (Battery temperature sensor circuit low input)	Signal voltage from Battery temperature sensor remains 0.16V or less for 5 seconds or more.	• Harness or connectors [Battery current sensor (Battery temperature sensor) circuit is shorted.] • Battery current sensor (Battery temperature sensor)
P1557	BAT TMP SEN/CIRC (Battery temperature sensor circuit high input)	Signal voltage from Battery temperature sensor remains 4.84V or more for 5 seconds or more.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 10 V or more at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-470, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198023

1.CHECK BATTERY TEMPERATURE SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect battery current sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between battery current sensor harness connector and ground.

+		–	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
F52	2	Ground	5 V

Is the inspection result normal?

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

2.CHECK BATTERY TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

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

+		–		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	2	F26	79	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK BATTERY TEMPERATURE SENSOR GROUND CIRCUIT

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

+		–		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	3	F26	87	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK BATTERY TEMPERATURE SENSOR

Check the battery temperature sensor. Refer to EC-471, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace battery negative cable assembly. Refer to PG-106, "Exploded View".

Component Inspection

INFOID:0000000012198024

1.CHECK BATTERY TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect battery current sensor.
3. Check the resistance between battery current sensor connector terminals.

Battery current sensor		Resistance
+	–	
Terminal		
2	3	Continuity with the resistance value 100 Ω or more

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly. Refer to PG-106, "Exploded View".

P1564 ASCD STEERING SWITCH

DTC Logic

INFOID:0000000012198025

DTC DETECTION LOGIC

NOTE:
If DTC P1564 is displayed with DTC P0603, P0604, P0605, P0606, P0607, P060A and P060B first perform the trouble diagnosis for DTC P0603, P0604, P0605, P0606, P0607, P060A and P060B. Refer to EC-115, "DTC Index".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1564	ASCD SW (ASCD steering switch)	• An excessively high voltage signal from the ASCD steering switch is sent to ECM. • ECM detects that input signal from the ASCD steering switch is out of the specified range. • ECM detects that the ASCD steering switch is stuck ON.	• Harness or connectors (ASCD steering switch circuit is open or shorted.) • ASCD steering switch • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Wait at least 10 seconds.
3. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press ACCEL/RES switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press COAST/SET switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Check DTC.

Is DTC detected?

YES >> Proceed to EC-472, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198026

1.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT

1. Turn ignition switch ON.
2. Select “CANCEL SW”, “RESUME/ACC SW” and “SET SW” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check each item indication as per the following conditions.

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF

Monitor item	Condition		Indication
RESUME/ACC SW	ACCEL/RES switch	Pressed	ON
		Released	OFF
SET SW	COAST/SET switch	Pressed	ON
		Released	OFF

Without CONSULT
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals.

ECM			Condition	Voltage (Approx.)
Connector	+	-		
	Terminal			
E18	110	111	MAIN switch: Pressed	0 V
			CANCEL switch: Pressed	1 V
			COAST/SET switch: Pressed	2 V
			ACCEL/RES switch: Pressed	3 V
			All ASCD steering switches: Released	4 V

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 2.

2.CHECK ASCD STEERING SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect combination switch (spiral cable) harness connector.
4. Check the continuity between combination switch (spiral cable) and ECM harness connector.

+		–		Continuity
Combination switch (Spiral cable)		ECM		
Connector	Terminal	Connector	Terminal	
M33	32	E18	111	Existed

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

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT

1. Check the continuity between ECM harness connector and combination switch.

+		–		Continuity
Combination switch (Spiral cable)		ECM		
Connector	Terminal	Connector	Terminal	
M33	25	E18	110	Existed

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

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK ASCD STEERING SWITCH

Refer to EC-474, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace ASCD steering switch. Refer to ST-9, "Exploded View".

Component Inspection

INFOID:0000000012198027

1.CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector.
2. Check the resistance between combination switch harness connector terminals as per the following conditions.

Combination switch (Spiral cable)			Condition	Resistance (Approx.)
Connector	+	–		
	Terminals			
M302	13	16	MAIN switch: Pressed	0 Ω
			CANCEL switch: Pressed	250 Ω
			COAST/SET switch: Pressed	660 Ω
			ACCEL/RES switch: Pressed	1,480 Ω
			All ASCD steering switches: Released	4,000 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD steering switch. Refer to ST-9, "Exploded View".

P1572 BRAKE PEDAL POSITION SWITCH

DTC Logic

INFOID:0000000012198028

DTC DETECTION LOGIC

NOTE:

- **If DTC P1572 is displayed with DTC P0603, P0604, P0605, P0606, P0607, P060A and P060B, first perform the trouble diagnosis for DTC P0603, P0604, P0605, P0606, P0607, P060A and P060B. Refer to EC-115, "DTC Index".**
- **This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.**

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition		Possible cause
P1572	ASCD BRAKE SW (ASCD brake switch)	A)	When the vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the brake pedal position switch are sent to the ECM at the same time.	• Harness or connectors (Stop lamp switch circuit is shorted.) (Brake pedal position switch circuit is shorted.) • Stop lamp switch • Brake pedal position switch • Incorrect stop lamp switch installation • Incorrect brake pedal position switch installation • ECM
		B)	Brake pedal position switch signal is not sent to ECM for extremely long time while the vehicle is driving.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

NOTE:

Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Start engine.
2. Press MAIN switch and make sure that CRUISE indicator is displayed in combination meter.
3. Drive the vehicle for at least 5 consecutive seconds as per the following conditions.

   CAUTION:

   Always drive vehicle at a safe speed.

   NOTE:

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

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

4. Check DTC.

Is DTC detected?

YES >> Proceed to EC-480, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Drive the vehicle for at least 5 consecutive seconds as per the following conditions.
   CAUTION:
   Always drive vehicle at a safe speed.
   NOTE:
   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

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

2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-480, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198029

1.CHECK OVERALL FUNCTION-I

With CONSULT
1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check “BRAKE SW1” indication as per the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as per the following.

ECM			Condition		Voltage (Approx.)
Connector	+	–			
	Terminal				
E18	116	127	Brake pedal	Slightly depressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

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

2.CHECK OVERALL FUNCTION-II

With CONSULT
Select “BRAKE SW2” and check indication as per the following conditions.

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal	Slightly depressed	ON
		Fully released	OFF

Without CONSULT
Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition		Voltage (Approx.)
Connector	+	–			
	Terminal				
E18	115	127	Brake pedal	Slightly depressed	Battery voltage
				Fully released	0 V

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 6.

3.CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY

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

+		–	Voltage
Brake pedal position switch			
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform the trouble diagnosis for power supply circuit.

4.CHECK BRAKE PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT

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

+		–		Continuity
Brake pedal position switch		ECM		
Connector	Terminal	Connector	Terminal	
E112	2	E18	116	Existed

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

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK BRAKE PEDAL POSITION SWITCH

Check the brake pedal position switch. Refer to EC-571, "Component Inspection (Brake Pedal Position Switch)"

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace brake pedal position switch. Refer to BR-20, "Exploded View".

6.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

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

+		–	Voltage
Stop lamp switch			
Connector	Terminal		
E102*1 E118*2	1	Ground	Battery voltage

*1: CVT models

*2: M/T models

Is the inspection result normal?

YES >> GO TO 7.
NO >> Perform the trouble diagnosis for power supply circuit.

7.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT

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

+		–		Continuity
Stop lamp switch		ECM		
Connector	Terminal	Connector	Terminal	
E102*1 E118*2	2	E18	115	Existed

*1: CVT models

*2: M/T models

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

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8.CHECK STOP LAMP SWITCH

Check the stop lamp switch. Refer to EC-479, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace stop lamp switch. Refer to BR-20, "Exploded View".

Component Inspection (Brake Pedal Position Switch)

INFOID:0000000012198030

1.CHECK BRAKE PEDAL POSITION SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect brake pedal position harness connector.
3. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition		Continuity
+	–			
Terminals				
1	2	Brake pedal	Fully released	Existed
			Slightly de-pressed	Not existed

Is the inspection result normal?

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

2.CHECK BRAKE PEDAL POSITION SWITCH-II

1. Adjust brake pedal position switch installation. Refer to BR-9, "Inspection and Adjustment".
2. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition		Continuity
+	–			
Terminals				
1	2	Brake pedal	Fully released	Existed
			Slightly de-pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace brake pedal position switch. Refer to BR-20, "Exploded View".

Component Inspection (Stop Lamp Switch)

INFOID:0000000012198031

1.CHECK STOP LAMP SWITCH-I

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

Stop lamp switch		Condition		Continuity
+	–			
Terminals				
1	2	Brake pedal	Fully released	Not existed
			Slightly de-pressed	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-9, "Inspection and Adjustment".
2. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Condition		Continuity
+	–			
Terminals				
1	2	Brake pedal	Fully released	Not existed
			Slightly de-pressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch. Refer to BR-20, "Exploded View".

P1574 ASCD VEHICLE SPEED SENSOR

Description

INFOID:0000000012198032

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-68, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description" for ASCD functions.

DTC Logic

INFOID:0000000012198033

DTC DETECTION LOGIC

NOTE:

- **If DTC P1574 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-195, "DTC Logic".**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-397, "EXCEPT FOR M/T MODELS : DTC Logic"**
- **If DTC P1574 is displayed with DTC DTC P0603, P0604, P0605, P0606, P0607, P060A and P060B, first perform the trouble diagnosis for DTC DTC P0603, P0604, P0605, P0606, P0607, P060A and P060B. Refer to EC-115, "DTC Index".**

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

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. Drive the vehicle at more than 40 km/h (25 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
   NOTE:
   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EC-480, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198034

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-190, "CONSULT Function".

Is DTC detected?

NO >> GO TO 2.
YES >> Perform trouble shooting relevant to DTC indicated.

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

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-39, "CONSULT Function".

Is DTC detected?

NO >> INSPECTION END
YES >> Perform trouble shooting relevant to DTC indicated.

P158A G SENSOR

DTC Logic

INFOID:0000000012198035

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause*
P158A	G SENSOR (G sensor calibration is incomplete)	ECM detects a state that calibration of the G sensor is incomplete.	G sensor calibration is incomplete

*: Since this DTC is detected when G sensor calibration is incomplete, there is not replacement parts.

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is DTC detected?

YES >> Proceed to EC-482, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198036

1.PERFORM CALIBRATION OF G SENSOR

Perform calibration of G sensor. Refer to EC-164, "Description".

>> INSPECTION END

P159A, P159C, P159D G SENSOR

DTC Logic

INFOID:0000000012198037

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P159A	G SENSOR (G sensor circuit)	When ECM detects the following status: A voltage signal transmitted from the G sensor is less than 0.5 V or more than 5.02 V continuously for 5 seconds or more.	• Harness or connectors (G sensor circuit is open or shorted.) (Intake air temperature sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (Crankshaft position sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) • G sensor • Intake air temperature sensor 2 • Turbocharger boost sensor • Fuel rail pressure sensor • Battery current sensor • Crankshaft position sensor • Exhaust valve timing control position sensor • Accelerator pedal position sensor 2 • Engine oil pressure sensor
P159C	G SENSOR (G sensor circuit low input)	When ECM detects the following status: A voltage signal transmitted from the G sensor is less than 0.5 V continuously for 5 seconds or more.	
P159D	G SENSOR (G sensor circuit high input)	When ECM detects the following status: A voltage signal transmitted from the G sensor is more than 4.5 V continuously for 5 seconds or more.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

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

Is 1st trip DTC detected?

YES >> Proceed to EC-483, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198038

1.CHECK G SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.

2. Disconnect G sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between G sensor harness connector terminals.

G sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
B32	3	2	5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 4.

2.CHECK G SENSOR SIGNAL CIRCUIT

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

+		–		Continuity
G sensor		ECM		
Connector	Terminal	Connector	Terminal	
B32	1	F26	83	Existed

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

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK G SENSOR

Check G sensor. Refer to EC-485, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> 1. Replace G sensor.
2. Perform calibration of G sensor. Refer to EC-164, "Description".

4.CHECK G SENSOR POWER SUPPLY CIRCUIT-II

Check the voltage between G sensor harness connector terminal and ground.

+		–	Voltage (Approx.)
G sensor			
Connector	Terminal		
B32	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 7.

5.CHECK G SENSOR GROUND CIRCUIT

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

+		–		Continuity
G sensor		ECM		
Connector	Terminal	Connector	Terminal	
B32	3	F26	87	Existed

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
F25	1	Ground	Existed
	2		
E18	123		
	124		
	127		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

7.CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors and each sensor harness connectors
3. Check harness connector for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F25	39	FRP sensor	F5	1
		EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
F26	68	Battery current sensor	F52	1
		G sensor	B32	3
	72	CMP sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

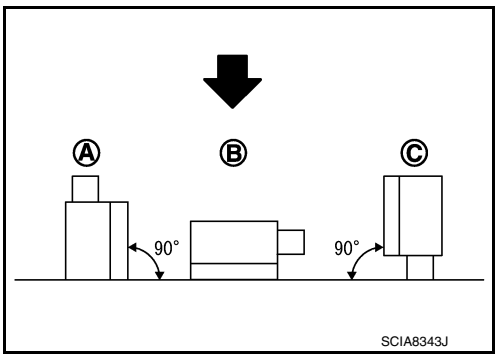
Component Inspection

INFOID:0000000012198039

1.CHECK G SENSOR

With CONSULT
1. Remove G sensor.
2. Reconnect all harness connectors disconnected.
3. Place the G sensor on a flat table.
4. Turn ignition switch ON.

5. Select “G SENSOR” in “DATA MONITOR” mode of “ENGINE” using CONSULT to check indications according to the following conditions:



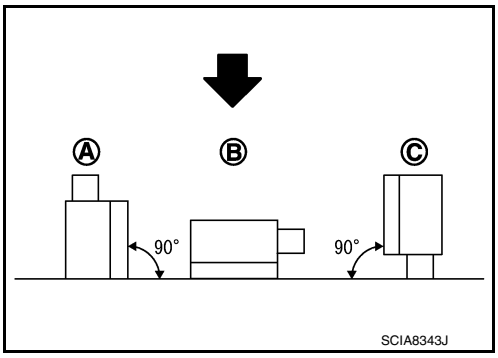
⬅ : Direction of gravitational force

Monitor item	Condition	Value (V)
G SENSOR	Parallel with the table (0G) (B)	2.18 – 2.82
	Vertical to the table (−1G) (A) ↓ Parallel with the table (0G) (B) ↓ Vertical to the table (1G) (C)	0.85 – 1.49* ↓ 2.18 – 2.82* ↓ 3.51 – 4.15*

*: Check that voltage rises as the G sensor measurement condition changes in the order of (A), (B), and (C).

⊗Without CONSULT

1. Remove G sensor.
2. Reconnect all harness connectors disconnected.
3. Place the G sensor on a flat table.
4. Turn ignition switch ON.
5. Check the voltage between ECM harness connector terminal and ground.



⬅ : Direction of gravitational force

+ ECM Connector	+ ECM Terminal	−	Condition	Voltage (V)
F26	83	Ground	Parallel with the table (0G) (B)	2.18 – 2.82
			Vertical to the table (−1G) (A) ↓ Parallel with the table (0G) (B) ↓ Vertical to the table (1G) (C)	0.85 – 1.49* ↓ 2.18 – 2.82* ↓ 3.51 – 4.15*

*: Check that voltage rises as the G sensor measurement condition changes in the order of (A), (B), and (C).

Is the inspection result normal?

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

P159B G SENSOR

DTC Logic

INFOID:0000000012198040

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P159B	G SENSOR (G sensor circuit range/performance)	Every time when the vehicle is stopped, ECM detects the following status 13 times in a row: A voltage signal transmitted from the G sensor is less than 2.275V or more than 2.725 V continuously for 5 seconds or more.	• Harness or connectors (G sensor circuit is open or shorted.) (Intake air temperature sensor 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (Crankshaft position sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Accelerator pedal position sensor 2 circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) • G sensor • Intake air temperature sensor 2 • Turbocharger boost sensor • Fuel rail pressure sensor • Battery current sensor • Crankshaft position sensor • Exhaust valve timing control position sensor • Accelerator pedal position sensor 2 • Engine oil pressure sensor • G sensor fitting condition

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:

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

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. Drive the vehicle for at least 5 seconds at 35 km/h (22 MPH) or more.
3. Stop the vehicle and let it idle for at least 5 seconds.
   NOTE:
   • Depress the brake pedal to bring the vehicle to a full stop.
   • Never depress the accelerator pedal while the vehicle is stopped.
4. Repeat Step 2 and Step 3 thirteen times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-488, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198041

1.PERFORM CALIBRATION OF G SENSOR

Perform calibration of G sensor. Refer to EC-164, "Description".

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC Confirmation Procedure. Refer to EC-487, "DTC Logic".

Is 1st trip DTC detected?

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

3.CHECK G SENSOR FITTING CONDITION

Check G sensor fitting condition.

Is the inspection result normal?

YES >> GO TO 4.
NO >> 1. Adjust parts fitting condition.
2. Perform calibration of G sensor. Refer to EC-164, "Description".

4.CHECK G SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect G sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between G sensor harness connector terminals.

G sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
B32	3	2	5 V

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 7.

5.CHECK G SENSOR SIGNAL CIRCUIT

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

G sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B32	1	F26	83	Existed

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

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK G SENSOR

Check G sensor. Refer to EC-490, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> 1. Replace G sensor.

2. Perform calibration of G sensor. Refer to EC-164, "Description".

7. CHECK G SENSOR POWER SUPPLY CIRCUIT-II

Check the voltage between G sensor harness connector terminal and ground.

+		–	Voltage (Approx.)
G sensor			
Connector	Terminal		
B32	3	Ground	5 V

Is the inspection result normal?

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

8. CHECK G SENSOR GROUND CIRCUIT

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

G sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B32	2	F26	87	Existed

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
F25	1	Ground	Existed
	2		
E18	123		
	124		
	127		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

10. CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors and each sensor harness connectors
3. Check harness connector for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F25	39	FRP sensor	F5	1
		EOP sensor	F43	3
		Turbocharger boost sensor	F75	1

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F26	68	Battery current sensor	F52	1
		G sensor	B32	3
	72	CMP sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

Component Inspection

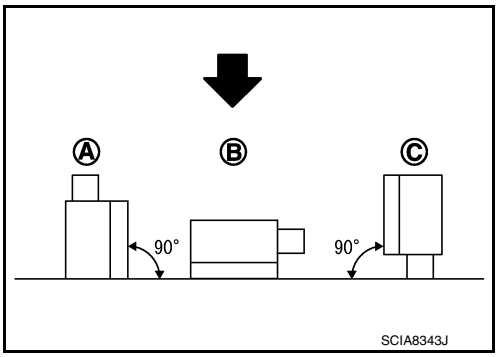
INFOID:0000000012198042

1. CHECK G SENSOR

With CONSULT

1. Remove G sensor.
2. Reconnect all harness connectors disconnected.
3. Place the G sensor on a flat table.
4. Turn ignition switch ON.
5. Select “G SENSOR” in “DATA MONITOR” mode of “ENGINE” using CONSULT to check indications according to the following conditions:

⬅ : Direction of gravitational force



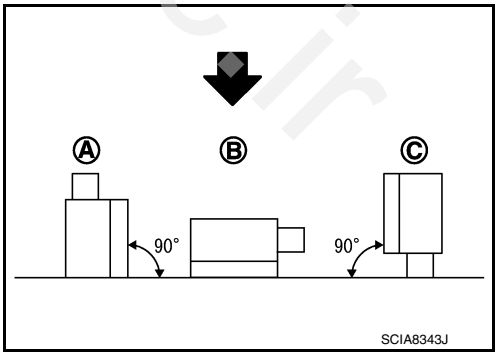
Monitor item	Condition	Value (V)
G SENSOR	Parallel with the table (0G) (B)	2.18 – 2.82
	Vertical to the table (−1G) (A) ↓ Parallel with the table (0G) (B) ↓ Vertical to the table (1G) (C)	0.85 – 1.49* ↓ 2.18 – 2.82* ↓ 3.51 – 4.15*

*: Check that voltage rises as the G sensor measurement condition changes in the order of (A), (B), and (C).

Without CONSULT

1. Remove G sensor.
2. Reconnect all harness connectors disconnected.
3. Place the G sensor on a flat table.
4. Turn ignition switch ON.
5. Check the voltage between ECM harness connector terminal and ground.

⬅ : Direction of gravitational force



+		−	Condition	Voltage (V)
ECM				
Connector	Terminal			
F26	83	Ground	Parallel with the table (0G) (B)	2.18 – 2.82
			Vertical to the table (−1G) (A) ↓ Parallel with the table (0G) (B) ↓ Vertical to the table (1G) (C)	0.85 – 1.49* ↓ 2.18 – 2.82* ↓ 3.51 – 4.15*

*: Check that voltage rises as the G sensor measurement condition changes in the order of (A), (B), and (C).

Is the inspection result normal?

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

P1650 STARTER MOTOR RELAY 2

Description

INFOID:0000000012198043

ECM controls ON/OFF state of the starter relay, according to the engine and vehicle condition. On the other hand, models with the Intelligent Key System transmit a control signal to IPDM E/R by way of BCM via CAN communication.
Under normal conditions, ECM controls and maintains the starter relay in OFF state during engine running or “D” position.
When detecting a decrease in engine speed due to rapid deceleration or heavy load condition, ECM controls and reactivates the starter relay.
IPDM E/R detects a control state of starter relay and starter control relay and transmits a feedback signal to ECM via CAN communication.

DTC Logic

INFOID:0000000012198044

DTC DETECTION LOGIC

NOTE:
- If DTC P1650 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to EC-195, "DTC Logic".
- If DTC P1650 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to EC-419, "DTC Logic".
- If DTC P1650 is displayed with B209F or B20A0 of IPDM E/R, perform the trouble diagnosis for B209F or B20A0. Refer to SEC-101, "DTC Logic" or SEC-103, "DTC Logic".
- If DTC P1650 is displayed with B26F9 or B26FA of BCM, perform the trouble diagnosis for B209F or B20A0. Refer to SEC-95, "DTC Logic" or SEC-97, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition		Possible cause
P1650	STR MTR RELAY 2 (Starter relay circuit)	A	Starter relay is stuck ON.	• Harness and connectors (Between IPDM E/R harness connector and ECM harness connector is shorted to ground.) (Between IPDM E/R harness connector and BCM harness connector is shorted to ground.) • IPDM E/R
		B	Starter relay power supply circuit is excessively high voltage.	• Harness and connectors (Between IPDM E/R harness connector and ECM harness is open or shorted to power.) (Between IPDM E/R harness connector and BCM harness is open or shorted to power.) (Between IPDM E/R harness connector and battery is open.) • IPDM E/R
		C	Starter relay circuit is excessively low voltage	• Harness and connectors (Starter relay circuit is open or shorted.) • IPDM E/R

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

NOTE:
Before performing the following procedure, confirm that battery voltage is 12 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND C

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-493, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

With CONSULT

CAUTION:

Always drive at a safe speed.

1. Start the engine.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Start the engine and warm it up to normal operating temperature.
5. Turn ignition switch OFF.
6. Lift up drive wheels.
7. Turn ignition switch ON.
8. Select “POWER BALANCE” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
9. Restart the engine and let it idle at least 10 seconds.
10. Shift the selector lever to D position while depressing fully the brake pedal.
11. Select 1 - 4 cylinders in “POWER BALANCE” and cut the fuel of all cylinders.
12. Check 1st trip DTC.

Without CONSULT

CAUTION:

Always drive at a safe speed.

1. Start the engine.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Start the engine and warm it up to normal operating temperature.
5. Turn ignition switch OFF.
6. Lift up drive wheels.
7. Restart the engine and let it idle at least 10 seconds.
8. Shift the selector lever to D position while depressing fully the brake pedal.
9. Remove vacuum hoses from intake manifold.
10. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-493, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198045

1.CHECK STARTER RELAY POWER SUPPLY CIRCUIT

Check the starter motor relay power supply circuit. Refer to PCS-36, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK STARTER RELAY CONTROL SIGNAL CIRCUIT

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

+		–		Continuity
IPDM E/R		BCM		
Connector	Terminal	Connector	Terminal	
E13	30	M70	97	Existed

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

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK INTERMITTENT INCIDENT

Perform GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-37, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P1651 STARTER MOTOR RELAY

Description

INFOID:0000000012198046

ECM controls ON/OFF state of the starter relay, according to the engine and vehicle condition. On the other hand, models with the Intelligent Key System transmit a control signal to IPDM E/R by way of BCM via CAN communication.
Under normal conditions, ECM controls and maintains the starter relay in OFF state during engine running or “D” position.
When detecting a decrease in engine speed due to rapid deceleration or heavy load condition, ECM controls and reactivates the starter relay.
IPDM E/R detects a control state of starter relay and starter control relay and transmits a feedback signal to ECM via CAN communication.

DTC Logic

INFOID:0000000012198047

DTC DETECTION LOGIC

NOTE:
- If DTC P1650 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to EC-195, "DTC Logic".
- If DTC P1650 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to EC-419, "DTC Logic".
- If DTC P1650 is displayed with B209F or B20A0 of IPDM E/R, perform the trouble diagnosis for B209F or B20A0. Refer to SEC-101, "DTC Logic" or SEC-103, "DTC Logic".
- If DTC P1650 is displayed with B26F9 or B26FA of BCM, perform the trouble diagnosis for B209F or B20A0. Refer to SEC-95, "DTC Logic" or SEC-97, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	
P1651	STR MTR RELAY (Starter control relay circuit)	A correlated error is detected for 2 seconds or more between a control signal transmitted from ECM and a feedback signal transmitted from IPDM E/R via CAN communication line.	• Harness or connectors (Between ECM harness connector and IPDM E/R harness connector is shorted to power.) (Between ECM harness connector and BCM harness connector is shorted to power.) • IPDM E/R • BCM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

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

NOTE:
Before performing the following procedure, confirm that battery voltage is 12 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start the engine and let it idle at least 30 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-496, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198048

1.INSPECTION START

Check the starter motor operation.

Is the starter motor operated?

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

2.CHECK DTC WITH IPDM E/R

Check DTC with IPDM E/R. Refer to PCS-14, "CONSULT Function (IPDM E/R)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis for DTC indicated.

3.CHECK DTC WITH BCM

Check DTC with BCM. Refer to BCS-33, "BCM : CONSULT Function (BCM - BCM)".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform trouble diagnosis for DTC indicated.

4.CHECK CRANKING REQUEST SIGNAL CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		–		
ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F26	92	E13	23	Existed

5. Also check harness for short to ground to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK CRANKING REQUEST SIGNAL CIRCUIT-II

1. Disconnect BCM harness connector.
2. Check the continuity between ECM harness connector and BCM harness connector.

+		–		
ECM		BCM		Continuity
Connector	Terminal	Connector	Terminal	
F26	92	M69	64	Existed

3. Also check harness for short to ground to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK INTERMITTENT INCIDENT

Perform GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-37, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P1652 STARTER MOTOR SYSTEM COMM

Description

INFOID:0000000012198049

ECM controls ON/OFF state of the starter relay, according to the engine and vehicle condition. On the other hand, models with the Intelligent Key System transmit a control signal to IPDM E/R by way of BCM via CAN communication.
Under normal conditions, ECM controls and maintains the starter relay in OFF state during engine running or “D” position.
When detecting a decrease in engine speed due to rapid deceleration or heavy load condition, ECM controls and reactivates the starter relay.
IPDM E/R detects a control state of starter relay and starter control relay and transmits a feedback signal to ECM via CAN communication.

DTC Logic

INFOID:0000000012198050

DTC DETECTION LOGIC

NOTE:

- If DTC P1650 is displayed with DTC U1001, perform the trouble diagnosis for DTC U1001. Refer to EC-195, "DTC Logic".
- If DTC P1650 is displayed with DTC P0607, perform the trouble diagnosis for DTC P0607. Refer to EC-419, "DTC Logic".
- If DTC P1650 is displayed with B209F or B20A0 of IPDM E/R, perform the trouble diagnosis for B209F or B20A0. Refer to SEC-101, "DTC Logic" or SEC-103, "DTC Logic".
- If DTC P1650 is displayed with B26F9 or B26FA of BCM, perform the trouble diagnosis for B209F or B20A0. Refer to SEC-95, "DTC Logic" or SEC-97, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1652	STR MTR SYS COMM (Starter motor communication line)	ECM detects malfunction in starter motor drive circuit of the IPDM E/R.	IPDM E/R

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start the engine and wait at least 5 minutes.
3. Repeat step 1 and 2 for 20 times.
4. Check DTC.

Is DTC detected?

YES >> Proceed to EC-497, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198051

1.INSPECTION START

1. Erase DTC.
2. Perform DTC confirmation procedure. Refer to EC-497, "DTC Logic".
3. Check DTC.

Is the P1652 displayed again?

YES >> GO TO 2.
NO >> INSPECTION END

2.CHECK INTERMITTENT INCIDENT

Perform GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-37, "Removal and Installation".
NG >> Repair or replace error-detected parts.

P1805 BRAKE SWITCH

DTC Logic

INFOID:0000000012198052

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1805	BRAKE SW/CIRCUIT (Brake switch)	A stop lamp switch signal is not sent to ECM for extremely long time while the vehicle is driving.	• Harness or connectors (Stop lamp switch circuit is open or shorted.) • Stop lamp switch

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-499, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198053

1.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

+		−	Voltage
Stop lamp switch			
Connector	Terminal		
E102*1 E118*2	1	Ground	Battery voltage

*1: CVT models
*2: M/T models

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between stop lamp switch harness connector and ECM harness connector.

+		−		Continuity
Stop lamp switch		ECM		
Connector	Terminal	Connector	Terminal	
E102*1 E118*2	2	E18	115	Existed

*1: CVT models
*2: M/T models

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK STOP LAMP SWITCH

Check the stop lamp switch. Refer to EC-500, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace stop lamp switch. Refer to BR-20, "Exploded View".

Component Inspection (Stop Lamp Switch)

INFOID:0000000012198054

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Condition		Continuity
+	–			
Terminals				
1	2	Brake pedal	Fully released	Not existed
			Slightly de-pressed	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-9, "Inspection and Adjustment".
2. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Condition		Continuity
+	–			
Terminals				
1	2	Brake pedal	Fully released	Not existed
			Slightly de-pressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch. Refer to BR-20, "Exploded View".

P1807, P1808 BRAKE PEDAL POSITION SWITCH

DTC Logic

INFOID:0000000013475492

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1807	Brake pedal position switch (Brake pedal position switch)	Regardless of ON/OFF of stop lamp switch signal when brake pedal is depressed 100 times, a brake pedal position switch signal remains OFF.	• Harness or connectors (Brake pedal position switch circuit is shorted.) • Brake pedal position switch • Incorrect brake pedal position switch installation • ECM
P1808	Brake pedal position switch (Brake pedal position switch)	Regardless of ON/OFF of stop lamp switch signal when brake pedal is depressed 100 times, a brake pedal position switch signal remains ON.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE 1

With CONSULT

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check “BRAKE SW1” indication as per the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as per the following.

ECM			Condition		Voltage (Approx.)
Connector	+	–			
	Terminal				
E18	116	127	Brake pedal	Slightly depressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> Proceed to EC-502, "Diagnosis Procedure".

3.PERFORM DTC CONFIRMATION PROCEDURE 2

1. Turn ignition switch ON.
2. Depress the brake pedal for at least 100 times.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EC-502, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000013475493

1.CHECK OVERALL FUNCTION

With CONSULT
1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check “BRAKE SW1” indication as per the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as per the following.

ECM			Condition		Voltage (Approx.)
Connector	+	–			
	Terminal				
E18	116	127	Brake pedal	Slightly depressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 2.

2.CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect brake pedal position switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between brake pedal position switch harness connector and ground.

+		–	Voltage
Brake pedal position switch			
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform the trouble diagnosis for power supply circuit.

3.CHECK BRAKE PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between brake pedal position switch harness connector and ECM harness connector.

+		–		Continuity
Brake pedal position switch		ECM		
Connector	Terminal	Connector	Terminal	
E112	2	E18	116	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK BRAKE PEDAL POSITION SWITCH

Check the brake pedal position switch. Refer to EC-503, "Component Inspection (Brake Pedal Position Switch)"

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace brake pedal position switch. Refer to BR-20, "Exploded View".

Component Inspection (Brake Pedal Position Switch)

INFOID:0000000013475494

1. CHECK BRAKE PEDAL POSITION SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect brake pedal position harness connector.
3. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition		Continuity
+	–			
Terminals				
1	2	Brake pedal	Fully released	Existed
			Slightly de-pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2. CHECK BRAKE PEDAL POSITION SWITCH-II

1. Adjust brake pedal position switch installation. Refer to BR-9, "Inspection and Adjustment".
2. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition		Continuity
+	–			
Terminals				
1	2	Brake pedal	Fully released	Existed
			Slightly de-pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace brake pedal position switch. Refer to BR-20, "Exploded View".

P2096, P2097 A/F SENSOR 1

DTC Logic

INFOID:0000000012198055

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P2096	POST CAT FUEL TRIM SYS B1 (Post catalyst fuel trim system too lean bank 1)	The output voltage computed by ECM from the A/F sensor 1 signal is shifts to the lean side for a specified period.	• A/F sensor 1 • A/F sensor 1 heater • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks • Exhaust gas leaks
P2097	POST CAT FUEL TRIM SYS B1 (Post catalyst fuel trim system too rich bank 1)	The A/F signal computed by ECM from the A/F sensor 1 signal is shifts to the rich side for a specified period.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Clear the mixture ratio self-learning value. Refer to EC-165, "Description".
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
4. Let engine idle for 1 minute.
5. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-504, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198056

1.CHECK HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Check harness connector for water.

Water should not exit.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness connector.

2.RETIGHTEN A/F SENSOR 1 AND HEATED OXYGEN SENSOR 2

Loosen and retighten the A/F sensor 1 and heated oxygen sensor 2. Refer to EM-44, "Exploded View", EX-5, "Exploded View".

>> GO TO 3.

3.CHECK FOR EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst 2.

Is exhaust gas leak detected?

YES >> Repair or replace malfunctioning parts.
NO >> GO TO 4.

4.CHECK FOR INTAKE AIR LEAK

1. Reconnect A/F sensor 1 harness connector.
2. Start engine and run it at idle.
3. Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace malfunctioning parts.
NO >> GO TO 5.

5.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-165, "Description".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-297, "DTC Logic" or EC-301, "DTC Logic".
NO >> GO TO 6.

6.CHECK A/F SENSOR 1 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor 1 harness connector and ground.

+		-	Voltage
A/F sensor 1			
Connector	Terminal		
F70	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7.CHECK A/F SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between A/F sensor 1 harness connector and IPDM E/R harness connector.

+		–		Continuity
A/F sensor 1		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F70	4	E14	36	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

8.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

+		–		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F70	1	F25	21	Existed
	2		25	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

+		-	Continuity
A/F sensor 1			
Connector	Terminal		
F70	1	Ground	Not existed
	2		

+		-	Continuity
ECM			
Connector	Terminal		
F25	21	Ground	Not existed
	25		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK A/F SENSOR 1 HEATER

Check the A/F sensor 1 heater. Refer to EC-204, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 12.

10. CHECK HEATED OXYGEN SENSOR 2

Check heated oxygen sensor 2. Refer to EC-276, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

11. CHECK INTERMITTENT INCIDENT

Perform GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair or replace error-detected parts.

12. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. Refer to EM-44, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

Do you have CONSULT?

YES >> GO TO 13.
NO >> GO TO 14.

13. CONFIRM A/F ADJUSTMENT DATA

With CONSULT
1. Turn ignition switch ON.
2. Select “A/F ADJ-B1” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Make sure that “0.000” is displayed on CONSULT screen.

Is “0.000” displayed?

YES >> INSPECTION END
NO >> GO TO 14.

14. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Clear the mixture ratio self-learning value. Refer to EC-165, "Description".

Do you have CONSULT?

YES >> GO TO 15.
NO >> INSPECTION END

15. CONFIRM A/F ADJUSTMENT DATA

With CONSULT
1. Turn ignition switch ON.
2. Select “A/F ADJ-B1” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Make sure that “0.000” is displayed on CONSULT screen.

>> INSPECTION END

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

DTC Logic

INFOID:0000000012198057

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2100	ETC MOT PWR-B1 (Throttle control motor relay circuit open)	ECM detects a voltage of power source for throttle control motor is excessively low.	• Harness or connectors (Throttle control motor relay circuit is open) • Throttle control motor relay
P2103	ETC MOT PWR (Throttle control motor relay circuit short)	ECM detect the throttle control motor relay is stuck ON.	• Harness or connectors (Throttle control motor relay circuit is shorted) • Throttle control motor relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V.

Witch DTC is detected?

P2100 >> GO TO 2.
P2103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EC-508, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-508, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198058

1.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY

1. Turn ignition switch OFF.
2. Check the voltage between ECM harness connector and ground.

+		–		Voltage
ECM				
Connector	Terminal	Connector	Terminal	
F26	77	E18	127	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		–		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F26	77	E15	60	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL

Check the voltage between ECM harness connector and ground as per the following conditions.

ECM			Condition	Voltage (Approx.)
Connector	+	–		
	Terminal			
E18	122	127	Ignition switch: OFF	0 V
			Ignition switch: ON	Battery voltage

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 4.

4. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		–		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E18	122	E15	55	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

DTC Logic

INFOID:0000000012198059

DTC DETECTION LOGIC

NOTE:

- **If DTC P2101 is displayed with DTC P2100, first perform the trouble diagnosis for DTC P2100. Refer to EC-508, "DTC Logic".**
- **If DTC P2101 is displayed with DTC P2119, first perform the trouble diagnosis for DTC P2119. Refer to EC-515, "DTC Logic".**

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2101	ETC FNCTN/CIRC-B1 (Electric throttle control performance)	Electric throttle control function does not operate properly.	• Harness or connectors (Throttle control motor circuit is open or shorted) • Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when engine is running.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EC-510, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198060

1.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL

Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition	Voltage (Approx.)
Connector	+	–		
	Terminal			
E18	122	127	Ignition switch: OFF	0 V
			Ignition switch: ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		–		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E18	122	E15	55	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		–		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F26	77	E15	60	Existed

2. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	5	F26	51	Not existed
			52	Existed
	6		51	Existed
			52	Not existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct. Refer to EM-27, "Exploded View".
2. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to EC-161, "Description".

6.CHECK THROTTLE CONTROL MOTOR

Check the throttle control motor. Refer to EC-512, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace electric throttle control actuator. Refer to EM-29, "Exploded View".

Component Inspection

INFOID:0000000012198061

1.CHECK THROTTLE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Check the resistance between electric throttle control actuator terminals as per the following.

Electric throttle control actuator		Resistance (Approx.)
+	–	
Terminals		
5	6	1 - 15 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace electric throttle control actuator. Refer to EM-29, "Exploded View".

P2118 THROTTLE CONTROL MOTOR

DTC Logic

INFOID:0000000012198062

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2118	ETC MOT-B1 (Throttle control motor circuit short)	ECM detects short in both circuits between ECM and throttle control motor.	• Harness or connectors (Throttle control motor circuit is shorted.) • Electric throttle control actuator (Throttle control motor)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EC-513, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198063

1.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	5	F26	51	Not existed
			52	Existed
	6		51	Existed
			52	Not existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK THROTTLE CONTROL MOTOR

Check the throttle control motor. Refer to EC-514, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace electric throttle control actuator. Refer to EM-29, "Exploded View".

Component Inspection

INFOID:0000000012198064

1.CHECK THROTTLE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Check the resistance between electric throttle control actuator terminals as per the following.

Electric throttle control actuator		Resistance (Approx.)
+	–	
Terminals		
5	6	1 - 15 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace electric throttle control actuator. Refer to EM-29, "Exploded View".

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Logic

INFOID:0000000012198065

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition		Possible cause
P2119	ETC ACTR-B1 (Electric throttle control actuator)	A	Electric throttle control actuator does not function properly due to the return spring malfunction.	Electric throttle control actuator
		B	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C	ECM detect the throttle valve is stuck open.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND B

1. Turn ignition switch ON and wait at least 1 second.
2. Set selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
3. Set selector lever to P (CVT) or Neutral (M/T) position.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Set selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
7. Set selector lever to P (CVT) or Neutral (M/T) position.
8. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
9. Check DTC.

Is DTC detected?

YES >> Proceed to EC-515, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Set selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
3. Set selector lever to P (CVT) or Neutral (M/T) position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.

Is DTC detected?

YES >> Proceed to EC-515, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198066

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct. Refer to EM-27, "Exploded View".
2. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

YES >> Replace electric throttle control actuator. Refer to EM-29, "Exploded View".

NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to EC-161, "Description".

P2122, P2123 APP SENSOR

DTC Logic

INFOID:0000000012198067

DTC DETECTION LOGIC

NOTE:
If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-424, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2122	APP SEN 1/CIRC (Accelerator pedal position sensor 1 circuit low input)	An excessively low voltage from the APP sensor 1 is sent to ECM.	• Harness or connectors (APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1)
P2123	APP SEN 1/CIRC (Accelerator pedal position sensor 1 circuit high input)	An excessively high voltage from the APP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-517, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198068

1.CHECK APP SENSOR 1 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position (APP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between APP sensor harness connector and ground.

+		−	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E101	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

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	
E101	4	E18	101	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK APP SENSOR 1 GROUND CIRCUIT

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	
E101	2	E18	105	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK APP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

+		–		
APP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
E101	3	E18	102	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK APP SENSOR

Check the APP sensor. Refer to EC-518, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace accelerator pedal assembly. Refer to EM-29, "Exploded View".

Component Inspection

INFOID:0000000012198069

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 terminals as per the following condition.

ECM			Condition		Voltage
Connector	+	–			
	Terminal				
E18	102	105	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	119	120		Fully released	0.3 - 0.6 V
				Fully depressed	1.95 - 2.4 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly. Refer to EM-29, "Exploded View".

P2127, P2128 APP SENSOR

DTC Logic

INFOID:0000000012198070

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2127	APP SEN 2/CIRC (Accelerator pedal position sensor 2 circuit low input)	An excessively low voltage from the APP sensor 2 is sent to ECM.	• Harness or connectors (APP sensor 2 circuit is open or shorted.) [Crankshaft position sensor (POS) circuit is shorted.] (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) (Battery current sensor circuit is shorted.) • Accelerator pedal position sensor (APP sensor 2) • Crankshaft position sensor (POS) • Refrigerant pressure sensor • EVAP control system pressure sensor • Battery current sensor
P2128	APP SEN 2/CIRC (Accelerator pedal position sensor 2 circuit high input)	An excessively high voltage from the APP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-520, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198071

1.CHECK APP SENSOR 2 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position (APP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between APP sensor harness connector and ground.

+		−	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E101	5	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness connector for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F25	39	FRP sensor	F5	1
		EOP sensor	F43	3
		Turbocharger boost sensor	F75	1
F26	68	Battery current sensor	F52	1
		G sensor	B32	3
	72	CMP sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK APP SENSOR 2 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		–		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
E101	1	E18	120	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

+		–		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
E101	6	E18	119	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts

5.CHECK APP SENSOR

Check the APP sensor. Refer to EC-522, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".

NO >> Replace accelerator pedal assembly. Refer to EM-29, "Exploded View".

Component Inspection

INFOID:0000000012198072

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 terminals as per the following condition.

ECM			Condition		Voltage
Connector	+	–			
	Terminal				
E18	102	105	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	119	120		Fully released	0.3 - 0.6 V
				Fully depressed	1.95 - 2.4 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace accelerator pedal assembly. Refer to EM-29, "Exploded View".

P2135 TP SENSOR

DTC Logic

INFOID:0000000012198073

DTC DETECTION LOGIC

NOTE:
If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-424, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2135	TP SENSOR-B1 (Throttle position sensor circuit range/performance)	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	• Harness or connector (TP sensor 1 or 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1 or 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-523, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198074

1.CHECK THROTTLE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric throttle control actuator harness connector and ground.

+		−	Voltage (Approx.)
Electric throttle control actuator			
Connector	Terminal		
F29	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ground.

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	1	F26	62	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	4	F26	74	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	2	F26	75	Existed
	3		76	

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Check the throttle position sensor. Refer to EC-524, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace electric throttle control actuator. Refer to EM-29, "Exploded View".

Component Inspection

INFOID:0000000012198075

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.

3. Perform “ Throttle Valve Closed Position Learning”. Refer to EC-161, "Description".
4. Turn ignition switch ON.
5. Set selector lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition		Voltage
Connector	+	–			
	Terminal				
F26	75	74	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	76			Fully released	Less than 4.75V
				Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace electric throttle control actuator. Refer to EM-29, "Exploded View".

P2138 APP SENSOR

DTC Logic

INFOID:0000000012198076

DTC DETECTION LOGIC

NOTE:
If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-424, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2138	APP SENSOR (Accelerator pedal position sensor circuit range/ performance)	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	• Harness or connector (APP sensor 1 or 2 circuit is open or shorted.) (Turbocharger boost sensor circuit is open or shorted.) (Fuel rail pressure sensor circuit is open or shorted.) (Battery current sensor circuit is open or shorted.) (G sensor circuit is open or shorted.) (Camshaft position sensor circuit is open or shorted.) (Exhaust valve timing control position sensor circuit is open or shorted.) (Engine oil pressure sensor circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1 or 2) • Turbocharger boost sensor • Fuel rail pressure sensor • Battery current sensor • G sensor • Camshaft position sensor • Exhaust valve timing control position sensor • Engine oil pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-527, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198077

1.CHECK APP SENSOR 1 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position (APP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between APP sensor harness connector and ground.

+		−	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E101	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		−		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
E101	4	E18	101	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK APP SENSOR 2 POWER SUPPLY

Check the voltage between APP sensor harness connector and ground.

+		−	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E101	5	Ground	5 V

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness connector for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F25	39	FRP sensor	F5	1
		EOP sensor	F43	3
		Turbocharger boost sensor	F75	1

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
F26	68	Battery current sensor	F52	1
		G sensor	B32	3
	72	CMP sensor	F109	1
		EVT control position sensor	F110	1
E18	118	APP sensor 2	E101	5

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

5.CHECK APP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		–		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
E101	1	E18	120	Existed
	2		105	

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK APP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

+		–		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
E101	3	E18	102	Existed
	6		119	

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts

7.CHECK APP SENSOR

Check the APP sensor. Refer to EC-522, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace accelerator pedal assembly. Refer to EM-29, "Exploded View".

Component Inspection

INFOID:0000000012198078

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 terminals as per the following condition.

ECM			Condition		Voltage
Connector	+	–			
	Terminal				
E18	102	105	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	119	120		Fully released	0.3 - 0.6 V
				Fully depressed	1.95 - 2.4 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly. Refer to EM-29, "Exploded View".

P2162 VEHICLE SPEED SENSOR

Description

INFOID:0000000012198079

ECM receives a rear wheel sensor signal from ABS actuator and electric unit (control unit) via CAN communication to switch combustion for the direct injection gasoline system. For the direct injection gasoline system, refer to EC-51, "DIRECT INJECTION GASOLINE SYSTEM : System Description".

DTC Logic

INFOID:0000000012198080

DTC DETECTION LOGIC

NOTE:

- If DTC P2162 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to EC-115, "DTC Index".
- If DTC P2162 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-419, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2162	VEHICLE SPEED SEN A/B (Vehicle speed sensor A/B correlation)	ECM detects a rear LH wheel sensor signal or a rear RH wheel sensor signal transmitted from the ABS actuator and electric unit (control unit) via CAN communication at least for 15 seconds in a row when the vehicle is in stopped condition.	• Harness or connectors (The CAN communication line is open or shorted) • Rear LH wheel sensor • Rear RH wheel sensor • ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 9 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 30 seconds.
   NOTE:
   Never depress the accelerator pedal during idle running.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-530, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198081

1.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

With CONSULT

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-39, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform diagnosis procedure corresponding to DTC indicated.

2.CHECK REAR WHEEL SENSOR-I

With CONSULT
1. Stop the vehicle.
2. Set the parking brake.
3. Use CONSULT to select “RR RH SENSOR” and “RR RH SENSOR” in “DATA MONITOR” mode of “ABS”
4. Check indications of “RR RH SENSOR” and “RR RH SENSOR”.
NOTE:
Never cause the vehicle to vibrate.

Is 0 km/h (0 MPH) indicated for both “RR RH SENSOR” and “RR RH SENSOR”?

YES >> GO TO 3.
NO >> Perform trouble diagnosis of the rear wheel sensor if 0 km/h (0 MPH) is not displayed. Refer to BRC-88, "Diagnosis Procedure".

3. CHECK REAR WHEEL SENSOR-II

With CONSULT
1. Drive the vehicle at 20 km/h (13 MPH).
CAUTION:
Always drive vehicle at a safe speed.
2. Check indications of “RR RH SENSOR” and “RR RH SENSOR”.

Is the difference between the indicated values of “RR RH SENSOR” and “RR RH SENSOR” within ± 1 km/h (1 MPH)?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Perform trouble diagnosis of the rear wheel sensor. Refer to BRC-88, "Diagnosis Procedure"

P219A AIR FUEL RATIO

DTC Logic

INFOID:0000000012826857

DTC DETECTION LOGIC

NOTE:

- **If DTC P219A is displayed with other DTC, first perform the trouble diagnosis for the other DTC. Refer to EC-115, "DTC Index".**

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P219A	AIR FUEL RATIO B1 (AIR FUEL RATIO B1)	ECM detects a lean/rich air fuel ratio state in any cylinder for a specified length of time.	• Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor • Intake air leaks • Lack of fuel • Incorrect PCV hose connection • Improper spark plug • Insufficient compression • The fuel injector circuit is open or shorted • ignition coil • The ignition signal circuit is open or shorted

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING-1

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

NOTE:

Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 2.

2.PRECONDITIONING-2

1. Turn ignition switch ON.
2. Clear the mixture ratio self-learning value. Refer to EC-165, "Description".

Will CONSULT be used?

YES >> GO TO 3.
NO >> GO TO 6.

3.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Turn ignition switch ON.
2. Select “COOLAN TEMP/S” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Start the engine.
4. Make sure that “COOLAN TEMP/S” indicates more than 80°C (176°F).

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

1. Select “SYSTEM 1 DIAGNOSIS B B1” and “SYSTEM 1 DIAGNOSIS A B1” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Drive vehicle under the following conditions for at least 5 consecutive seconds.

CAUTION:

- **Always drive vehicle at a safe speed.**

ENG SPEED	1,600 – 2,600rpm
COOLAN TEMP/S	More than 80°C (176°F)
B/FUEL SCHDL	6 – 14 msec
Selector lever	CVT: D position M/T: 6th position
SYSTEM 1 DIAGNOSIS B B1	PRSENT

NOTE:
- Drive the vehicle at approximately 88 km/h (55MPH) allows easy diagnosis.
- Keep the accelerator pedal as possible during crusing.

3. Check “SYSTEM 1 DIAGNOSIS A B1” indication.

Is “CMPLT” displayed?

YES >> GO TO 5.
NO >> GO TO 2.

5.PERFORM DTC CONFIRMATION PROCEDURE-3

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-533, "Diagnosis Procedure".
NO >> INSPECTION END

6.PERFORM DTC CONFIRMATION PROCEDURE-4

Without CONSULT

1. Start the engine and warm it up to normal operating temperature.
2. Drive vehicle under the following conditions for at least 5 consecutive seconds.

CAUTION:
- **Always drive vehicle at a safe speed.**

Engine speed	1,600 – 2,600rpm
Calculated load value	24 – 77 %
Selector lever	CVT: D position M/T: 6th position

NOTE:
- Drive the vehicle at approximately 88 km/h (55MPH) allows easy diagnosis.
- Keep the accelerator pedal as possible during crusing.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-533, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012826858

1.CHECK FOR INTAKE AIR LEAK

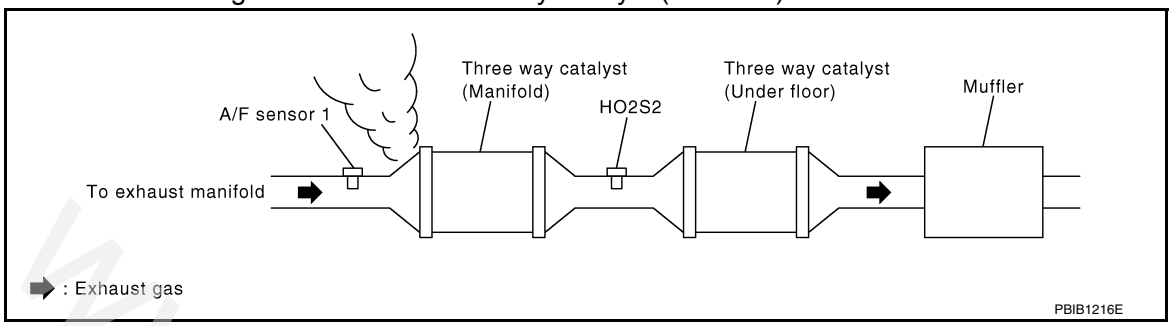
1. Stop engine and check the following for connection.
- Air duct
- Vacuum hoses
- PCV hose
- Intake air passage between air duct to intake manifold
2. Start engine and let it idle.
3. Listen for an intake air leak after the mass air flow sensor.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK EXHAUST GAS LEAK

1. Stop engine and visually check exhaust tube, three way catalyst and muffler for dents connection.
2. Start engine and let it idle.
3. Listen for an exhaust gas leak before three way catalyst (manifold).



Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-166, "Work Procedure".
2. Check fuel pressure. Refer to EC-166, "Work Procedure".

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 8.

4.CHECK MASS AIR FLOW SENSOR

With CONSULT
Check “MASS AIRFLOW” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
For specification, refer to EC-591, "Mass Air Flow Sensor".

With GST
Check mass air flow sensor signal in Service $01 using GST.
For specification, refer to EC-591, "Mass Air Flow Sensor".

Is the inspection result normal?

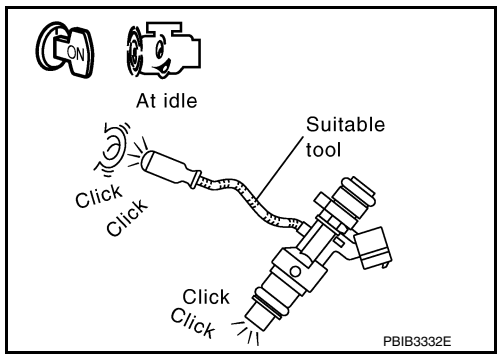
YES >> GO TO 5.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-233, "Diagnosis Procedure".

5.CHECK FUNCTION OF FUEL INJECTOR

With CONSULT
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Check that each circuit produces a momentary engine speed drop.

Without CONSULT
1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



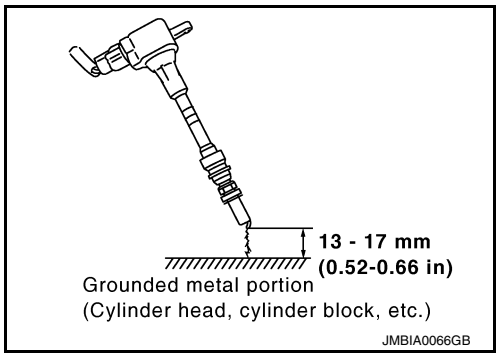
Is the inspection result normal?

YES >> GO TO 6.
NO >> Perform trouble diagnosis for fuel injector, refer to EC-541, "Component Function Check".

6.CHECK FUNCTION OF IGNITION COIL-1

CAUTION:
Perform the following steps in a well-ventilated area with no combustibles.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse from IPDM E/R to release fuel pressure.
   NOTE:
   CONSULT must not be used to release fuel pressure. It develops again during the following steps, if released by using CONSULT.
3. Start the engine.
4. After an engine stall, crank the engine two or three times to release all the fuel pressure.
5. Turn ignition switch OFF.
6. Disconnect all the harness connectors of ignition coil to prevent electric discharge from occurring in ignition coil.
7. Remove ignition coil assembly and spark plug of cylinder. Refer to EM-60, "Removal and Installation".
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Allow a 13-17mm (0.52-0.66 in) spacing between spark plug and grounded metal portion as shown in the figure to fix the ignition coil with a rope or an equivalent.
11. Crank the engine for approximately 3 seconds to see if sparking occurs between spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:
- **The discharge voltage becomes 20 kV or higher. Therefore, always stay away from the spark plug and ignition coil at least 50 cm (19.7 in) during the inspection.**
- **Leaving a space of more than 17mm (0.66 in) may damage the ignition coil.**

NOTE:
When the gap is less than 13 mm (0.52 in), a the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 9.

7.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-17, "Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

8.DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace fuel filter and fuel pump assembly. Refer to FL-6, "2WD : Exploded View" (2WD models) or FL-10, "AWD : Exploded View" (AWD models).
NO >> Repair or replace error-detected parts.

9.CHECK FUNCTION OF IGNITION COIL-2

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a non-malfunctioning spark plug.
3. Crank engine for approximately 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

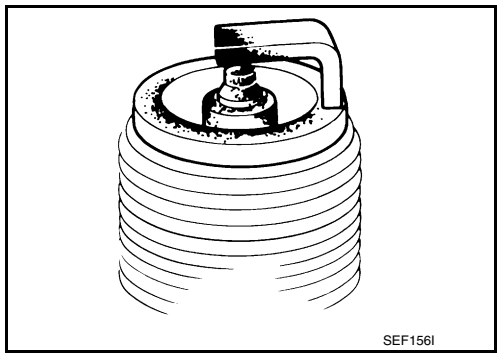
YES >> GO TO 10.
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-554, "Component Function Check".

10. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES >> 1. Repair or clean spark plug. Refer to EM-60, "Exploded View".
2. GO TO 11.
NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-139, "Spark Plug".



11. CHECK FUNCTION OF IGNITION COIL-3

1. Reconnect the initial spark plugs.
2. Crank engine for approximately 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-139, "Spark Plug".

P2263 TC SYSTEM

DTC Logic

INFOID:0000000012198082

DTC DETECTION LOGIC

NOTE:
If DTC P2263 is displayed with DTC P0237 or P0238, first perform the trouble diagnosis for DTC P0237 or P0238. Refer to EC-332, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2263	TC SYSTEM-B1 (Turbocharger boost system performance)	In spite of the boosting area, the boost does not increase.	• Intake air leaks • Exhaust gas leaks • Turbocharger boost sensor • Turbocharger boost control solenoid valve • Recirculation valve • Exhaust manifold and turbocharger assembly • Boost control actuator

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-537, "Component Function Check".

NOTE:
Use component function check to check the overall function of the turbocharger system circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-538, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012198083

1.PERFORM COMPONENT FUNCTION CHECK-I

Check the following:
- Disconnection of air duct or hose between electric throttle control actuator and compressor wheel.
- Exhaust gas leaks of exhaust manifold
- Open stuck of recirculation valve
- Stuck of turbocharger

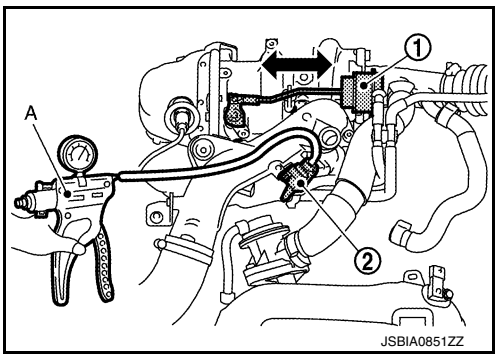
Is the inspection result normal?

YES >> GO TO 2.
NO >> Proceed to EC-538, "Diagnosis Procedure".

2.PERFORM COMPONENT FUNCTION CHECK-II

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost control solenoid valve harness connector.
3. Disconnect of hose between turbocharger boost control solenoid valve and compressor outlet pipe.
4. Install pressure pump to turbocharger boost control solenoid valve.

5. Check that the rod of the boost control actuator (1) activates when supplying pressure and battery voltage to the turbocharger boost control solenoid valve (2) as per the following conditions.



A. Pressure pump

Turbocharger boost control solenoid valve	Operation
Condition	
Supply pressure [73 kPa (548 mmHg, 21.56 inHg)] with battery voltage to terminals 1 and 2	Boost control actuator rod operates
Supply pressure [73 kPa (548 mmHg, 21.56 inHg)] with battery voltage to terminals 1 and 2	Boost control actuator rod not operates

CAUTION:
Do not supply pressure over 83 kPa (623 mmHg, 24.51 inHg).

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-538, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198084

1.CHECK FOR EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak of exhaust manifold.

Is exhaust gas leak detected?

YES >> Repair or replace malfunction parts.
NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak between electric throttle control actuator and compressor wheel.

Is intake air leak detected?

YES >> Repair or replace malfunction parts.
NO >> GO TO 3.

3.CHECK RECIRCULATION VALVE

1. Turn ignition switch OFF.
2. Check recirculation valve. Refer to EM-41, "Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace recirculation valve. Refer to EM-32, "Exploded View".

4.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY

1. Disconnect turbocharger boost control solenoid valve harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger boost control solenoid valve harness connector and ground.

+		–	Voltage
Turbocharger boost control solenoid valve			
Connector	Terminal		
F54	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between turbocharger boost control solenoid valve harness connector and IPDM E/R harness connector.

+		–		Continuity
Turbocharger boost control solenoid valve		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F54	2	E14	36	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply.
NO >> Repair or replace error-detected parts.

6.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger boost control solenoid valve harness connector and ECM harness connector.

+		–		Continuity
Turbocharger boost control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F54	1	F26	73	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Check the turbocharger boost control solenoid valve. Refer to EC-540, "Component Inspection (Turbocharger Boost Control Solenoid Valve)".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace turbocharger boost control solenoid valve. Refer to EM-40, "Exploded View".

8.CHECK BOOST CONTROL ACTUATOR

Check the boost control actuator. Refer to EM-41, "Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace exhaust manifold and turbocharger assembly. Refer to EM-40, "Exploded View".

9.CHECK TURBOCHARGER BOOST SENSOR

Check the turbocharger boost sensor. Refer to EC-540, "Component Inspection (Turbocharger Boost Sensor)".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace turbocharger boost sensor. Refer to EM-32, "Exploded View".

10.CHECK EXHAUST MANIFOLD AND TURBOCHARGER ASSEMBLY

Check the exhaust manifold and turbocharger assembly. Refer to EM-45, "Inspection".

Is the inspection result normal?

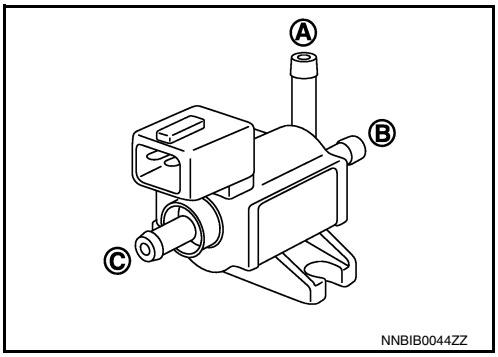
YES >> CHECK INTERMITTENT INCIDENT. Refer to GI-45, "Intermittent Incident".
NO >> Replace exhaust manifold and turbocharger assembly. Refer to EM-40, "Exploded View".

Component Inspection (Turbocharger Boost Control Solenoid Valve)

INFOID:0000000012198085

1.CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

1. Turn ignition switch OFF
2. Disconnect turbocharger boost control solenoid valve harness connector.
3. Disconnect hoses connected to turbocharger boost control solenoid valve.
4. Check air passage continuity of turbocharger boost control solenoid valve as per the following conditions.



Condition	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12 V direct current supply between terminals 1 and 2	Existed	Not existed
No supply	Not existed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace turbocharger boost control solenoid valve. Refer to EM-40, "Exploded View".

Component Inspection (Turbocharger Boost Sensor)

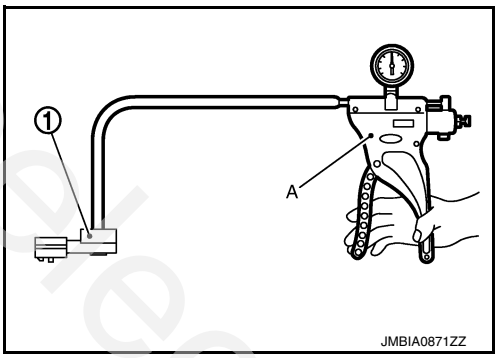
INFOID:0000000012198086

1.CHECK TURBOCHARGER BOOST SENSOR

1. Turn ignition switch OFF.
2. Remove turbocharger boost sensor with its harness connector.
3. Install pressure pump (A) to turbocharger boost sensor (1).

CAUTION:
When insert a pressure pump hose to the sensor, be careful to the damage of the sensor housing.

4. Turn ignition switch ON.
5. Check the voltage between ECM harness connector terminals as per the following conditions.



NOTE:
- Always calibrate the pressure pump gauge when using it.
- Inspection should be done at room temperature [10 - 30°C (50 - 86°F)].

ECM			Condition [Pressure (Relative to atmospheric pressure)]	Voltage (Approx.)
Connector	+	–		
	Terminal			
F25	41	44	0 kPa (0 mbar, 0 mmHg, 0 inHg)	2.03 V
			40 kPa (400 mbar, 300 mmHg, 11.81 inHg)	2.67 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace turbocharger boost sensor. Refer to EM-40, "Exploded View".

FUEL INJECTOR

Component Function Check

INFOID:0000000012198087

1.INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

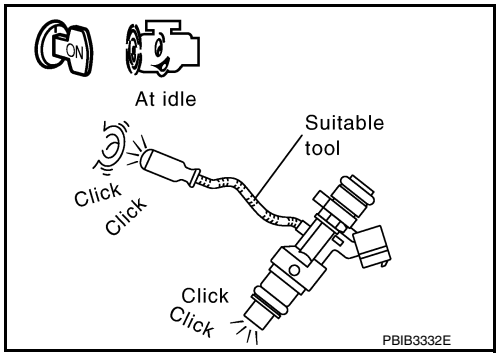
YES >> GO TO 2.
NO >> Proceed to EC-541, "Diagnosis Procedure".

2.CHECK FUEL INJECTOR FUNCTION

With CONSULT
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Check that each circuit produces a momentary engine speed drop.

Without CONSULT
1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-541, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198088

1.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel injector harness connector and ground.

+			–	Voltage
Fuel injector				
Cylinder	Connector	Terminal		
1	F65	1	Ground	Battery voltage
2	F66	1		
3	F67	1		
4	F68	1		

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 2.

2.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel injector harness connector and ECM harness connector.

+			–		Continuity
Fuel injector			ECM		
Cylinder	Connector	Terminal	Connector	Terminal	
1	F65	1	F25	3	Existed
2	F66	1		4	
3	F67	1			
4	F68	1		3	

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3. CHECK FUEL INJECTOR DRIVER POWER SUPPLY

1. Reconnect ECM harness connector.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

+		–	Voltage
ECM			
Connector	Terminal		
F26	49	Ground	Battery voltage
	53		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident"
NO >> GO TO 4.

4. CHECK FUEL INJECTOR DRIVER POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector relay harness connector.
4. Check the continuity between ECM harness connector and fuel injector relay harness connector.

+		–		Continuity
ECM		Fuel injector relay		
Connector	Terminal	Connector	Terminal	
F26	49	E57	5	Existed
	53		7	

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts

5. CHECK FUEL INJECTOR RELAY POWER SUPPLY (CONTACT SIDE)

Check the voltage between fuel injector relay harness connector and ground.

+		–	Voltage
Fuel injector relay			
Connector	Terminal		
E57	3	Ground	Battery voltage
	6		

Is the inspection result normal?

YES >> GO TO 6.
NO >> Perform the trouble diagnosis for power supply circuit.

6.CHECK FUEL INJECTOR RELAY POWER SUPPLY (EXCITATION COIL SIDE)

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between fuel injector relay harness connector and ground.

+		−	Voltage
Fuel injector relay			
Connector	Terminal		
E57	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7

7.CHECK FUEL INJECTOR RELAY POWER SUPPLY CIRCUIT (EXCITATION COIL SIDE)

1. Turn ignition switch OFF.
2. Disconnect fuel injector relay harness connector.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between IPDM E/R harness connector and fuel injector harness connector.

+		−		Continuity
IPDM E/R		Fuel injector relay		
Connector	Terminal	Connector	Terminal	
E14	35	E57	1	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

8.CHECK FUEL INJECTOR RELAY GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector relay harness connector.
3. Check the continuity between fuel injector relay harness connector and ground.

+		−	Continuity
Fuel injector relay			
Connector	Terminal		
E57	2	Ground	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

9.CHECK FUEL INJECTOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel injector harness connector and ECM harness connector.

+			–		Continuity
Fuel injector			ECM		
Cylinder	Connector	Terminal	Connector	Terminal	
1	F65	2	F25	5	Existed
2	F66	2		6	
3	F67	2		7	
4	F68	2		8	

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace error-detected parts.

10.CHECK FUEL INJECTOR RELAY

Check the fuel injector relay. Refer to EC-544, "Component Inspection (Fuel Injector Relay)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident"
NO >> Replace fuel injector relay. Refer to PG-9, "Standardized Relay".

11.CHECK FUEL INJECTOR

Check the fuel injector. Refer to EC-544, "Component Inspection (Fuel Injector)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident"
NO >> Replace malfunctioning fuel injector. Refer to EM-54, "Exploded View".

Component Inspection (Fuel Injector)

INFOID:0000000012198089

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.

Fuel injector		Resistance
+	–	
Terminals		
1	2	1.44 - 1.73 Ω [at 10 - 60°C (50 - 140°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector.EM-54, "Exploded View"

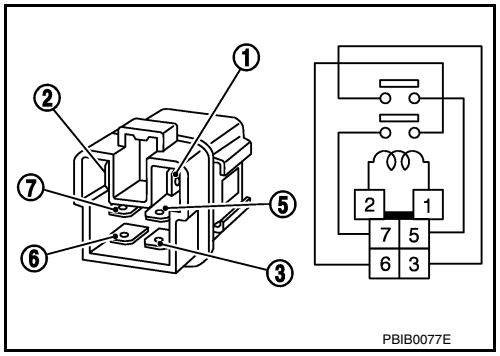
Component Inspection (Fuel Injector Relay)

INFOID:0000000012198090

1.CHECK FUEL INJECTOR RELAY

1. Turn ignition switch OFF.
2. Remove fuel injector relay.

3. Check the continuity between fuel heater relay terminals as per the following conditions.



Fuel injector relay		Conditions	Continuity
+	–		
Terminal			
3	5	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed
6	7	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel injector relay.

LOW PRESSURE FUEL PUMP

Component Function Check

INFOID:0000000012198091

1.CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.

NOTE:
Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-546, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198092

1.CHECK FUEL PUMP RELAY POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector terminals.

ECM			Voltage
Connector	+	–	
	Terminal		
E18	117	127	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		–		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E18	117	E13	31	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK LOW FUEL PUMP POWER SUPPLY

1. Turn ignition switch OFF.
2. Reconnect ECM harness connector.
3. Disconnect fuel level sensor unit and fuel pump harness connector.
4. Turn ignition switch ON.
5. Check the voltage between fuel level sensor unit and fuel pump harness connector and ground.

+		–	Voltage
Fuel level sensor unit and fuel pump			
Connector	Terminal		
B46	1	Ground	Battery voltage should for exist 1 second after ignition switch is turn ON.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK LOW FUEL PUMP POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between fuel level sensor unit and fuel pump harness connector and IPDM E/R harness connector.

+		–		Continuity
Fuel level sensor unit and fuel pump		IPDM E/R		
Connector	Terminal	Connector	Terminal	
B46	1	E15	54	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

5.CHECK LOW FUEL PUMP GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between fuel level sensor unit and fuel pump harness connector and ground.

+		–	Continuity
Fuel level sensor unit and fuel pump			
Connector	Terminal		
B46	3	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK LOW FUEL PUMP

Check the low fuel pump. Refer to EC-547, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace fuel level sensor unit and fuel pump. Refer to FL-6, "2WD : Exploded View".

Component Inspection

INFOID:0000000012198093

1.CHECK FUEL PRESSURE REGULATOR

1. Turn ignition switch OFF.
2. Check low fuel pressure. Refer to EC-166, "Work Procedure".

Is inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK LOW PRESSURE FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit.
3. Check resistance between fuel level sensor unit terminals as follows.

Fuel level sensor unit		Condition	Resistance
+	–		
Terminals			
2	4	Temperature: 25°C (77°F)	0.2 - 5.0 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel level sensor unit. Refer to FL-6, "2WD : Exploded View".

HIGH PRESSURE FUEL PUMP

Component Function Check

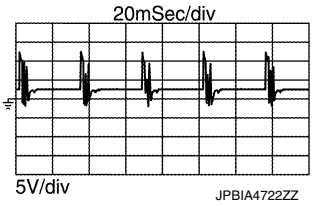
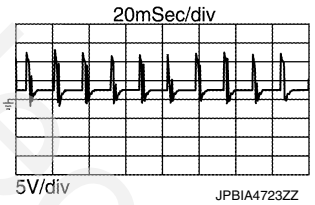
INFOID:0000000012198094

1.CHECK HIGH PRESSURE FUEL PUMP FUNCTION

With CONSULT
1. Start engine.
2. Check “FUEL PRES SEN V” in “DATA MONITOR” mode of “ENGINE” using CONSULT.

Monitor Item	Condition	Values/Status
FUEL PRES SEN V	Engine speed: Idle	1,140 – 1,460 mV
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,300 – 2,900 mV

Without CONSULT
1. Start engine.
2. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F26	55	50	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14 V) ★ 
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V) ★ 

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-549, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198095

1.CHECK HIGH PRESSURE FUEL PUMP POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

+		–	Voltage
ECM			
Connector	Terminal		
F26	54	Ground	Battery voltage

Is inspection result normal?

YES >> GO TO 8.
NO >> GO TO 2.

2.CHECK HIGH PRESSURE FUEL PUMP POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector relay harness connector.
4. Check the continuity between ECM harness connector and high pressure fuel pump relay harness connector.

+		−		Continuity
ECM		High pressure fuel pump relay		
Connector	Terminal	Connector	Terminal	
F26	54	E58	3	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts

3.CHECK HIGH PRESSURE FUEL PUMP RELAY POWER SUPPLY (CONTACT SIDE)

Check the voltage between high pressure fuel pump relay harness connector and ground.

+		−	Voltage
High pressure fuel pump relay			
Connector	Terminal		
E58	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform the trouble diagnosis for power supply circuit.

4.CHECK HIGH PRESSURE FUEL PUMP RELAY POWER SUPPLY (EXCITATION COIL SIDE)

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between high pressure fuel pump relay harness connector and ground.

+		−	Voltage
High pressure fuel pump relay			
Connector	Terminal		
E58	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5

5.CHECK HIGH PRESSURE FUEL PUMP RELAY POWER SUPPLY CIRCUIT (EXCITATION COIL SIDE)

1. Turn ignition switch OFF.
2. Disconnect high pressure fuel pump relay harness connector.
3. Disconnect IPDM E/R harness connector.
4. check the continuity between ipdm e/r harness connector and high pressure fuel pump harness connector.

+		–		Continuity
IPDM E/R		High pressure fuel pump relay		
Connector	Terminal	Connector	Terminal	
E14	35	E58	2	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

6.CHECK HIGH PRESSURE FUEL PUMP RELAY GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect high pressure fuel pump relay harness connector.
3. Check the continuity between high pressure fuel pump relay harness connector and ground.

+		–	Continuity
High pressure fuel pump relay			
Connector	Terminal		
E58	1	Ground	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK HIGH PRESSURE FUEL PUMP RELAY

Check the high pressure fuel pump relay. Refer to EC-553, "Component Inspection (High Pressure Fuel Pump Relay)".

Is inspection result normal?

YES >> GO TO 8.
NO >> Replace high pressure fuel pump relay. Refer to PG-9, "Standardized Relay".

8.CHECK HIGH PRESSURE FUEL PUMP CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and high pressure fuel pump harness connector.
3. Check the continuity between ECM harness connector and high pressure fuel pump harness connector.

+		–		Continuity
ECM		High pressure fuel pump		
Connector	Terminal	Connector	Terminal	
F26	55	F53	1	Existed
	56		2	

4. Also check harness for short to ground and to power.

Is inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9.CHECK HIGH PRESSURE FUEL PUMP

Check the high pressure fuel pump. Refer to EC-552, "Component Inspection (High Pressure Fuel Pump)".

Is inspection result normal?

YES >> GO TO 10.
NO >> Replace high pressure fuel pump. Refer to EM-49, "Exploded View".

10. CHECK HIGH PRESSURE FUEL PUMP INSTALLATION CONDITION

1. Turn ignition switch OFF.
2. Check that the high pressure fuel pump is installed with no backlash and looseness.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace error-detected parts.

11. CHECK CAMSHAFT

1. Remove camshaft. Refer to EM-88, "Exploded View".
2. Check camshaft. Refer to EM-92, "Inspection".

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace camshaft. Refer to EM-88, "Exploded View".

Component Inspection (High Pressure Fuel Pump)

INFOID:0000000012198096

1. CHECK HIGH PRESSURE FUEL PUMP-I

1. Turn ignition switch OFF.
2. Disconnect high pressure fuel pump harness connector.
3. Check the resistance between high pressure fuel pump terminals as follows.

High pressure fuel pump		Condition		Resistance
+	–			
Terminal				
1	2	Temperature °C (°F)	20 – 30 (68 - 86)	0.46 - 0.51 Ω

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace high pressure fuel pump. Refer to EM-49, "Exploded View".

2. CHECK HIGH PRESSURE FUEL PUMP-II

With CONSULT

1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check “FUEL PRES SEN” in “DATA MONITOR” of “ENGINE” using CONSULT.

Data monitor item	Condition	Voltage (Approx.)
FUEL PRES SEN V	Engine speed: idle	1,140 – 1,460 mV
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,300 – 2,900 mV

Without CONSULT

1. Start the engine.
2. Check fuel rail pressure sensor signal voltage.

+		–	Condition	Value (Approx.)
Fuel rail pressure sensor				
Connector	Terminal			
F5	2	Ground	Engine speed: idle	1.14 – 1.46 V
			Engine speed: Revving engine from idle to 4,000 rpm quickly	1.3 – 2.9 V

Is the inspection result normal?

YES >> INSPECTION END

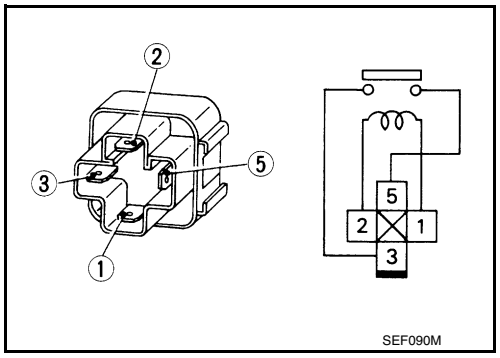
NO >> Replace high pressure fuel pump. Refer to EM-49, "Exploded View".

Component Inspection (High Pressure Fuel Pump Relay)

INFOID:0000000012198097

1. CHECK HIGH PRESSURE FUEL PUMP RELAY

1. Turn ignition switch OFF.
2. Remove high pressure fuel pump relay.
3. Check the continuity between high pressure fuel pump relay terminals as per the following conditions.



High pressure fuel pump relay		Conditions	Continuity
+	–		
Terminal			
3	5	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure fuel pump relay.

IGNITION SIGNAL

Component Function Check

INFOID:0000000012198098

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

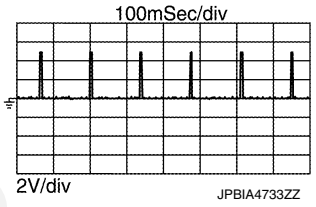
Does the engine start?

YES >> GO TO 2.
NO >> Proceed to EC-554, "Diagnosis Procedure".

2.IGNITION SIGNAL FUNCTION

With CONSULT
1. Perform “POWER BALANCE” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
2. Check that each circuit produces a momentary engine speed drop.

Without CONSULT
1. Let engine idle.
2. Check the voltage signal between ECM harness connector and ground with an oscilloscope.

ECM				Voltage signal
+		–		
Connector	Terminal	Connector	Terminal	
F26	82	E18	127	
	86			
	90			
	94			

NOTE:
The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-554, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198099

1.CHECK CONDENSER POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Turn ignition switch ON.
4. Check the voltage between condenser harness connector and ground.

+		–	Voltage
Condenser			
Connector	Terminal		
F13	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK CONDENSER POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and condenser harness connector.

+		–		Continuity
IPDM E/R		Condenser		
Connector	Terminal	Connector	Terminal	
E15	61	F13	1	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK CONDENSER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between Condenser harness connector and ground.

+		–	Continuity
Condenser			
Connector	Terminal		
F13	2	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK CONDENSER

Check the condenser. refer to EC-557, "Component Inspection (Condenser)".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace condenser.

5.CHECK IGNITION COIL POWER SUPPLY

1. Reconnect all harness connectors disconnected.
2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ignition coil harness connector and ground.

+			–	Voltage
Ignition coil				
Cylinder	Connector	Terminal		
1	F33	3	Ground	Battery voltage
2	F34	3		
3	F35	3		
4	F36	3		

Is the inspection result normal?

YES >> GO TO 6.
NO >> Perform the trouble diagnosis for power supply circuit.

6.CHECK IGNITION COIL GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

+			–	Continuity
Ignition coil				
Cylinder	Connector	Terminal		
1	F33	2	Ground	Existed
2	F34	2		
3	F35	2		
4	F36	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ignition coil harness connector.

+			–		Continuity
Ignition coil			ECM		
Cylinder	Connector	Terminal	Connector	Terminal	
1	F33	1	F26	82	Existed
2	F34	1		86	
3	F35	1		90	
4	F36	1		94	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8. CHECK IGNITION COIL WITH POWER TRANSISTOR

Check the ignition coil with power transistor. Refer to EC-556, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-60, "Exploded View".

Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000012198100

1. CHECK IGNITION COIL WITH POWER TRANSISTOR-I

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as per the following.

Ignition coil with power transistor		Resistance [Ω at 25°C (77°F)]
+	–	
Terminal		
1	2	Except 0 or ∞
	3	Except 0
2	3	

Is the inspection result normal?

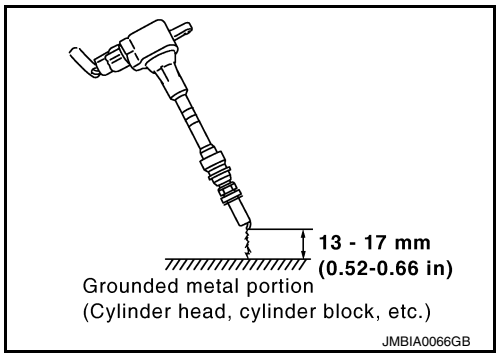
YES >> GO TO 2.

NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-60, "Exploded View".

2.CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.
4. Start engine.
5. After engine stalls, crank it two or three times to release all fuel pressure.
6. Turn ignition switch OFF.
7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils. Refer to EM-60, "Exploded View".
8. Remove ignition coil and spark plug of the cylinder to be checked. Refer to .0EM-60, "Exploded View"
9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
10. Connect spark plug and harness connector to ignition coil.
11. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **During the operation, always stay 0.5 cm (19.7 in) away from the spark plug and the ignition coil. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.**

NOTE:
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-60, "Exploded View".

Component Inspection (Condenser)

INFOID:0000000012198101

1.CHECK CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check resistance between condenser terminals as per the following.

Condenser		Resistance
+	–	
Terminal		
1	2	Above 1 MΩ [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace Condenser.

ELECTRICAL LOAD SIGNAL

Description

INFOID:0000000012198102

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred via the CAN communication line.

Component Function Check

INFOID:0000000012198103

1.CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

With CONSULT
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Select “LOAD SIGNAL” and check indication as per the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Rear window defogger switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.
NO >> Proceed to EC-558, "Diagnosis Procedure".

2.CHECK LIGHTING SWITCH FUNCTION

With CONSULT-III
Check “LOAD SIGNAL” indication as per the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Lighting switch	ON at 2nd position	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.
NO >> Proceed to EC-558, "Diagnosis Procedure".

3.CHECK HEATER FAN CONTROL SWITCH FUNCTION

With CONSULT
Select “HEATER FAN SW” and check indication as per the following conditions.

Monitor item	Condition		Indication
HEATER FAN SW	Heater fan control switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-558, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198104

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to EC-558, "Component Function Check".

Which circuit is related to the incident?

Rear window defogger>>GO TO 2.
Headlamp>>GO TO 3.
Heater fan>>GO TO 4.

2.CHECK REAR WINDOW DEFOGGER SYSTEM

Check the rear window defogger system. Refer to DEF-18, "Work Flow".

>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Check the headlamp system. Refer to EXL-47, "Work Flow".

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Check the heater fan control system. Refer to HAC-45, "Work Flow".

>> INSPECTION END

COOLING FAN

Component Function Check

INFOID:0000000012198105

1.CHECK COOLING FAN FUNCTION

With CONSULT
1. Turn ignition switch ON.
2. Perform “FAN DUTY CONTROL” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Check that cooling fan speed varies according to the percentage.

Without CONSULT
1. Activate IPDM E/R auto active test and check cooling fan motors operation. Refer to PCS-12, "Diagnosis Description".
2. Check that cooling fan operates.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-560, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198106

1.CHECK COOLING FAN CONTROL MODULE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect cooling fan control nodule harness connector.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan control nodule harness connector and ground.

+		–	Voltage
Cooling fan control module			
Connector	Terminal		
E203	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 2.

2.CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay harness connector.
3. Check the continuity between cooling fan control nodule harness connector and cooling fan relay harness connector.

+		–		Continuity
Cooling fan control module		Cooling fan relay		
Connector	Terminal	Connector	Terminal	
E203	3	E204	3	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between cooling fan relay harness connector and IPDM E/R harness connector.

+		–		Continuity
Cooling fan relay		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E204	1	E17	67	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK COOLING FAN RELAY

Check cooling fan relay. Refer to EC-562, "Component Inspection (Cooling Fan Relay)".

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Replace cooling fan relay. Refer to PG-9, "Standardized Relay".

5. CHECK COOLING FAN CONTROL MODULE GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between cooling fan control nodule harness connector and ground.

+		–	Continuity
Cooling fan control module			
Connector	Terminal		
E203	1	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK COOLING FAN CONTROL SIGNAL CIRCUIT

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between cooling fan control nodule harness connector and IPDM E/R harness connector.

+		–		Continuity
Cooling fan control module		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E203	2	E17	72	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. CHECK COOLING FAN CONTROL MODULE OUTPUT SIGNAL CIRCUIT

1. Reconnect all harness connectors disconnected.
2. Disconnect cooling fan control module harness connector.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan control module terminals and ground.

+		–	Voltage
Cooling fan control module			
Connector	Terminal		
E301	4	Ground	Battery voltage
E302	6		

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8.CHECK COOLING FAN MOTORS -1 AND -2

Check the cooling fan motor. Refer to EC-562, "Component Inspection (Cooling Fan Motor)".

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace cooling motor. Refer to CO-19, "Exploded View".

Component Inspection (Cooling Fan Motor)

INFOID:0000000012198107

1.CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan control module harness connector.
3. Supply cooling fan control module harness connector terminals with battery voltage as per the following, and check operation.

Cooling fan control module				Operation
Motor	Connector	Terminal		
		(+)	(–)	
1	E301	4	5	Cooling fan operates.
2	E302	6	7	

Is the inspection result normal?

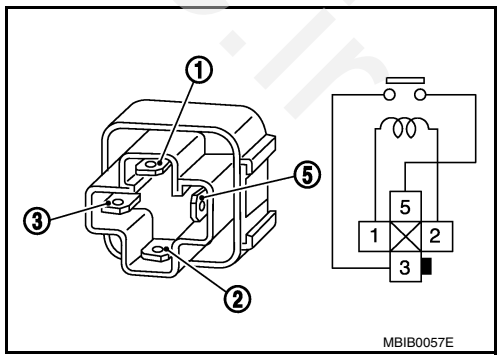
YES >> INSPECTION END
NO >> Replace malfunctioning cooling fan motor. Refer to CO-19, "Exploded View".

Component Inspection (Cooling Fan Relay)

INFOID:0000000012198108

1.CHECK COOLING FAN RELAY

1. Turn ignition switch OFF.
2. Remove cooling fan relay.
3. Check the continuity between cooling fan relay terminals under the following conditions.



Cooling fan relay		Conditions	Continuity
+	–		
Terminal			
3	5	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan relay.

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

Component Function Check

INFOID:0000000012198109

1.CHECK ORVR FUNCTION

Check whether the following symptoms are present.
- Fuel odor from EVAP canister is strong.
- Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

Is any symptom present?

YES >> Proceed to EC-563, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198110

1.INSPECTION START

Check whether the following symptoms are present.
A: Fuel odor from EVAP canister is strong.
B: Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

Which symptom is present?

A >> GO TO 2.
B >> GO TO 8.

2.CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
   The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

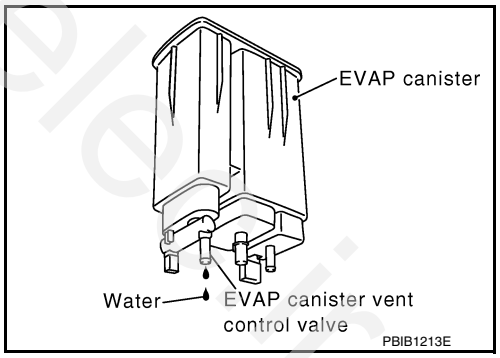
YES >> GO TO 3.
NO >> GO TO 4.

3.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 4.
NO >> GO TO 7.



4.REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 5.

5.CHECK DRAIN FILTER

Refer to EC-567, "Component Inspection (Drain filter)".

Is the inspection result normal?

OK >> GO TO 6.
NO >> Replace drain filter.

6.DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

7. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-565, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace refueling EVAP vapor cut valve with fuel tank.

8. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
   The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

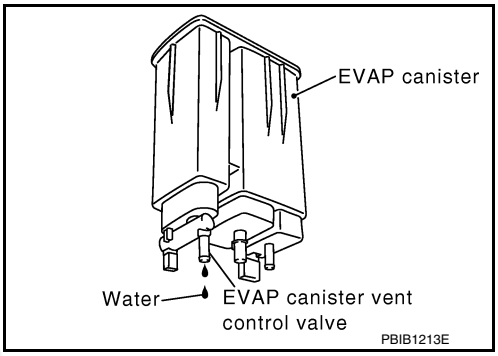
YES >> GO TO 9.
NO >> GO TO 10.

9. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 10.
NO >> GO TO 13.



10. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 11.

11. CHECK DRAIN FILTER

Refer to EC-567, "Component Inspection (Drain filter)".

Is the inspection result normal?

OK >> GO TO 12.
NO >> Replace drain filter.

12. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

13. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair or replace hoses and tubes.

14. CHECK RECIRCULATION LINE

Check recirculation line for clogging, dents and cracks.

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace fuel filler tube.

15. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-565, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace refueling EVAP vapor cut valve with fuel tank.

16. CHECK FUEL FILLER TUBE

Check fuel filler tube and hose connected to the fuel tank for clogging, dents and cracks.

Is the inspection result normal?

YES >> GO TO 17.
NO >> Replace fuel filler tube.

17. CHECK ONE-WAY FUEL VALVE-I

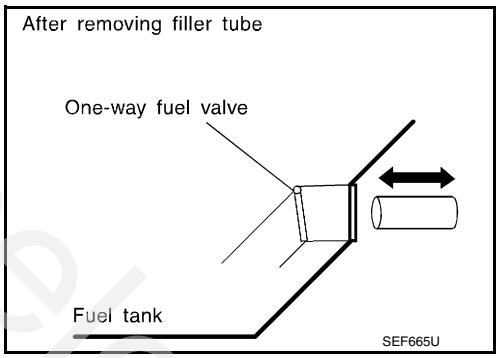
Check one-way valve for clogging.

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair or replace one-way fuel valve with fuel tank.

18. CHECK ONE-WAY FUEL VALVE-II

1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as per the following.
   When a stick is inserted, the valve should open, when removing stick it should close.
   Do not drop any material into the tank.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.

Component Inspection (Refueling EVAP vapor cut valve)

INFOID:0000000012198111

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 3.

2. CHECK REFUELING EVAP VAPOR CUT VALVE

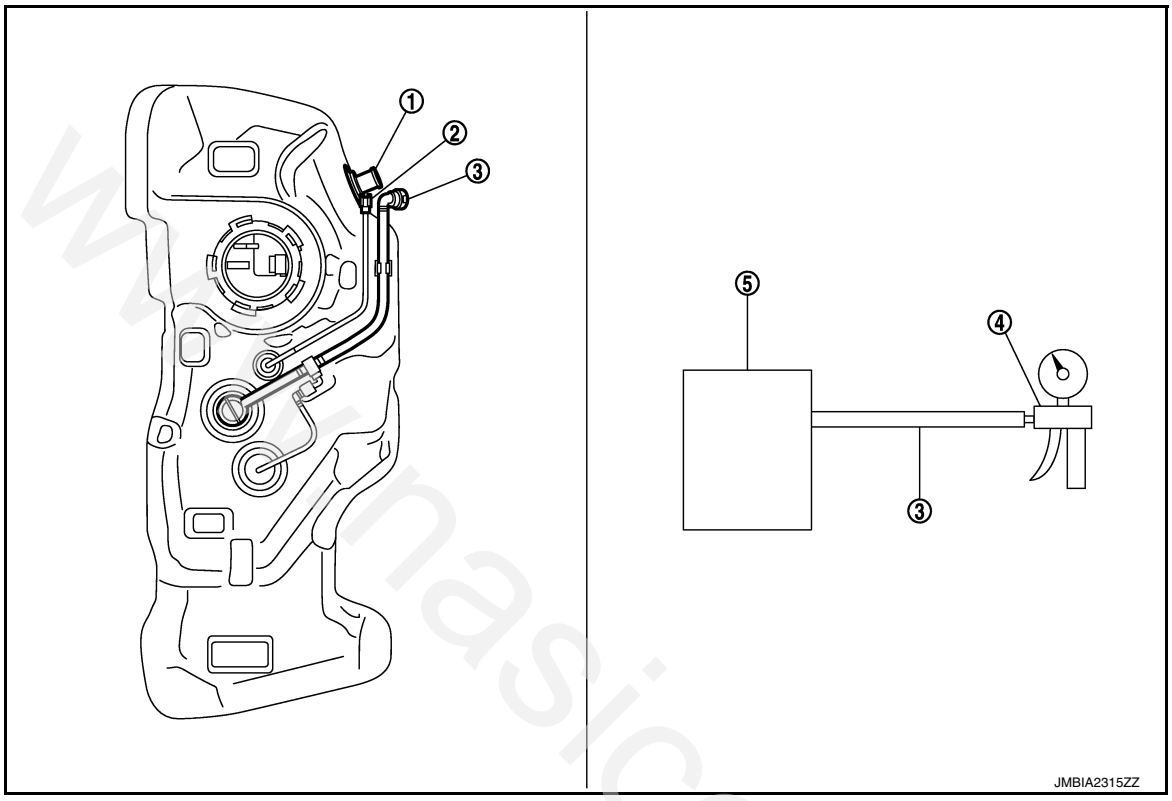
With CONSULT

1. Remove fuel tank. Refer to FL-18, "2WD : Removal and Installation".
2. Drain fuel from the tank as per the following:
- Remove fuel feed hose located on the fuel gauge retainer.
- Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
- Drain fuel using “FUEL PUMP RELAY” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Check refueling EVAP vapor cut valve for being stuck to close as per the following.
   Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
4. Check refueling EVAP vapor cut valve for being stuck to open as per the following.

- Connect vacuum pump to hose end.
- Remove fuel gauge retainer with fuel gauge unit.

Always replace O-ring with new one.

- Put fuel tank upside down.
- Apply vacuum pressure to hose end [−13.3 kPa (−0.136 kg/cm^3, −1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.



1. Filler tube
2. Recirculation line
3. EVAP/ORVR line
4. Vacuum/pressure handy pump
5. Fuel tank

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-27, "2WD : Exploded View".

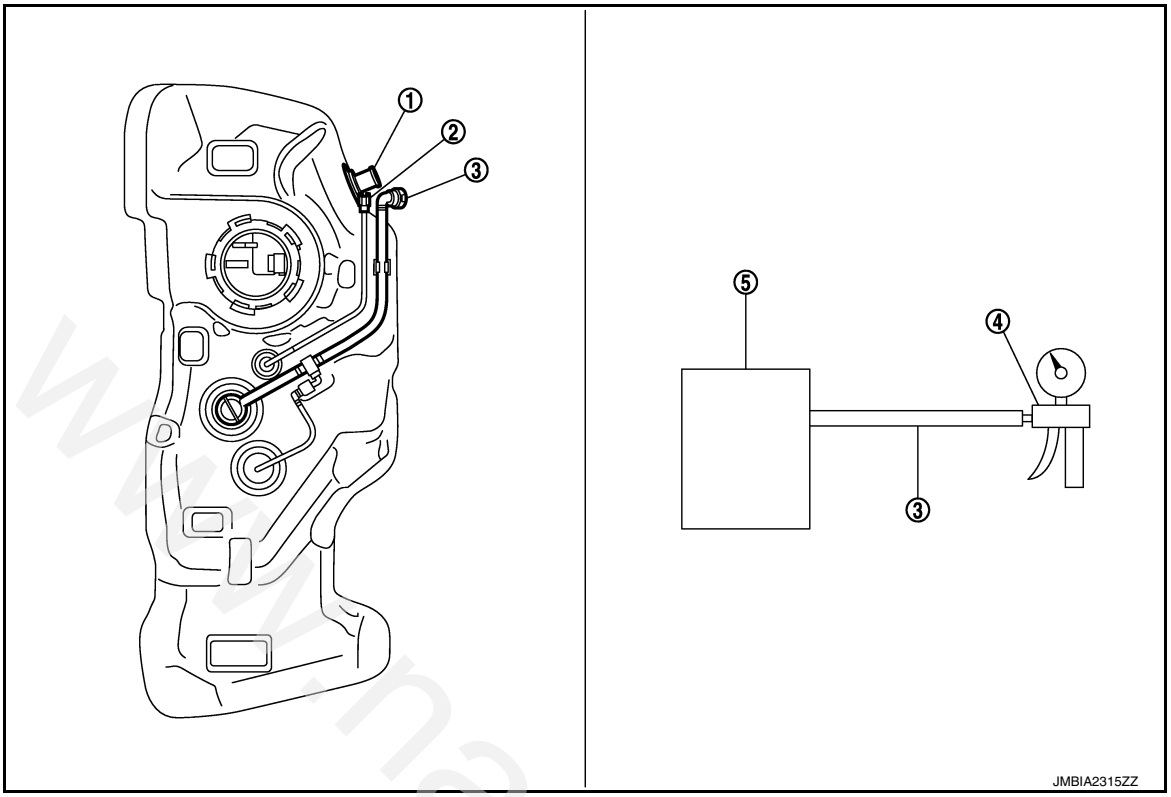
3. CHECK REFUELING EVAP VAPOR CUT VALVE

Without CONSULT

1. Remove fuel tank. Refer to FL-18, "2WD : Exploded View".
2. Drain fuel from the tank as per the following:
- Remove fuel gauge retainer.
- Drain fuel from the tank using a handy pump into a fuel container.
3. Check refueling EVAP vapor cut valve for being stuck to close as per the following.
Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
4. Check refueling EVAP vapor cut valve for being stuck to open as per the following.
- Connect vacuum pump to hose end.
- Remove fuel gauge retainer with fuel gauge unit.

Always replace O-ring with new one.

- Put fuel tank upside down.
- Apply vacuum pressure to hose end [−13.3 kPa (−0.136 kg/cm^3, −1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.



1. Filler tube
2. Recirculation line
3. EVAP/ORVR line
4. Vacuum/pressure handy pump
5. Fuel tank

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace refueling EVAP vapor cut valve with fuel tank .Refer to FL-27, "2WD : Exploded View".

Component Inspection (Drain filter)

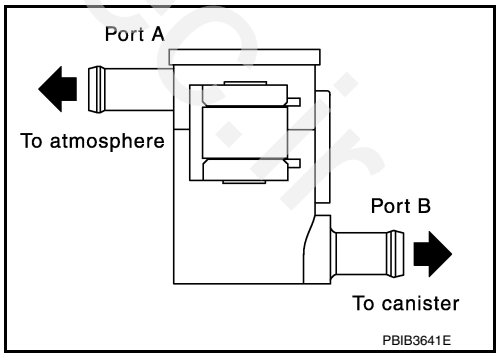
INFOID:0000000012198112

1.CHECK DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace drain filter.



REFRIGERANT PRESSURE SENSOR

Component Function Check

INFOID:0000000012198113

1.CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower fan switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM			Voltage
Connector	+	–	
	Terminal		
F25	19	12	1.0 - 4.0V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-568, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198114

1.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY

1. Turn ignition OFF.
2. Disconnect refrigerant pressure sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between refrigerant pressure sensor harness connector and ground.

+		–	Voltage (Approx.)
Refrigerant pressure sensor			
Connector	Terminal		
E49	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

+		–		Continuity
Refrigerant pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
E49	3	F25	23	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK REFRIGERANT PRESSURE SENSOR GROUND

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

+		–		Continuity
Refrigerant pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
E49	1	F25	12	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between ECM harness connector and refrigerant pressure sensor harness connector.

+		–		Continuity
Refrigerant pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
E49	2	F25	19	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK INTERMITTENT INCIDENT.

Perform GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor. Refer to HAC-98, "Exploded View".
NO >> Repair or replace error-detected parts.

BRAKE PEDAL POSITION SWITCH

Component Function Check

INFOID:0000000012198115

1.CHECK BRAKE PEDAL POSITION SWITCH FUNCTION

With CONSULT
1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check “BRAKE SW1” indication as per the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as per the following.

ECM			Condition		Voltage (Approx.)
Connector	+	–			
	Terminal				
E18	116	127	Brake pedal	Slightly depressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-570, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198116

1.CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect brake pedal position switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between brake pedal position switch harness connector and ground.

+		–	Voltage
Brake pedal position switch			
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK BRAKE PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between brake pedal position switch harness connector and ECM harness connector.

+		–		Continuity
Brake pedal position switch		ECM		
Connector	Terminal	Connector	Terminal	
E112	2	E18	116	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK BRAKE PEDAL POSITION SWITCH

Check the brake pedal position switch. Refer to EC-571, "Component Inspection (Brake Pedal Position Switch)"

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace brake pedal position switch. Refer to BR-20, "Exploded View".

Component Inspection (Brake Pedal Position Switch)

INFOID:0000000012198117

1.CHECK BRAKE PEDAL POSITION SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect brake pedal position harness connector.
3. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition		Continuity
+	–			
Terminals				
1	2	Brake pedal	Fully released	Existed
			Slightly de-pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK BRAKE PEDAL POSITION SWITCH-II

1. Adjust brake pedal position switch installation. Refer to BR-9, "Inspection and Adjustment".
2. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition		Continuity
+	–			
Terminals				
1	2	Brake pedal	Fully released	Existed
			Slightly de-pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace brake pedal position switch. Refer to BR-20, "Exploded View".

CLUTCH PEDAL POSITION SWITCH

Component Function Check

INFOID:0000000012198118

1.CHECK FOR CLUTCH PEDAL POSITION SWITCH FUNCTION

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM			Condition		Voltage (Approx.)
Connector	+	–			
	Terminal				
E18	108	127	Clutch pedal	Slightly depressed	Battery voltage
				Fully released	0V

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Proceed to EC-572, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198119

1.CHECK CLUTCH PEDAL POSITION INPUT SIGNAL

1. Turn ignition switch OFF.
2. Disconnect clutch pedal position switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between clutch pedal position switch harness connector and ground.

+		–	Voltage
Clutch pedal position switch			
Connector	Terminal		
E113	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK CLUTCH PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors.
3. Check the continuity between clutch pedal position switch harness connector and ECM harness connector.

+		–		Continuity
Clutch pedal position switch		ECM		
Connector	Terminal	Connector	Terminal	
E113	1	E18	108	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK CLUTCH PEDAL POSITION SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors.
3. Check the continuity between clutch pedal position switch harness connector and ground

+		–	Continuity
Clutch pedal position switch			
Connector	Terminal		
E113	2	Ground	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK CLUTCH PEDAL POSITION SWITCH

Check the clutch pedal position switch. Refer to EC-573, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace clutch pedal position switch. Refer to CL-11, "Exploded View".

Component Inspection

INFOID:0000000012198120

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 terminals as per the following conditions.

Clutch pedal position switch		Condition		Continuity
+	–			
Terminal				
1	2	Clutch pedal	Fully released	Existed
			Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK CLUTCH PEDAL POSITION SWITCH-II

1. Adjust clutch pedal position switch installation. Refer to CL-12, "Inspection and Adjustment".
2. Check the continuity between clutch pedal position switch terminals as per the following conditions.

Clutch pedal position switch		Condition		Continuity
+	–			
Terminal				
1	2	Clutch pedal	Fully released	Existed
			Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace clutch pedal position switch. Refer to CL-11, "Exploded View".

INFORMATION DISPLAY (ASCD)

Component Function Check

INFOID:0000000012198121

1.CHECK INFORMATION DISPLAY

1. Start engine.
2. Press ASCD MAIN switch on ASCD steering switch.
3. Drive the vehicle at more than 40 km/h (25 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
4. Press SET/– switch.
5. Check that the reading of the speedometer shows the same value as the set speed indicated in the information display while driving the vehicle on a flat road.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-574, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198122

1.CHECK DTC

Check that DTC UXXXX, P0500 or P1574 is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO-1 >> Perform trouble diagnosis for DTC UXXXX.
NO-2 >> Perform trouble diagnosis for DTC P0500. Refer to EC-397, "EXCEPT FOR M/T MODELS : DTC Logic".
NO-3 >> Perform trouble diagnosis for DTC P1574. Refer to EC-480, "DTC Logic".

2.CHECK DTC WITH COMBINATION METER

Refer to MWI-22, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis for DTC indicated.

3.CHECK INTERMITTENT INCIDENT

Perform GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-64, "Removal and Installation".
NO >> Repair or replace error-detected parts.

MALFUNCTION INDICATOR LAMP

Component Function Check

INFOID:0000000012198123

1.CHECK MIL FUNCTION

1. Turn ignition switch ON.
2. Check that MIL lights up.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-575, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198124

1.CHECK DTC

Check that DTC UXXXX is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for DTC UXXXX.

2.CHECK DTC WITH METER

Refer to MWI-22, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis for DTC indicated.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-64, "Removal and Installation".
NO >> Repair or replace error-detected parts.

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM

Symptom Table

INFOID:0000000012198125

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Low pressure fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-546
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-166
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-541
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-586
	FRP sensor circuit	1	1	2	2	2		2	2			2			EC-312
	High pressure fuel pump circuit			4		3									EC-549
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-589
	Incorrect idle speed adjustment						1	1	1	1		1			EC-162
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-510, EC-515
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-585
	Ignition circuit	1	1	2	2	2		2	2			2			EC-554
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-187
Mass air flow sensor circuit		1	1	2	2	2		2	2			2			EC-238
Engine coolant temperature sensor circuit							3			3					EC-249
Air fuel ratio (A/F) sensor 1 circuit															EC-263, EC-267, EC-270, EC-292
Throttle position sensor circuit							2			2					EC-253, EC-323, EC-450, EC-451
Accelerator pedal position sensor circuit				3	2	1									EC-517, EC-520, EC-526

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Heated oxygen sensor 2 circuit			6		6		6	6			5			EC-273, EC-279, EC-286
Knock sensor circuit			2								3			EC-341
Engine oil temperature sensor circuit			4		2						3			EC-320
Engine oil pressure sensor circuit			4		4	3	3	3			3			EC-408
Crankshaft position sensor (POS) circuit	2	2												EC-343
Camshaft position sensor (PHASE) circuit	3	2												EC-346
Turbocharger boost sensor circuit			3		3									EC-332
Vehicle speed signal circuit		2	3		3						3			EC-397, EC-401, EC-530
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-415, EC-416, EC-417, EC-418, EC-419, EC-420, EC-421
Intake valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-196, EC-211
Exhaust valve timing control solenoid valve circuit		3	2		1	3	2	2	3		3			EC-199, EC-214
Exhaust valve timing control position sensor circuit	5	5	5	5	5		5	5			5			EC-430
Turbocharger boost control solenoid valve circuit			3		3									EC-209
PNP signal circuit			3		3		3	3			3			EC-426
Refrigerant pressure sensor circuit		2				3			3		4			EC-568
Cooling fan control module circuit	5	5	5	5	5		5	5	5	4	5			EC-560
Battery current sensor circuit						4	5	5					3	EC-457, EC-460, EC-463, EC-466
Starter relay circuit	3													EC-492
Starter control relay circuit	3													EC-495
Electrical load signal circuit							3							EC-558

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-45
ABS actuator and electric unit (control unit)			4											BRC-59

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		A A	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5													FL-22, FL-24
	Fuel piping			5	5	5		5	5			5			EM-54
	Vapor lock		5												—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Air	Air duct		5	5		5		5	5			5			EM-27
	Air cleaner														EM-27
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)	5			5		5			5					EM-29
	Electric throttle control actuator														
	Air leakage from intake manifold/ Collector/Gasket														
Cranking	Battery	1	1	1		1		1	1			1		1	PG-105
	Generator circuit														CHG-8
	Starter circuit	3													STR-6
	Signal plate	6													EM-115
	PNP signal	4													TM-24 , TM-326
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-101
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-115
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mecha-nism	Timing chain	5	5	5	5	5		5	5			5			EM-77
	Camshaft														EM-89
	Intake valve timing control														EM-77
	Exhaust valve timing control														EM-77
	Intake valve												3		EM-89
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/ Gasket	5	5	5	5	5		5	5			5			EM-44, EX-10
	Three way catalyst														EM-34, EM-37, EX-10

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-48, EM-113, LU-14, LU-18
	Oil level (Low)/Filthy oil														LU-9
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-16
	Thermostat									5					CO-23
	Water pump														CO-21
	Water gallery														CO-25
	Cooling fan									5					CO-19
	Coolant level (Low)/Contaminated coolant														CO-10
NVIS (Nissan Vehicle Immobilizer System - NATS)		1	1												SEC-13

1 - 6: The numbers refer to the order of inspection.

ASCD TEMPORARY RELEASE CANNOT BE PERFORMED BY THE CLUTCH PEDAL

Diagnosis Procedure

INFOID:0000000012198126

1.CHECK DTC WITH ECM

Check that DTC is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis relevant to DTC indicated.

2.CHECK CLUTCH PEDAL POSITION SWITCH

Refer to EC-572, "Component Function Check".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace malfunctioning part.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

INFORMATION DISPLAY IS MALFUNCTIONING

Diagnosis Procedure

INFOID:0000000012198127

1.CHECK DTC WITH ECM

Check that DTC is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis relevant to DTC indicated.

2.CHECK INFORMATION DISPLAY (ASCD)

Refer to EC-574, "Component Function Check".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace malfunctioning part.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

NORMAL OPERATING CONDITION

Description

INFOID:0000000012198128

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 2,500 rpm under no load (for example, the selector lever position is neutral and engine speed is over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 2,000 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under direct injection gasoline system, EC-51, "DIRECT INJECTION GASOLINE SYSTEM : System Description".

PERIODIC MAINTENANCE

IDLE SPEED

Inspection

INFOID:0000000012198129

1.CHECK IDLE SPEED

With CONSULT
Check idle speed in “DATA MONITOR” mode of “ENGINE” using CONSULT.
With GST
Check idle speed with Service $01 of GST.

>> INSPECTION END

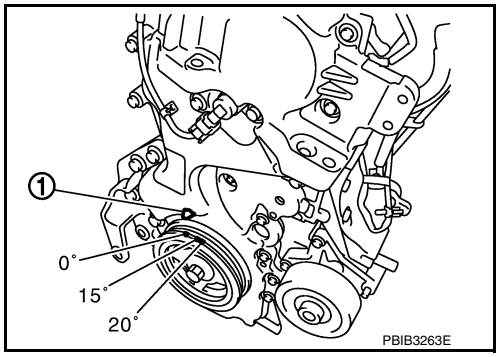
IGNITION TIMING

Inspection

INFOID:0000000012198130

1.CHECK IGNITION TIMING

1. Attach timing light to the ignition coil No.1 harness.
2. Check ignition timing.



1 : Timing indicator

>> INSPECTION END

EVAPORATIVE EMISSION SYSTEM

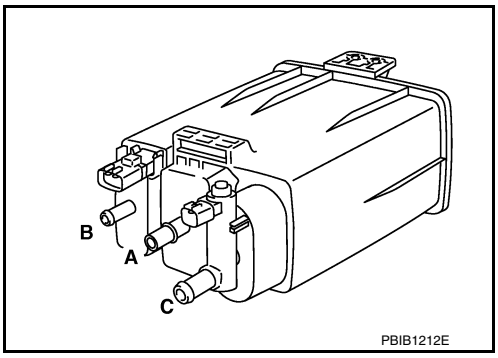
Inspection

INFOID:0000000012198131

EVAP CANISTER

1.CHECK EVAP CANISTER

1. Block port (B).
2. Blow air into port (A) and check that it flows freely out of port (C).
3. Release blocked port (B).
4. Apply vacuum pressure to port (B) and check that vacuum pressure exists at the ports (A) and (C).
5. Block port (A) and (B).
6. Apply pressure to port (C) and check that there is no leakage.



>> INSPECTION END

EVAP LEAK CHECK

Inspection

INFOID:0000000012198132

CAUTION:

- **Do not use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in EVAP system.**

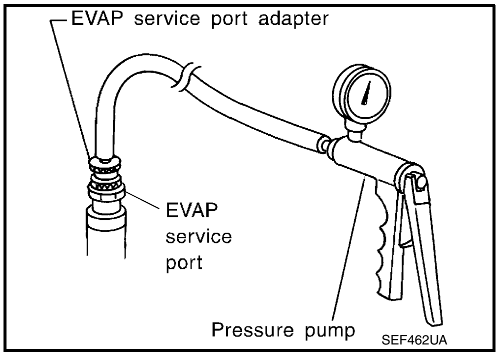
NOTE:

- Do not start engine.
- Improper installation of EVAP service port adapter [commercial service tool: (J-41413-OBD)] to the EVAP service port may cause a leak.

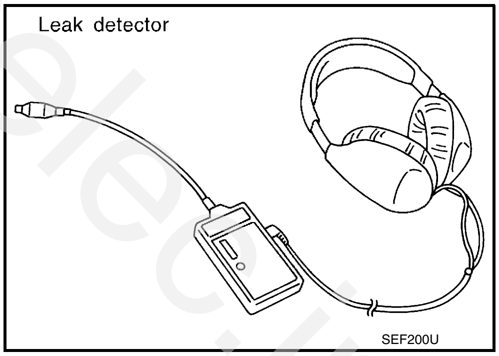
1. EVAP LEAK CHECK

With CONSULT

1. Install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.

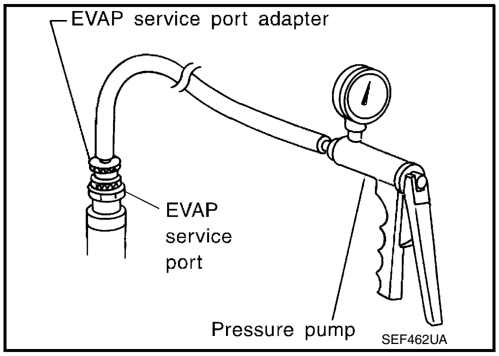


2. Turn ignition switch ON.
3. Select the “EVAP SYSTEM CLOSE” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.
4. Touch “START”. A bar graph (Pressure indicating display) will appear on the screen.
5. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
6. Remove EVAP service port adapter [commercial service tool: (J-41413-OBD)] and hose with pressure pump.
7. Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to EC-66, "EVAPORATIVE EMISSION SYSTEM : System Description".

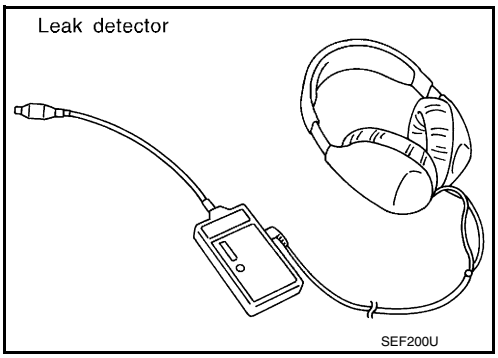


Without CONSULT

1. Install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.



2. Apply battery voltage between the terminals of EVAP canister vent control valve to make a closed EVAP system.
3. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2, 0.2 to 0.4 psi).
4. Remove EVAP service port adapter [commercial service tool: (J-41413-OBD)] and hose with pressure pump.
5. Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to EC-66, "EVAPORATIVE EMISSION SYSTEM : System Description".



>> INSPECTION END

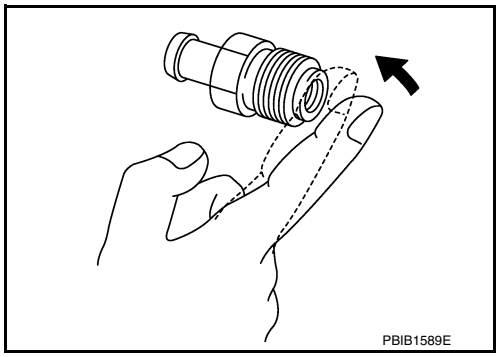
POSITIVE CRANKCASE VENTILATION

Inspection

INFOID:0000000012198133

1.CHECK PCV VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace PCV valve. Refer to EM-60, "Exploded View".

REMOVAL AND INSTALLATION

ECM

Removal and Installation

INFOID:0000000012198134

CAUTION:
Perform ADDITIONAL SERVICE WHEN REPLACING ECM. Refer to EC-157, "Description"

REMOVAL

1. Remove fusible link bracket. Keep a service area.
2. Disconnect ECM harness connectors. Refer to PG-6, "Harness Connector".
3. Remove ECM mounting nuts, and then remove ECM.

INSTALLATION

Install in the reverse order of removal.

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000012198135

Transmission	Condition	Specification
CVT	No load* (in P or N position)	650 ± 50 rpm
M/T	No load* (in Neutral position)	600 ± 50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Timing

INFOID:0000000012198136

Transmission	Condition	Specification
CVT	No load* (in P or N position)	6 ± 2° BTDC
M/T	No load* (in Neutral position)	8 ± 2° BTDC

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

INFOID:0000000012198137

Condition	Specification (Using CONSULT or GST)
At idle	5 – 35 %
At 2,500 rpm	5 – 35 %

Mass Air Flow Sensor

INFOID:0000000012198138

Supply voltage	Battery voltage (11 – 14 V)
Output voltage at idle	0.9 – 1.2V*
Mass air flow (Using CONSULT or GST)	1.0 – 4.0 g/s at idle* 2.0 – 10.0 g/s at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no load.

PRECAUTION

PRECAUTIONS

Precaution for Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

INFOID:0000000012198139

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. This system includes seat belt switch inputs and dual stage front air bag modules. The SRS system uses the seat belt switches to determine the front air bag deployment, and may only deploy one front air bag, depending on the severity of a collision and whether the front occupants are belted or unbelted. Information necessary to service the system safely is included in the “SRS AIR BAG” and “SEAT BELT” of this Service Manual.

WARNING:

Always observe the following items for preventing accidental activation.

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision that would result in air bag inflation, it is recommended that all maintenance and repair be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper repair, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see “SRS AIR BAG”.**
- **Never use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

PRECAUTIONS WHEN USING POWER TOOLS (AIR OR ELECTRIC) AND HAMMERS

WARNING:

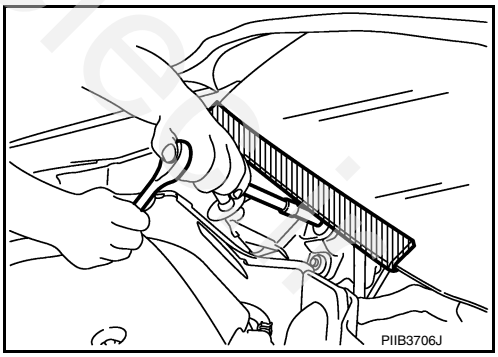
Always observe the following items for preventing accidental activation.

- **When working near the Air Bag Diagnosis Sensor Unit or other Air Bag System sensors with the ignition ON or engine running, never use air or electric power tools or strike near the sensor(s) with a hammer. Heavy vibration could activate the sensor(s) and deploy the air bag(s), possibly causing serious injury.**
- **When using air or electric power tools or hammers, always switch the ignition OFF, disconnect the battery or batteries, and wait at least 3 minutes before performing any service.**

Precaution for Procedure without Cowl Top Cover

INFOID:0000000012198140

When performing the procedure after removing cowl top cover, cover the lower end of windshield with urethane, etc to prevent damage to windshield.



Precautions For Xenon Headlamp Service

INFOID:0000000012198141

WARNING:

Comply with the following warnings to prevent any serious accident.

- **Disconnect the battery cable (negative terminal) or the power supply fuse before installing, removing, or touching the xenon headlamp (bulb included). The xenon headlamp contains high-voltage generated parts.**
- **Never work with wet hands.**
- **Check the xenon headlamp ON-OFF status after assembling it to the vehicle. Never turn the xenon headlamp ON in other conditions. Connect the power supply to the vehicle-side connector.**

(Turning it ON outside the lamp case may cause fire or visual impairments.)
- **Never touch the bulb glass immediately after turning it OFF. It is extremely hot.**

CAUTION:

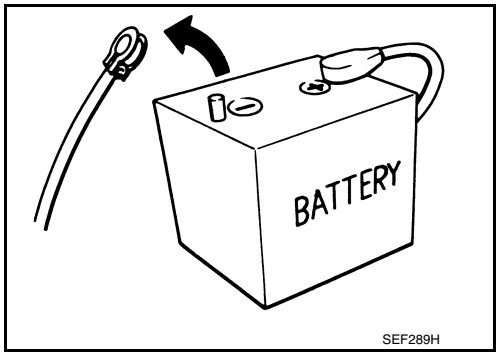
Comply with the following cautions to prevent any error and malfunction.
- **Install the xenon bulb securely. (Insufficient bulb socket installation may melt the bulb, the connector, the housing, etc. by high-voltage leakage or corona discharge.)**
- **Never perform HID circuit inspection with a tester.**
- **Never touch the xenon bulb glass with hands. Never put oil and grease on it.**
- **Dispose of the used xenon bulb after packing it in thick vinyl without breaking it.**
- **Never wipe out dirt and contamination with organic solvent (thinner, gasoline, etc.).**

Precautions for Removing Battery Terminal

INFOID:0000000012819130

When disconnecting the battery terminal, pay attention to the following.
- Always use a 12V battery as power source.
- Never disconnect battery terminal while engine is running.
- When removing the 12V battery terminal, turn OFF the ignition switch and wait at least 30 seconds.
- For vehicles with the engine listed below, remove the battery terminal after a lapse of the specified time:

D4D engine	: 20 minutes	YS23DDT	: 4 minutes
HRA2DDT	: 12 minutes	YS23DDTT	: 4 minutes
K9K engine	: 4 minutes	ZD30DDTi	: 60 seconds
M9R engine	: 4 minutes	ZD30DDTT	: 60 seconds
R9M engine	: 4 minutes		
V9X engine	: 4 minutes		
YD25DDTi	: 2 minutes		



NOTE:
ECU may be active for several tens of seconds after the ignition switch is turned OFF. If the battery terminal is removed before ECU stops, then a DTC detection error or ECU data corruption may occur.
- After high-load driving, if the vehicle is equipped with the V9X engine, turn the ignition switch OFF and wait for at least 15 minutes to remove the battery terminal.

NOTE:
- Turbocharger cooling pump may operate in a few minutes after the ignition switch is turned OFF.
- Example of high-load driving
  - Driving for 30 minutes or more at 140 km/h (86 MPH) or more.
  - Driving for 30 minutes or more on a steep slope.
- For vehicles with the 2-batteries, be sure to connect the main battery and the sub battery before turning ON the ignition switch.

NOTE:
If the ignition switch is turned ON with any one of the terminals of main battery and sub battery disconnected, then DTC may be detected.
- After installing the 12V battery, always check "Self Diagnosis Result" of all ECUs and erase DTC.

NOTE:
The removal of 12V battery may cause a DTC detection error.

On Board Diagnostic (OBD) System of Engine and CVT

INFOID:0000000012198143

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

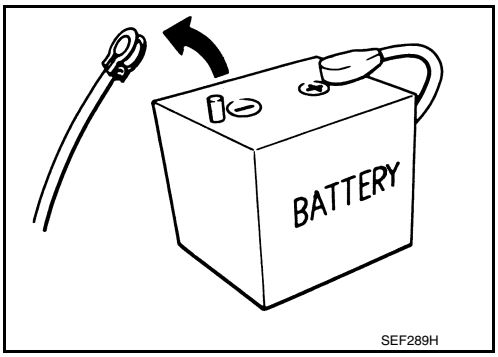
CAUTION:
- **Be sure to turn the ignition switch OFF and disconnect the negative battery cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**

- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-6, "Harness Connector".**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the EVAP system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

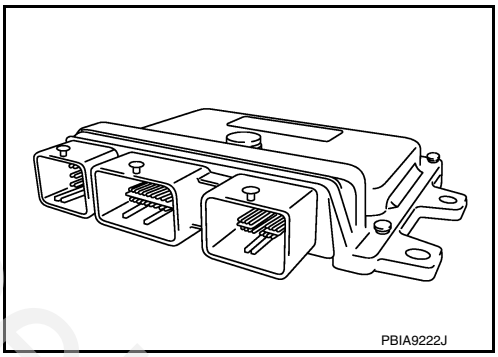
General Precautions

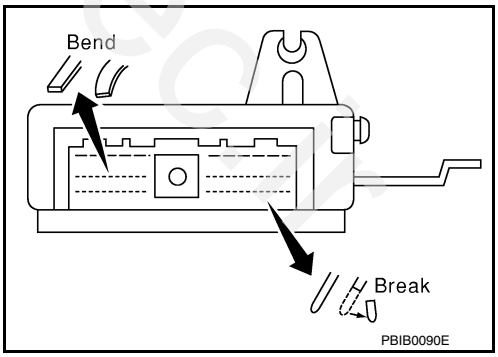
INFOID:0000000012198144

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect negative battery cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery ground cable.**

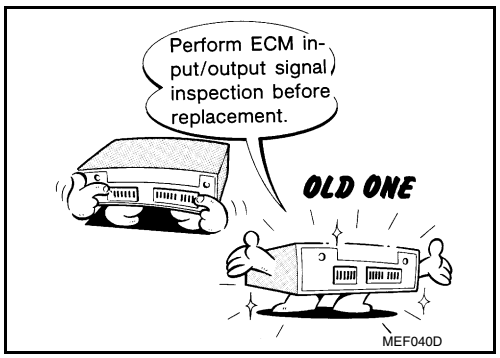


- **Do not disassemble ECM.**
- **If a battery cable is disconnected, the memory will return to the ECM value.**
  The ECM will now start to self-control at its initial value. Engine operation can vary slightly when the terminal is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- **If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.**
  - **Diagnostic trouble codes**
  - **1st trip diagnostic trouble codes**
  - **Freeze frame data**
  - **1st trip freeze frame data**
  - **System readiness test (SRT) codes**
  - **Test values**
- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.**
- **Keep engine control system parts and harness dry.**

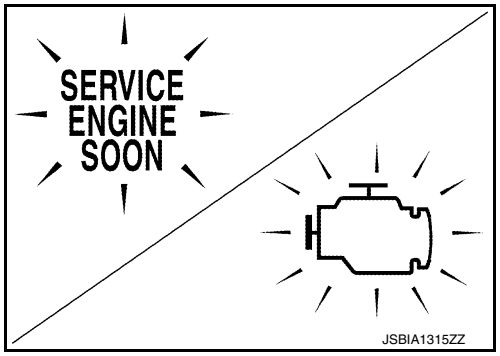




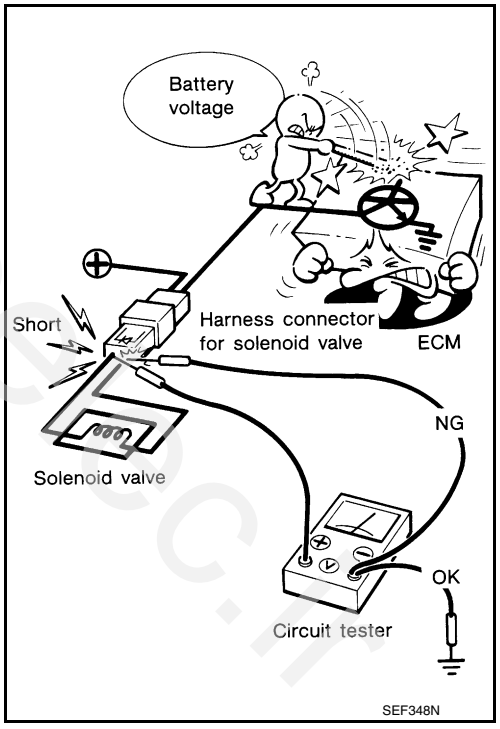
- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-679, "Reference Value".**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble electric throttle control actuator.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**



- **After performing each TROUBLE DIAGNOSIS, perform DTC CONFIRMATION PROCEDURE or Component Function Check. The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Component Function Check should be a good result if the repair is completed.**

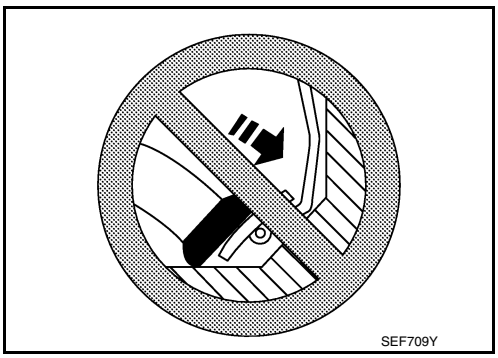


- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.

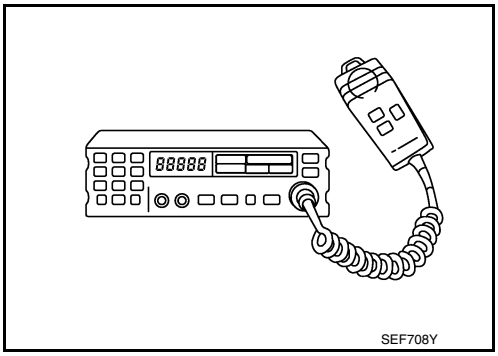


- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**

- **Do not depress accelerator pedal when starting.**
- **Immediately after starting, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**


SEF709Y

- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
- **Keep the antenna as far as possible from the electronic control units.**
- **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls. Do not let them run parallel for a long distance.**
- **Adjust the antenna and feeder line so that the standing-wave ratio can be kept smaller.**
- **Be sure to ground the radio to vehicle body.**



SEF708Y

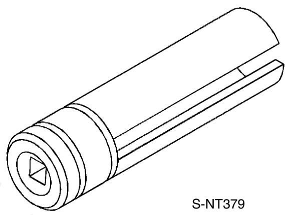
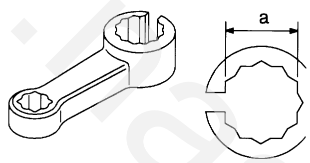
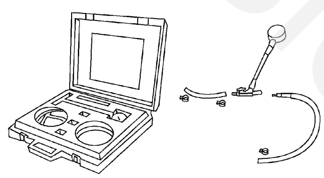
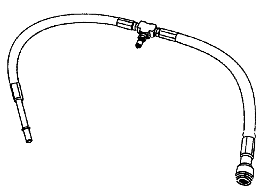
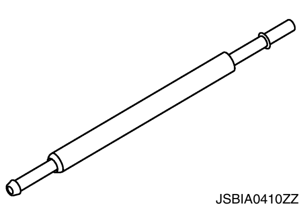
PREPARATION

PREPARATION

Special Service Tools

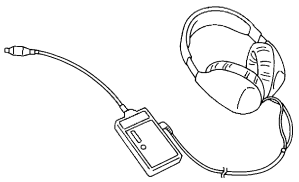
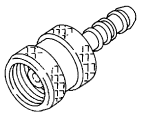
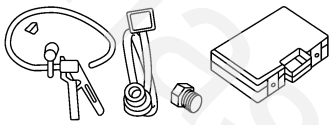
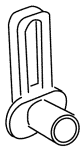
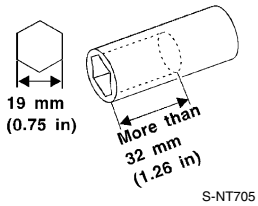
INFOID:0000000012198145

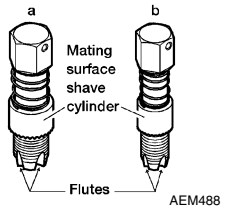
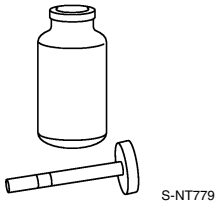
NOTE:
The actual shapes of TechMate tools may differ from those of special service tools illustrated here.

Tool number (TechMate No.) Tool name		Description
KV10117100 Heated oxygen sensor wrench	 S-NT379	Loosening or tightening heated oxygen sensor 2 (AWD) and air fuel ratio sensor 1 **For 22 mm (0.87 in) width hexagon nut**
KV10114400 Heated oxygen sensor wrench	 S-NT636	Loosening or tightening heated oxygen sensor 2 (2WD models) **a: For 22 mm (0.87 in) width hexagon nut**
(J-44321) Fuel pressure gauge kit	 LEC642	Checks fuel pressure
(J-44321-6) Fuel pressure adapter	 LBIA0376E	Connects fuel pressure gauge to quick connector type fuel lines.
KV10120000 Fuel tube adapter	 JSBIA0410ZZ	Measuring fuel pressure

Commercial Service Tools

INFOID:0000000012198146

Tool name (TechMate No.)	Description
Leak detector i.e.: (J-41416)  S-NT703	Locates the EVAP leak
EVAP service port adapter i.e.: (J-41413-OBD)  S-NT704	Applies positive pressure through EVAP service port
Fuel filler cap adapter i.e.: (J-42909)  ALBIA1353ZZ	Checks fuel tank vacuum relief valve opening pressure
Quick connector release  PBIC0198E	Removing fuel tube quick connectors in engine room (Available in SEC. 164 of PARTS CATALOG: Par No. 16441 6N210)
Socket wrench  S-NT705	Removing and installing engine coolant temperature sensor

Tool name (TechMate No.)		Description
Oxygen sensor thread cleaner		Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor** **b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor**
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)		Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

SYSTEM DESCRIPTION

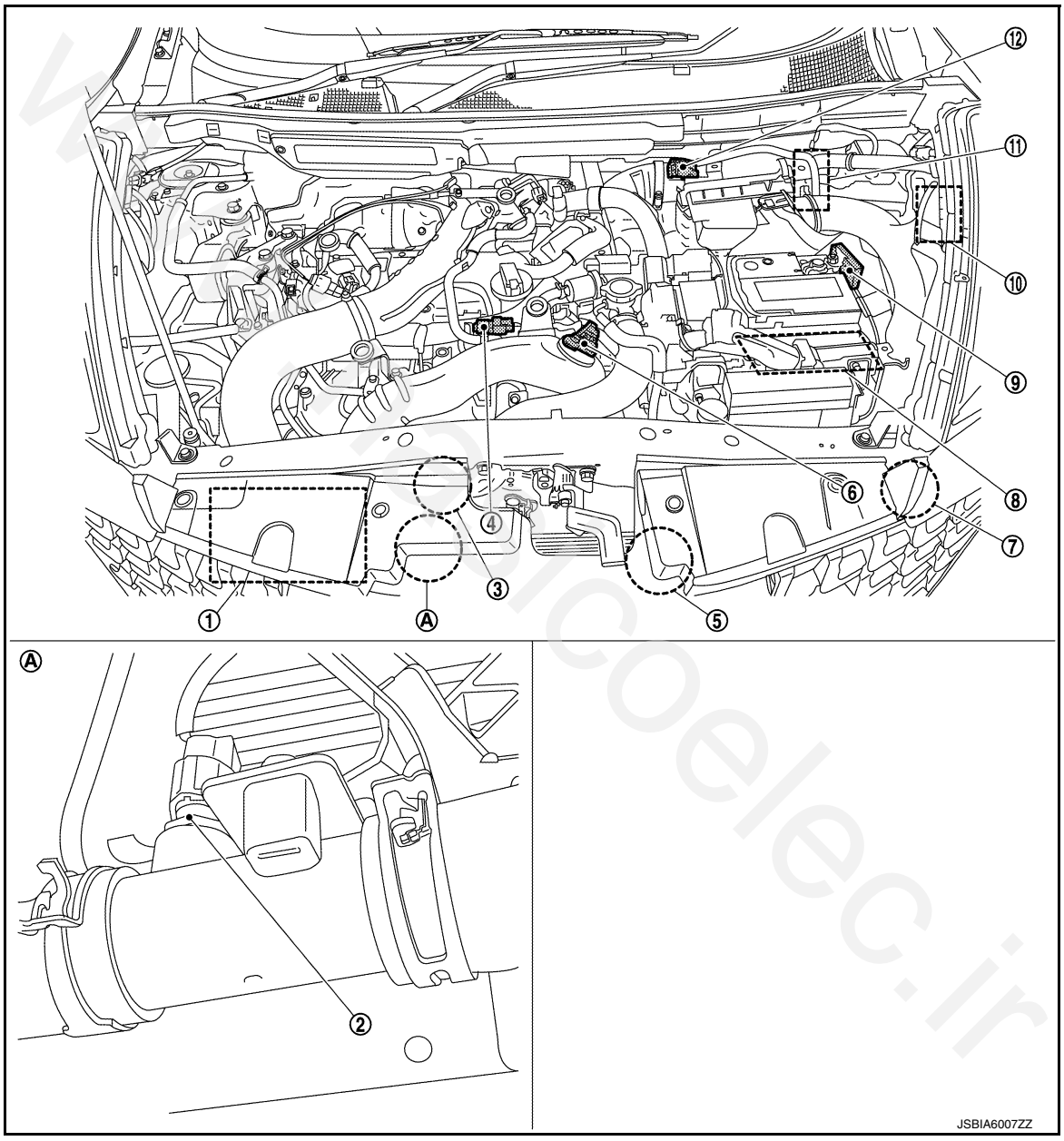
COMPONENT PARTS

ENGINE CONTROL SYSTEM

ENGINE CONTROL SYSTEM : Component Parts Location

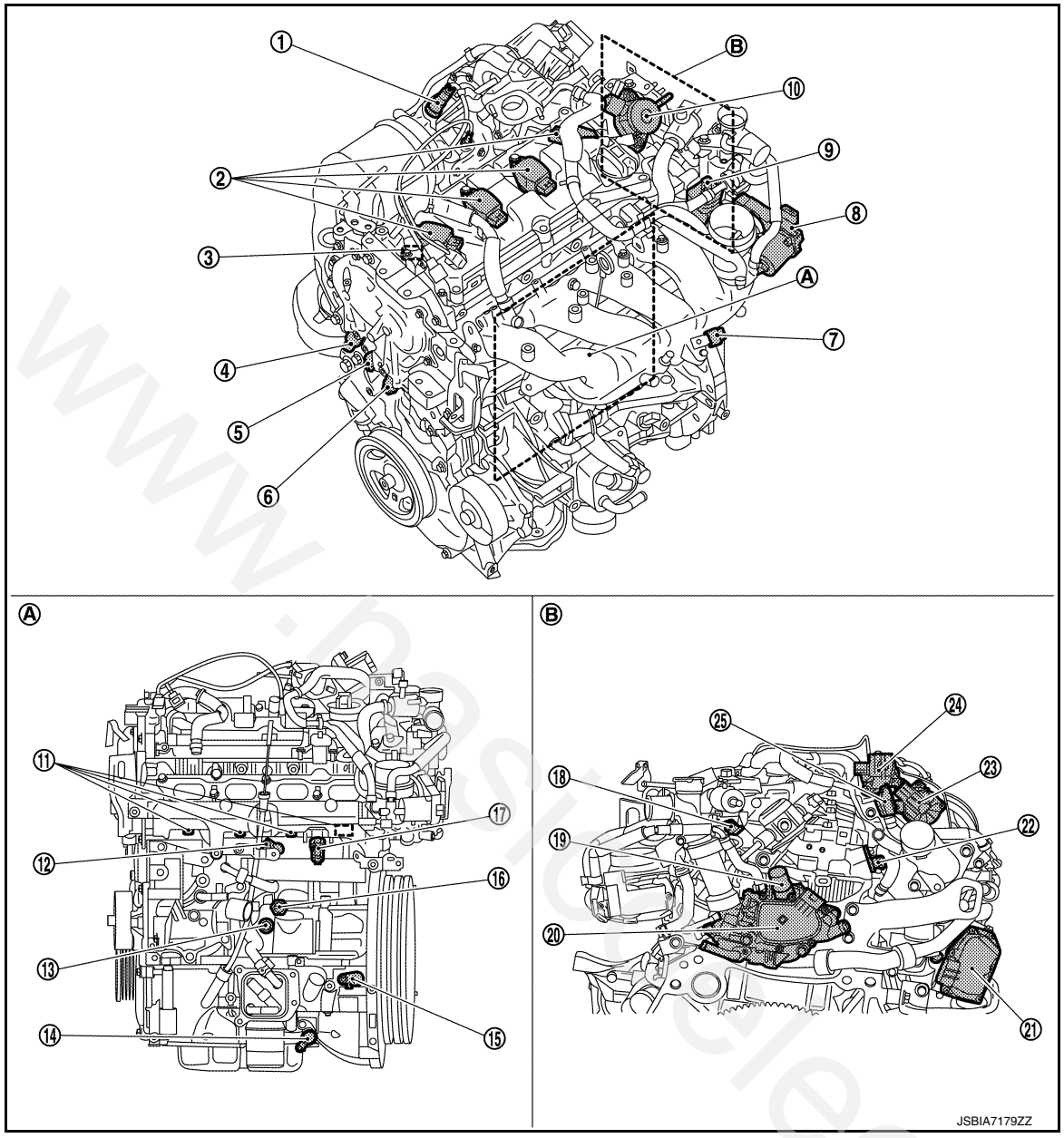
INFOID:0000000012198147

ENGINE ROOM COMPARTMENT



1.	Inter cooler	2.	Engine coolant temperature sensor 2	3.	Cooling fan control module
4.	EVAP canister purge volume control solenoid valve	5.	Cooling fan motor	6.	Turbocharger boost sensor
7.	Refrigerant pressure sensor	8.	ECM	9.	Battery current sensor
10.	IPDM E/R	11.	TCM	12.	Mass air flow sensor

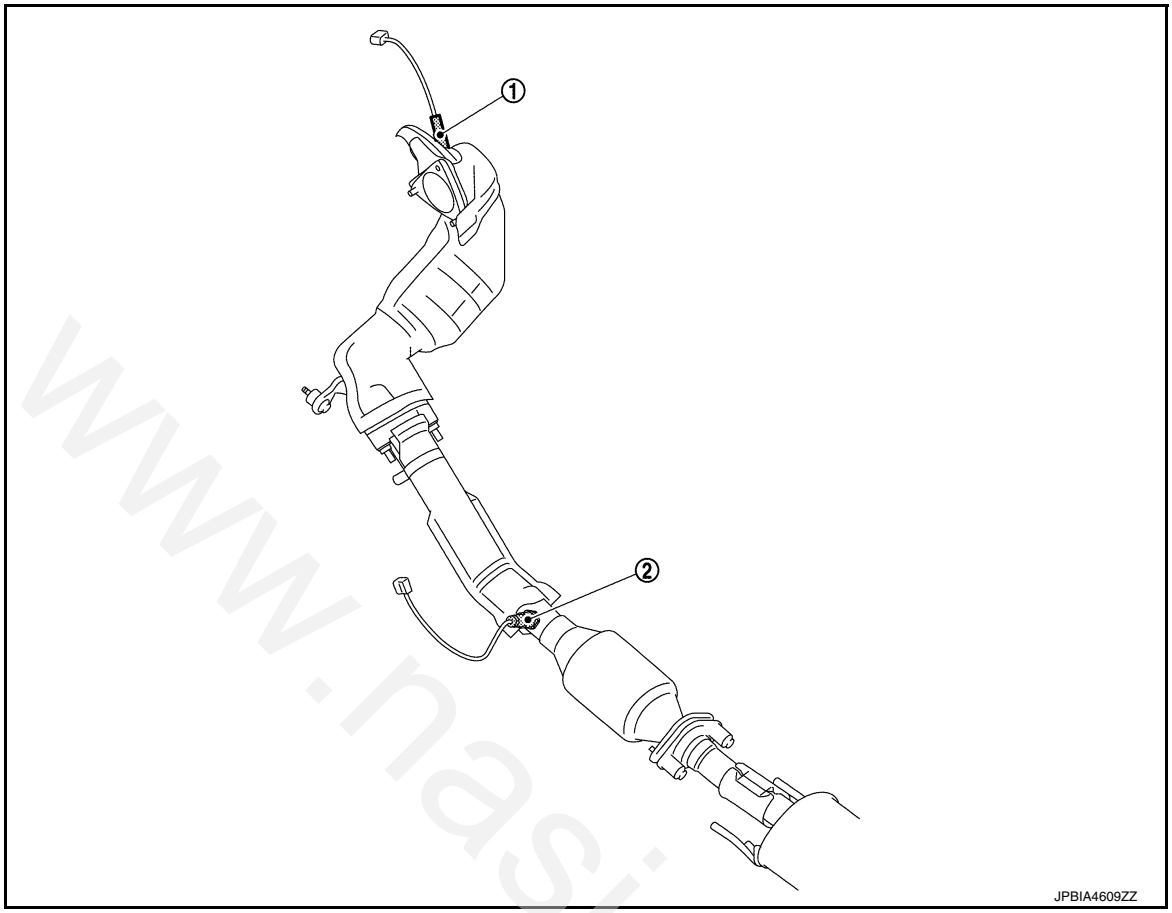
ENGINE COMPARTMENT



1. Air fuel ratio (A/F) sensor 1	2. Ignition coil (with power transistor)	3. PCV valve
4. Exhaust valve timing control solenoid valve	5. Intake valve timing intermediate lock control solenoid valve	6. Intake valve timing control solenoid valve
7. Manifold absolute pressure sensor	8. Electric throttle control actuator	9. Intake manifold runner control valve
10. High pressure fuel pump	11. Fuel injector	12. Knock sensor
13. Engine oil temperature sensor	14. Engine oil pressure control solenoid valve	15. Crankshaft position sensor
16. Engine oil pressure sensor	17. Fuel rail pressure sensor	18. Camshaft position sensor
19. Engine coolant temperature sensor	20. Multi-way control valve	21. EGR volume control valve
22. Exhaust valve timing control position sensor	23. Electric wastegate control actuator	24. Turbocharger bypass control valve
25. EGR pressure sensor		
A. Cylinder block left side	B. Engine rear end	

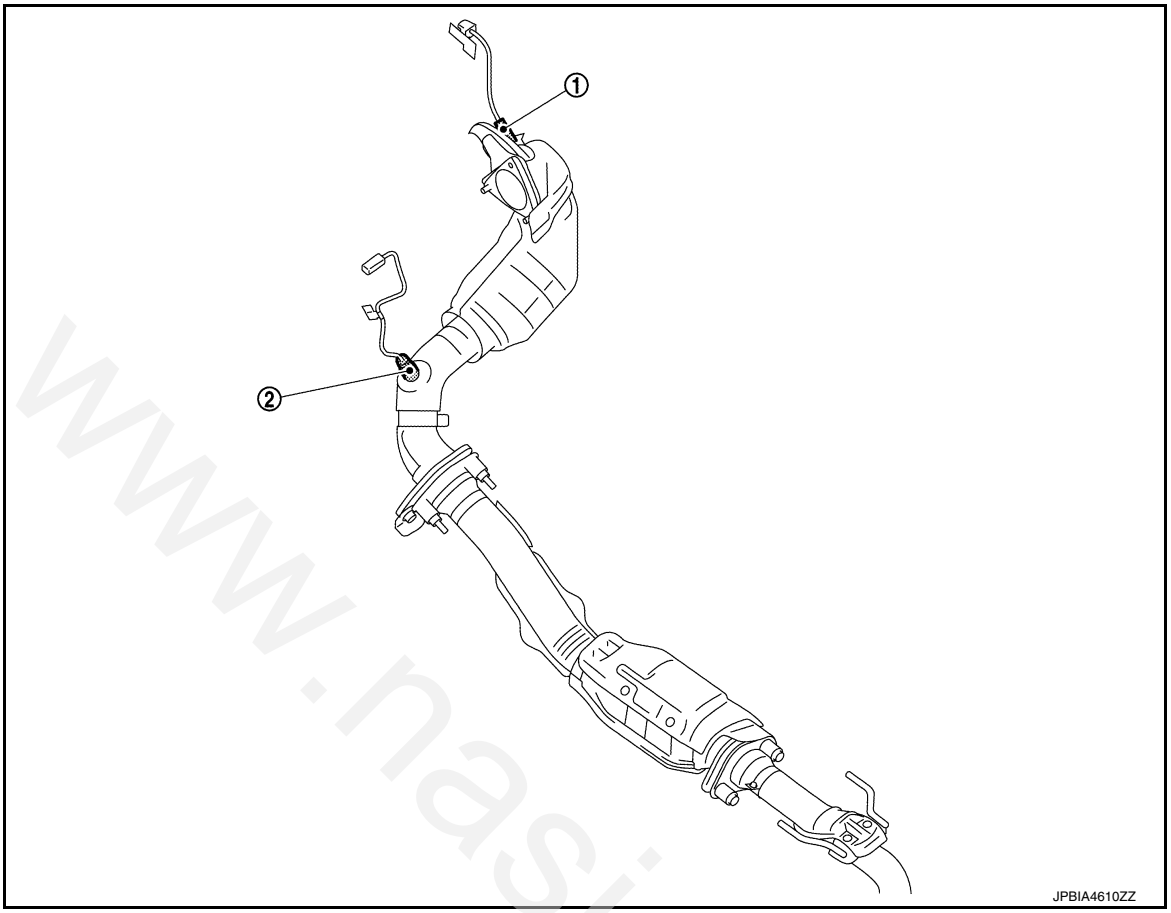
EXHAUST COMPARTMENT

2WD



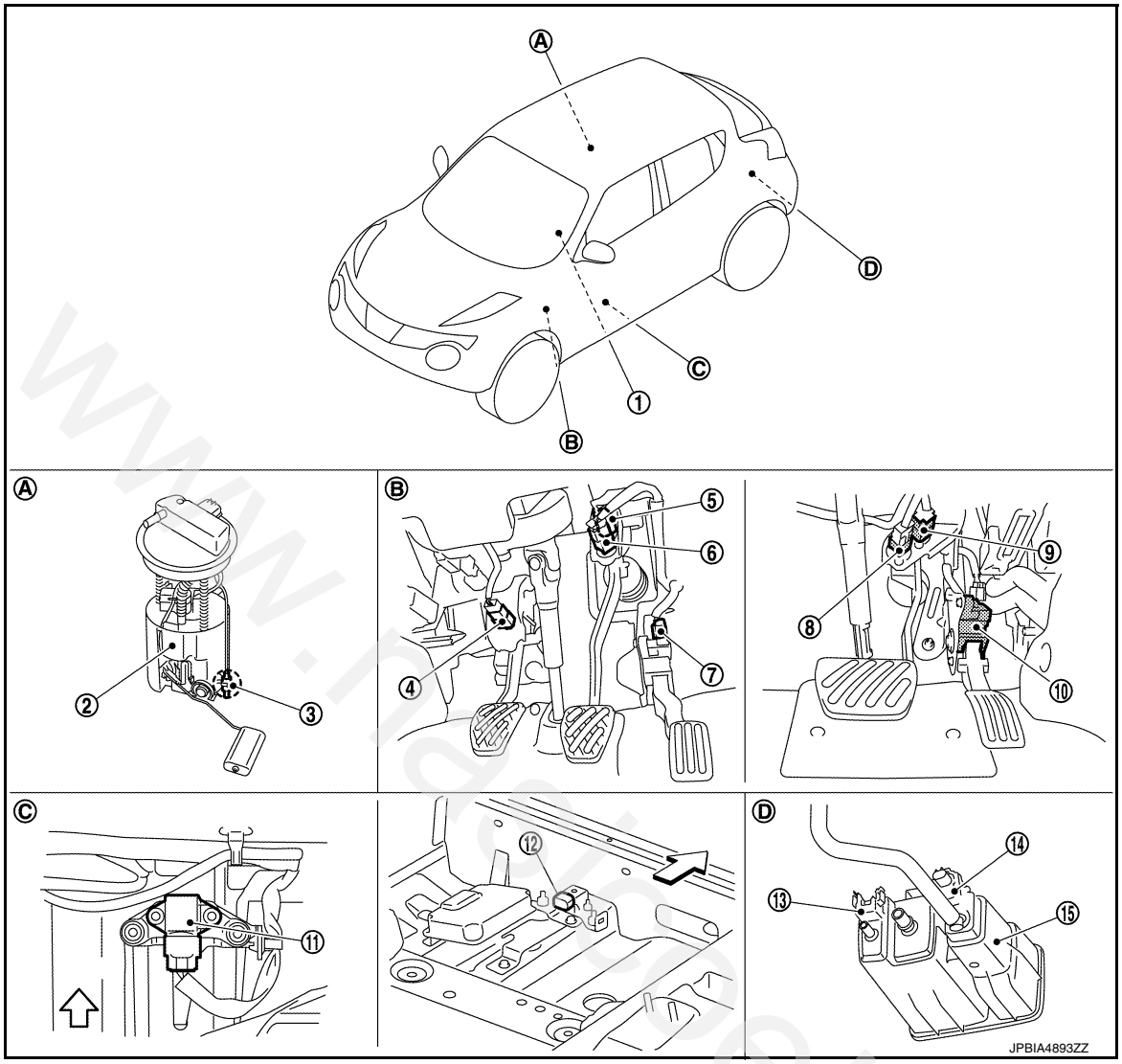
1. A/F sensor 1
2. Heated oxygen sensor 2

AWD



1. A/F sensor 1
2. Heated oxygen sensor 2

BODY COMPARTMENT



1. ASCD steering switch	2. Fuel level sensor unit, fuel filter and fuel pump assembly	3. Fuel tank temperature sensor
4. Clutch pedal position switch (with M/T models)	5. Brake pedal position switch (with M/T models)	6. Stop lamp switch (with M/T models)
7. Accelerator pedal position sensor (with M/T models)	8. Brake pedal position switch (with CVT models)	9. Stop lamp switch (with CVT models)
10. Accelerator pedal position sensor (with CVT models)	11. G sensor (with 2WD models)	12. G sensor (with AWD models)
13. EVAP control system pressure sensor	14. EVAP canister vent control valve	15. EVAP canister
A. Under of right side second seat	B. Periphery of pedals	C. Under of left side front seat
D. Fuel tank rear		
⇦ : Vehicle front		

ENGINE CONTROL SYSTEM : Component Description

INFOID:0000000012198148

Component	Reference
ECM	EC-606, "ECM"
Accelerator pedal position sensor	EC-606, "Accelerator Pedal Position Sensor"

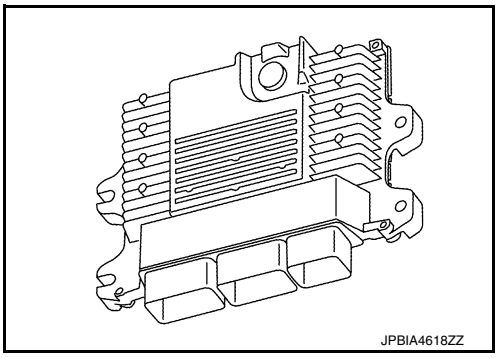
Component	Reference
Electric throttle control actuator	EC-606, "Electric Throttle Control Actuator"
Throttle control motor	
Throttle position sensor	
Ignition coil with power transistor	EC-607, "Ignition Coil With Power Transistor"
Fuel injector	EC-608, "Fuel Injector"
High pressure fuel pump	EC-608, "High Pressure Fuel Pump"
Fuel rail pressure sensor	EC-609, "Fuel Rail Pressure Sensor"
Low pressure fuel pump	EC-609, "Low Pressure Fuel Pump"
Mass air flow sensor	EC-609, "Mass Air Flow Sensor (With Intake Air Temperature Sensor 1)"
Intake air temperature sensor 1	
Turbocharger	EC-609, "Turbocharger"
Electric wastegate control actuator	
Turbocharger bypass control solenoid valve	
Turbocharger boost sensor	EC-610, "Turbocharger Boost Sensor (With Intake Air Temperature Sensor 2)"
Intake air temperature sensor 2	
Engine coolant temperature sensor	EC-611, "Engine Coolant Temperature Sensor 1", EC-612, "Engine Coolant Temperature Sensor 2"
Crankshaft position sensor	EC-612, "Crankshaft Position Sensor (POS)"
Camshaft position sensor	EC-612, "Camshaft Position Sensor (PHASE)"
Intake valve timing control solenoid valve	EC-613, "Intake Valve Timing Control Solenoid Valve"
Exhaust valve timing control position sensor	EC-613, "Exhaust Valve Timing Control Position Sensor"
Exhaust valve timing control solenoid valve	EC-613, "Exhaust Valve Timing Control Solenoid Valve"
Air fuel ratio (A/F) sensor 1	EC-614, "Air Fuel Ratio (A/F) Sensor 1"
Heated oxygen sensor 2	EC-615, "Heated Oxygen Sensor 2"
Knock sensor	EC-616, "Knock Sensor"
Engine oil pressure sensor	EC-616, "Engine Oil Pressure Sensor"
Engine oil temperature sensor	EC-616, "Engine Oil Temperature Sensor"
Cooling fan	EC-617, "Cooling Fan"
EVAP canister purge volume control solenoid valve	EC-617, "EVAP Canister Purge Volume Control Solenoid Valve"
Battery current sensor	EC-618, "Battery Current Sensor (With Battery Temperature Sensor)"
Battery temperature sensor	
Malfunction indicator lamp (MIL)	EC-619, "Malfunction Indicator lamp (MIL)"
Oil pressure warning lamp	EC-619, "Oil Pressure Warning Lamp"
Refrigerant pressure sensor	EC-619, "Refrigerant Pressure Sensor"
Stop lamp switch	EC-620, "Stop Lamp Switch & Brake Pedal Position Switch"
Brake pedal position switch	
Clutch pedal position switch (M/T models)	EC-620, "Clutch Pedal Position Switch"
ASCD steering switch	EC-620, "ASCD Steering Switch"
Information display	EC-620, "Information Display"
G sensor	EC-614, "G Sensor"
Manifold absolute pressure sensor	EC-619, "Manifold Absolute Pressure Sensor"
Engine oil pressure control solenoid valve	EC-616, "Engine Oil Pressure Control Solenoid Valve"
Intake valve timing intermediate lock control solenoid valve	EC-613, "Intake Valve Timing Intermediate Lock Control Solenoid Valve"
EGR pressure sensor	EC-614, "EGR Pressure Sensor"

Component	Reference
EGR volume control valve	EC-614, "EGR Volume Control Valve"
Electric wastegate control actuator	EC-609, "Turbocharger"
Multi-way control valve	EC-611, "Multi-way Control Valve"
Intake manifold runner control valve	EC-614, "Intake Manifold Runner Control Valve"

ECM

INFOID:0000000012198149

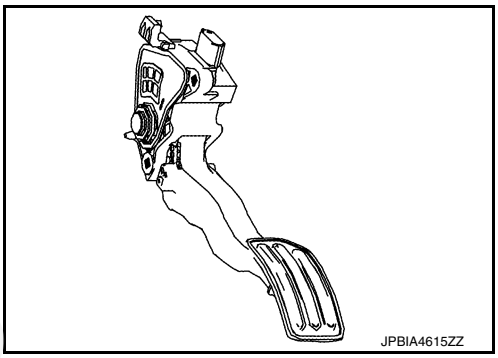
The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.



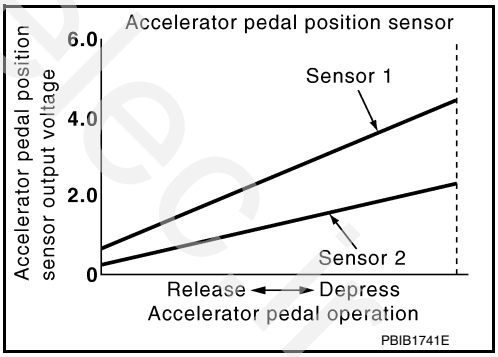
Accelerator Pedal Position Sensor

INFOID:0000000012198150

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.



Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.

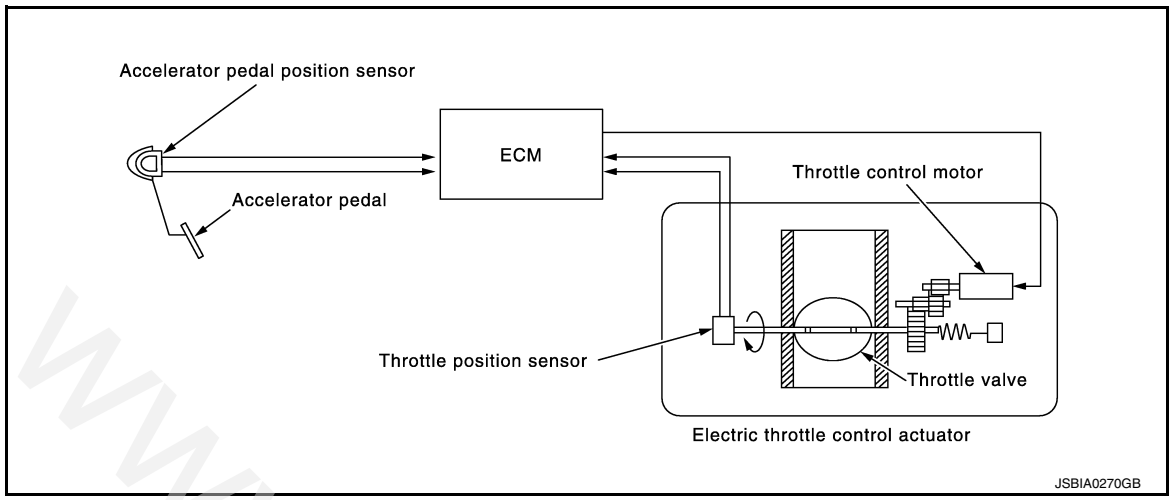


Electric Throttle Control Actuator

INFOID:0000000012198151

OUTLINE

Electric throttle control actuator consists of throttle body, throttle valve, throttle control motor and throttle position sensor.



THROTTLE CONTROL MOTOR RELAY

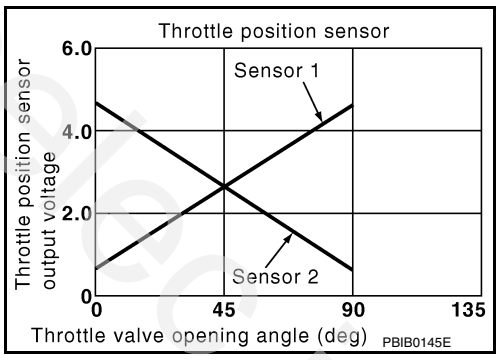
Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

THROTTLE CONTROL MOTOR

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

THROTTLE POSITION SENSOR

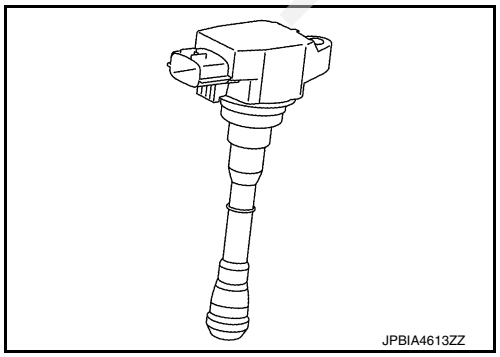
The throttle position sensor responds to the throttle valve movement. The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



Ignition Coil With Power Transistor

INFOID:0000000012198152

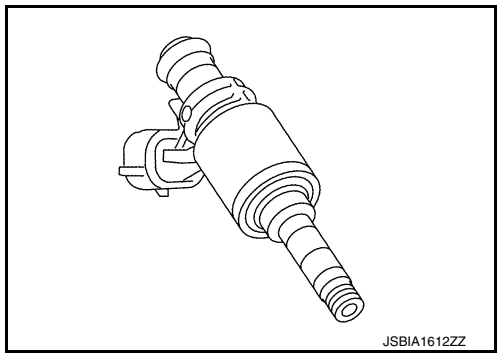
The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.



Fuel Injector

INFOID:0000000012198153

For the fuel injector, a high pressure fuel injector is used and this enables a high-pressure fuel injection at a high voltage within a short time. The ECM is equipped with an injector driver unit and actuates the fuel injector at a high voltage (approximately 65 V at the maximum).

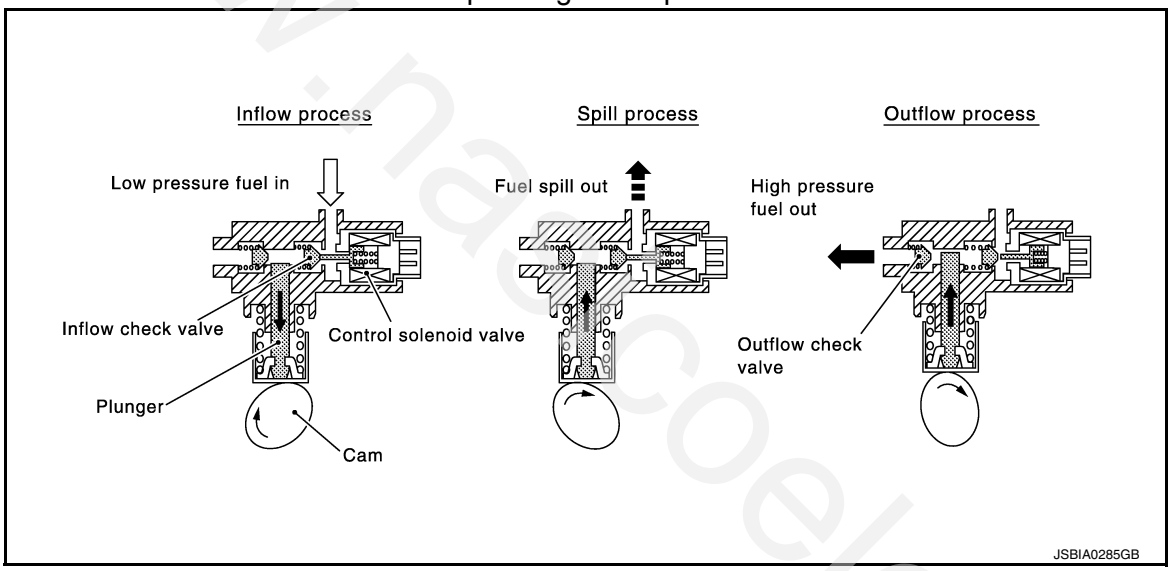


High Pressure Fuel Pump

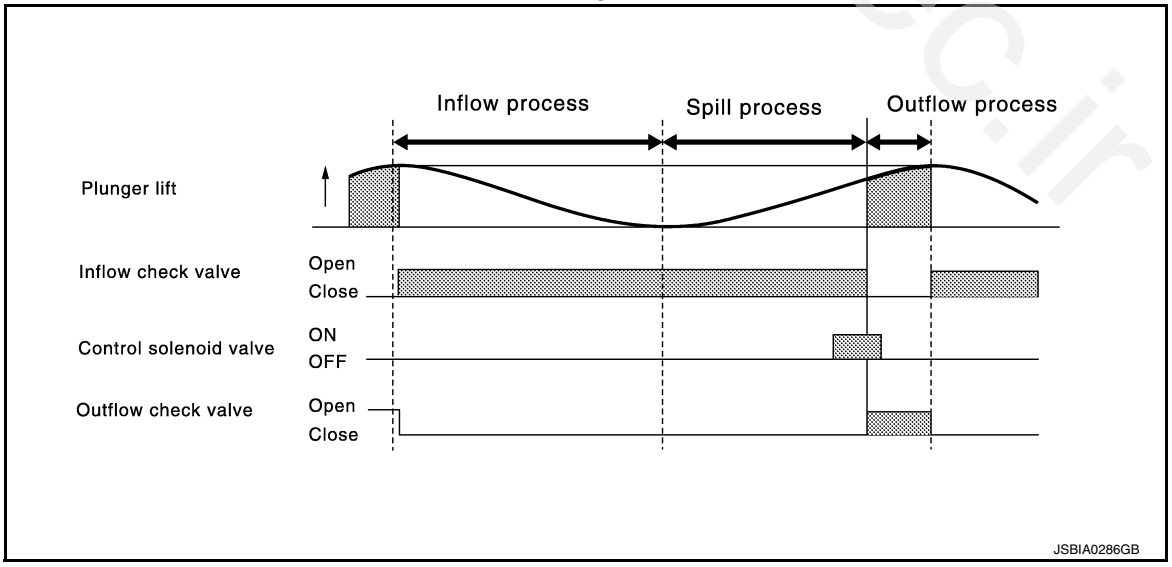
INFOID:0000000012198154

The high pressure fuel pump is activated by the exhaust camshaft.
ECM controls the high pressure fuel pump control solenoid valve built into the high pressure fuel pump and adjusts the amount of discharge by changing the suction timing of the low pressure fuel.

Operating Description



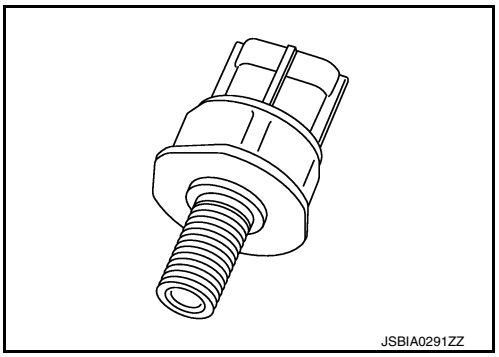
Operating Chart



Fuel Rail Pressure Sensor

INFOID:0000000012198155

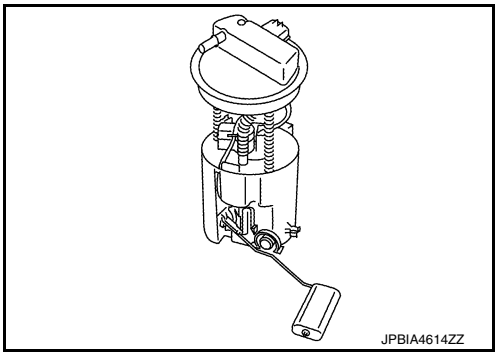
The fuel rail pressure (FRP) sensor is placed to the fuel rail and measures fuel pressure in the fuel rail. The sensor transmits voltage signal to the ECM. As the pressure increases, the voltage rises. The ECM controls the fuel pressure in the fuel rail by operating high pressure fuel pump. The ECM uses the signal from fuel rail pressure sensor as a feedback signal.


JSBIA0291ZZ

Low Pressure Fuel Pump

INFOID:0000000012198156

The low pressure fuel pump is integrated with a fuel pressure regulator and a fuel filter. This pump is build into the fuel tank.

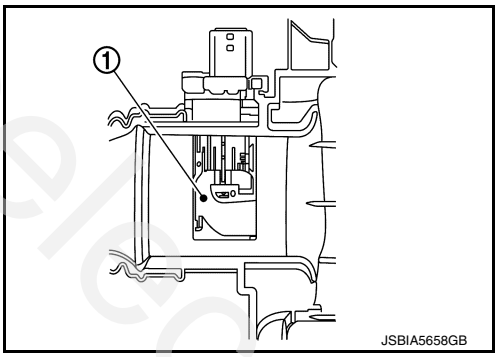

JPBIA4614ZZ

Mass Air Flow Sensor (With Intake Air Temperature Sensor 1)

INFOID:0000000012198157

MASS AIR FLOW SENSOR

The mass air flow sensor (MAF 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 MAF sensor controls the temperature of the heater in sensing element to a certain amount.
The temperature distribution around the heater changes according to the increase in intake air volume. The change is detected by a thermistor and the air volume data is sent to ECM by the MAF sensor.



JSBIA5658GB

INTAKE AIR TEMPERATURE SENSOR 1

The intake air temperature sensor 1 (IAT sensor 1) is built-into the mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature.

<Reference data>

Intake air temperature	Voltage*
25°C (77°F)	2.0 – 2.2 V
80°C (176°F)	3.0 – 3.2 V

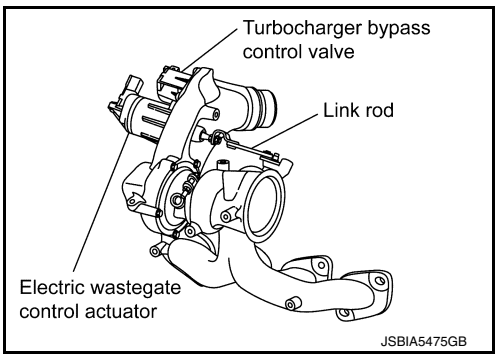
*: These data are reference values on the diagnosis tool.

Turbocharger

INFOID:0000000012198158

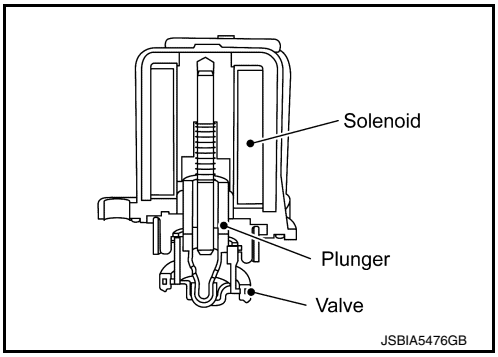
TURBOCHARGER BOOST CONTROL

The electric wastegate control actuator operates based on a signal from ECM and adjusts the turbo charger boost control valve angle via link rod. The electronic control allows the turbocharger wastegate control valve to be opened even in non-supercharging regions. This reduces pumping losses and contributes to the fuel economy. In charging regions, wastegate valve angles are controlled by the electronic control with a high degree of accuracy.



TURBOCHARGER BYPASS CONTROL

When an operating signal received from ECM energizes the solenoid, the turbocharger bypass control valve opens the valve by sucking in the plunger. The electronically-controlled turbocharger bypass control valve quickly opens the bypass valve when releasing the accelerator pedal during driving under supercharge. This reduces surge sound generated by the back flow of supercharged air to the compressor fin.

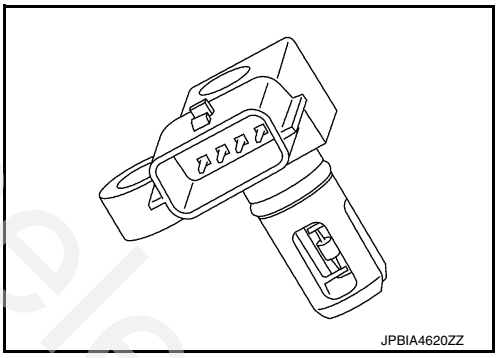


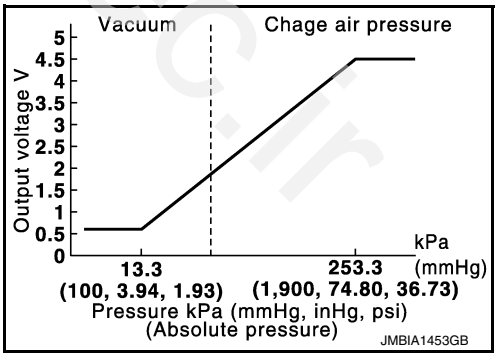
Turbocharger Boost Sensor (With Intake Air Temperature Sensor 2)

INFOID:0000000012198159

TURBOCHARGER BOOST SENSOR

The turbocharger boost sensor detects the pressure of the outlet side of the intercooler. When increasing the pressure, the output voltage of the sensor to the ECM increases.





INTAKE AIR TEMPERATURE SENSOR 2

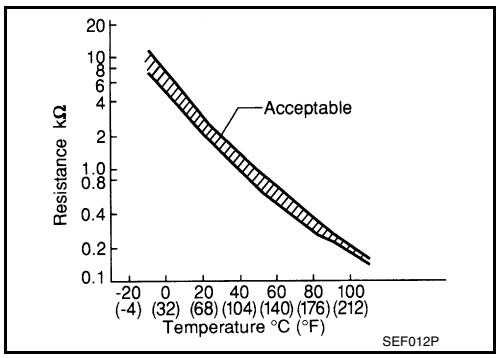
The intake air temperature sensor 2 is built-into turbocharger boost sensor. The sensor detects intake air temperature and transmits a signal to the ECM.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

<Reference data>

Intake air temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	3.27-3.35	1.940 - 2.089
80 (176)	1.19-1.23	0.310 - 0.322

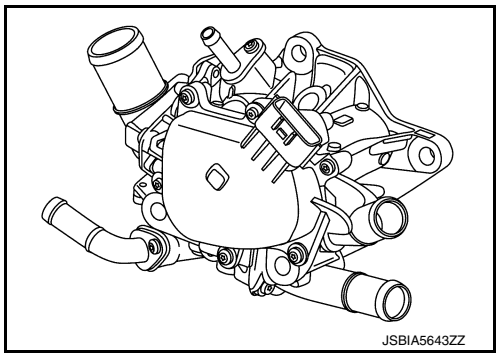
*: These data are reference values and are measured between ECM terminals.



Multi-way Control Valve

INFOID:0000000012198160

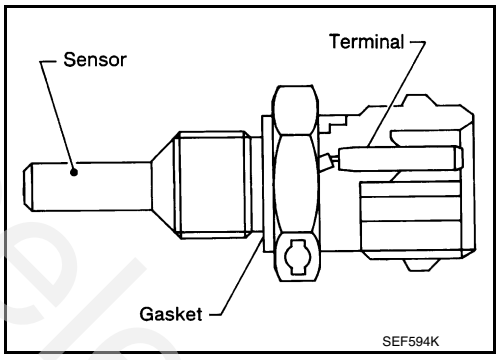
The multi-way control valve changes flow paths to Heater & EGR cooler, Oil cooler, and Radiator, according to coolant temperature and driving conditions.



Engine Coolant Temperature Sensor 1

INFOID:0000000012198161

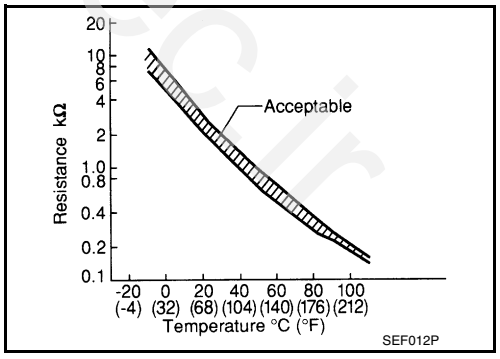
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
–10 (14)	4.29-4.50	7.0 - 11.4
20 (68)	3.48-3.58	2.37 - 2.63
50 (122)	2.03-2.49	0.68 - 1.00
90 (194)	0.97-1.04	0.236 - 0.260

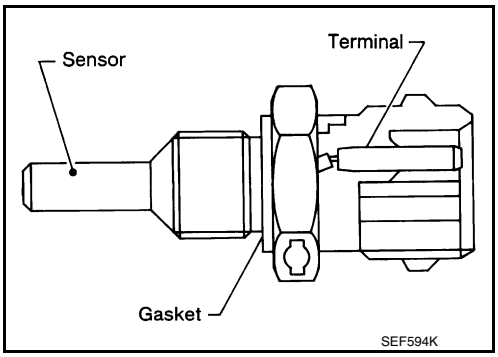
*: These data are reference values and are measured between ECM terminals.



Engine Coolant Temperature Sensor 2

INFOID:0000000012198162

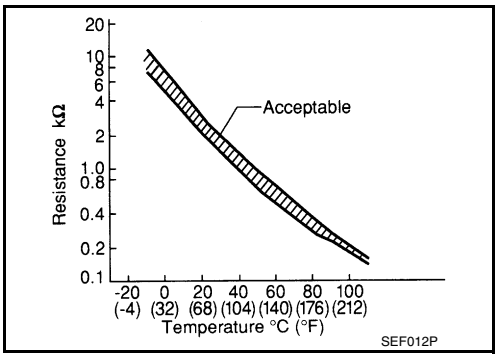
The engine coolant temperature sensor is used to detect the radiator-outlet water temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the radiator-outlet water temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
–10 (14)	4.29-4.50	7.0 - 11.4
20 (68)	3.48-3.58	2.37 - 2.63
50 (122)	2.03-2.49	0.68 - 1.00
90 (194)	0.97-1.04	0.236 - 0.260

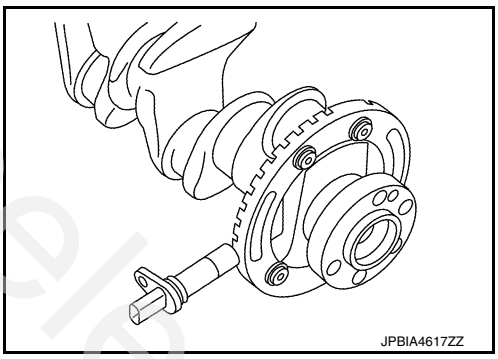
*: These data are reference values and are measured between ECM terminals.



Crankshaft Position Sensor (POS)

INFOID:0000000012198164

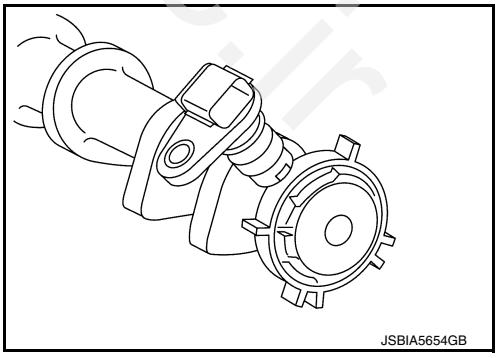
The crankshaft position sensor (POS) is located on the oil pan facing the gear teeth (cogs) of the signal plate. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.



Camshaft Position Sensor (PHASE)

INFOID:0000000012198165

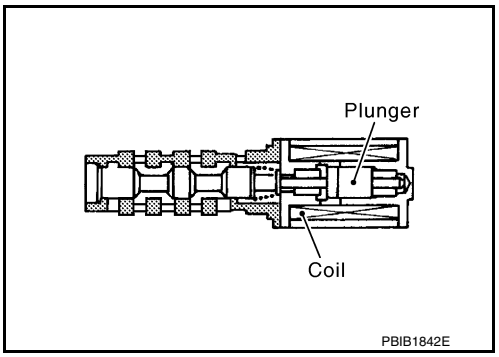
The camshaft position sensor (PHASE) senses the retraction of intake camshaft to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.



Intake Valve Timing Control Solenoid Valve

INFOID:0000000012198166

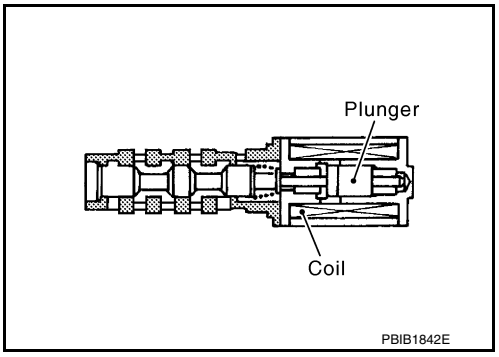
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.
The longer pulse width advances valve angle.
The shorter pulse width retards valve angle.
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.



Intake Valve Timing Intermediate Lock Control Solenoid Valve

INFOID:0000000012198167

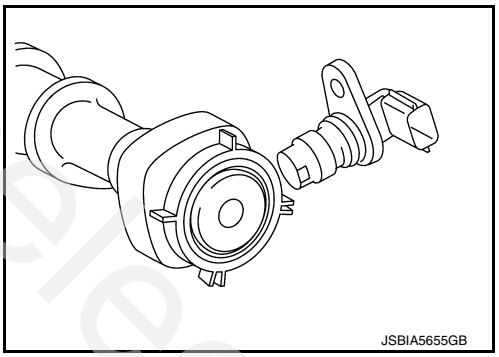
Intake valve timing intermediate lock control solenoid valve is activated by ON/OFF signals from the ECM.
The intake valve timing intermediate lock control solenoid valve opens/closes the path of oil pressure acting on the lock key in the camshaft sprocket (INT).
- When the solenoid valve becomes ON, oil pressure to the lock key is drained to perform intermediate lock.
- When the solenoid valve becomes OFF, oil pressure is acted on the lock key to release the intermediate lock.



Exhaust Valve Timing Control Position Sensor

INFOID:0000000012198168

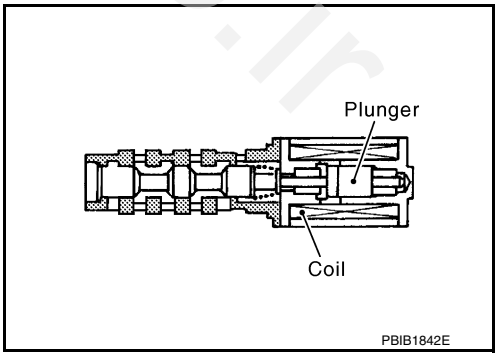
Exhaust valve timing control position sensor detects the protrusion of the signal plate installed to the exhaust camshaft front end.
This sensor signal is used for sensing a position of the exhaust camshaft.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low 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.



Exhaust Valve Timing Control Solenoid Valve

INFOID:0000000012198169

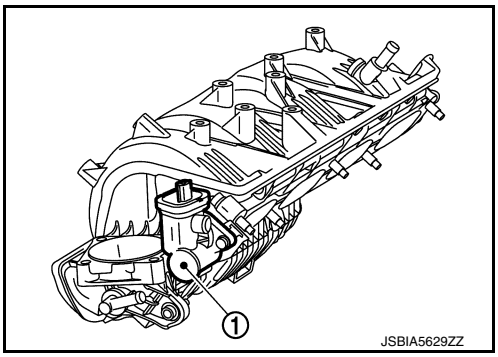
Exhaust valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The exhaust valve timing control solenoid valve changes the oil amount and direction of flow through exhaust valve timing control unit or stops oil flow.
The longer pulse width retards valve angle.
The shorter pulse width advances valve angle.
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the exhaust valve angle at the control position.



Intake Manifold Runner Control Valve

INFOID:0000000012198170

Intake manifold runner control valve① is integrated to intake manifold.
Intake manifold runner control valve is mounted each port of the intake manifold and opened/closed by the intake manifold runner control valve motor.
ECM controls the intake manifold runner control valve motor, according to signals of engine speed, water temperature, etc. and stabilizes combustion by generating a strong tumble flow.



INTAKE MANIFOLD RUNNER CONTROL VALVE MOTOR

Intake manifold runner control valve motor is connected to the rear end of the valve shaft.
The motor opens or closes the valve by the output signal of the ECM.

EGR Volume Control Valve

INFOID:0000000012198171

EGR VOLUME CONTROL VALVE

The EGR volume control valve used a DC motor and controls the flow rate of EGR from downstream of exhaust manifold catalyst. ECM controls the DC motor to make the valve opening angle in response to driving conditions.

EGR CONTROL POSITION SENSOR

The EGR control valve control position sensor is built in the EGR control valve and uses a permanent magnet and a semiconductor device. This sensor measures valve shaft movements and transmits a voltage signal to ECM. Based on this signal, ECM judges the valve opening angle as of then and controls the motor to achieve opening angle appropriate to the driving conditions.

EGR Pressure Sensor

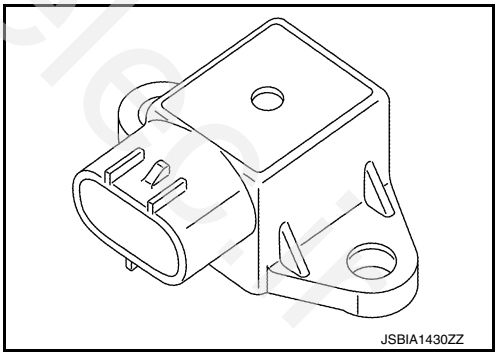
INFOID:0000000012198173

The EGR pressure sensor detects the pressure difference between before and behind the EGR volume control valve. This sensor is not directly used for the engine system control, but used only for self-diagnosis.

G Sensor

INFOID:0000000012198174

The G sensor has a semiconductor acceleration sensor and detects longitudinal G and tilt angle of the vehicle based on gravitational acceleration.
In addition, the G sensor converts a detected tilt angle into an electric signal and transmits it to ECM.



Air Fuel Ratio (A/F) Sensor 1

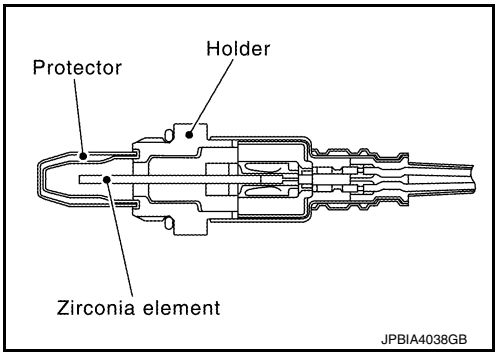
INFOID:0000000012198175

DESCRIPTION

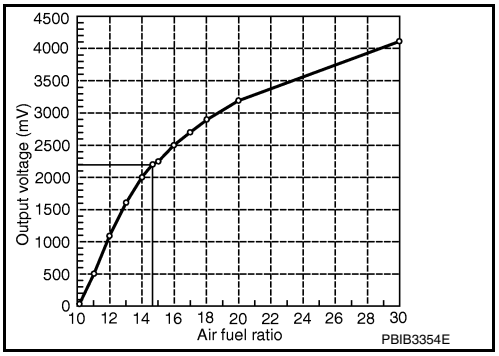
The sensor element of the A/F sensor 1 is composed an electrode layer, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement λ = 1, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range.

The exhaust gas components diffuse through the diffusion layer at the sensor cell. An electrode layer is applied voltage, and this current relative oxygen density in lean. Also this current relative hydrocarbon density in rich.



Therefore, the A/F sensor 1 is able to indicate air fuel ratio by this electrode layer of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of approximately 760°C (1,400°F).



A/F SENSOR 1 HEATER

A/F sensor 1 heater is integrated in the sensor.

The ECM performs ON/OFF duty control of the A/F sensor 1 heater corresponding to the engine operating condition to keep the temperature of A/F sensor 1 element within the specified range.

Heated Oxygen Sensor 2

INFOID:0000000012198176

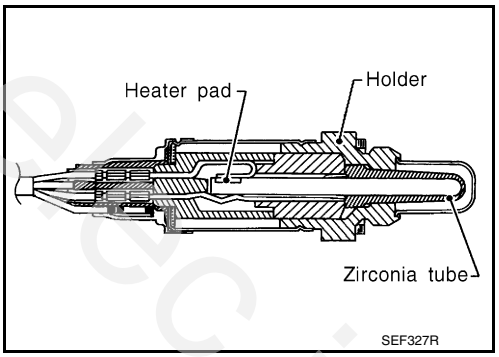
DESCRIPTION

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.

Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.

This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1 V in richer conditions to 0 V in leaner conditions.

Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



HEATED OXYGEN SENSOR 2 HEATER

Heated oxygen sensor 2 heater is integrated in the sensor.

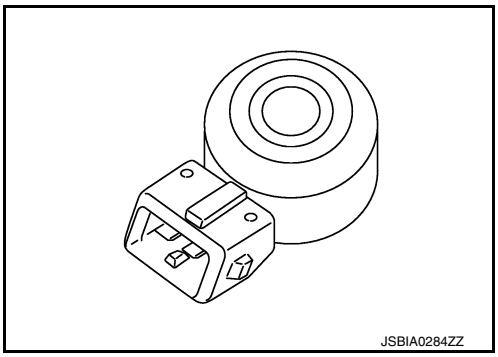
The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

Engine speed	Heated oxygen sensor 2 heater
Above 3,600 rpm	OFF
Below 3,600 rpm after the following conditions are met. • Engine: After warming up • Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

Knock Sensor

INFOID:0000000012198177

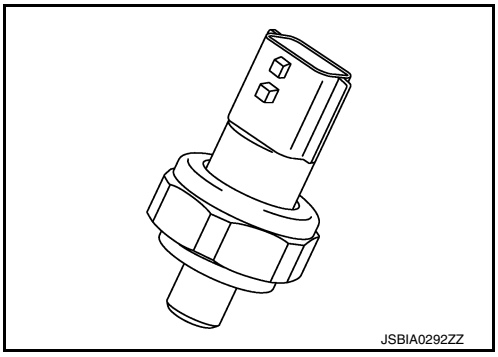
The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.



Engine Oil Pressure Sensor

INFOID:0000000012198178

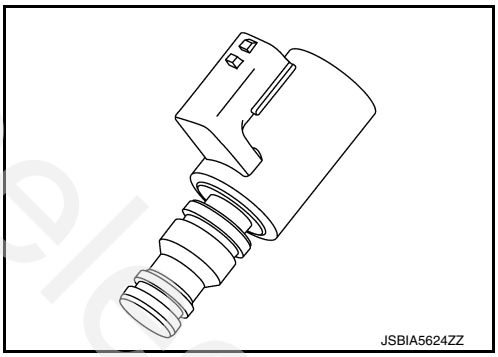
The engine oil pressure (EOP) sensor is detects engine oil pressure and transmits a voltage signal to the ECM.



Engine Oil Pressure Control Solenoid Valve

INFOID:0000000012198179

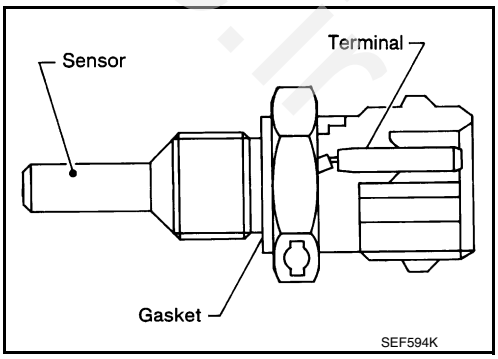
The engine oil pressure control solenoid valve performs the variable hydraulic control (low oil pressure control and high oil pressure control) according to oil temperature and engine load.



Engine Oil Temperature Sensor

INFOID:0000000012198180

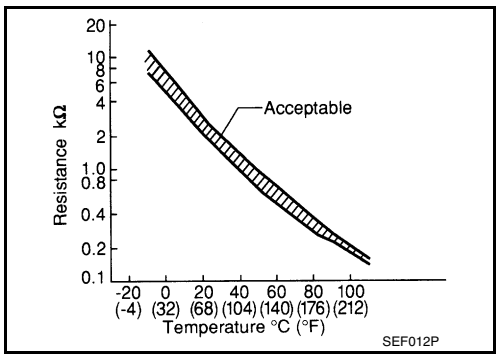
The engine oil temperature sensor is used to detect the engine oil temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine oil temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine oil temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
–10 (14)	4.29-4.50	7.0 - 11.4
20 (68)	3.48-3.58	2.37 - 2.63
50 (122)	2.03-2.49	0.68 - 1.00
90 (194)	0.97-1.04	0.236 - 0.260
110 (230)	0.63-0.67	0.143 - 0.153

*: These data are reference values and are measured between ECM terminals.



Cooling Fan

INFOID:0000000012198181

COOLING FAN CONTROL MODULE

Cooling fan control module receives ON/OFF pulse duty signal from IPDM E/R. Corresponding to this ON/OFF pulse duty signal, cooling fan control module sends cooling fan motor operating voltage to cooling fan motor. The revolution speed of cooling fan motor is controlled by duty cycle of the voltage.

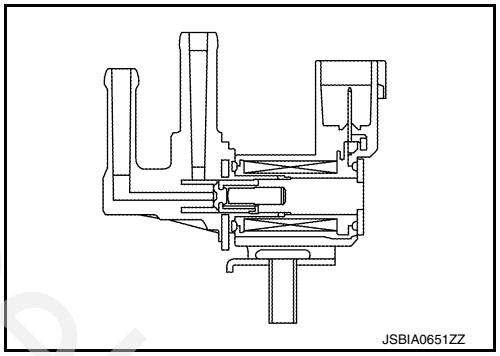
COOLING FAN MOTOR

Cooling fan motor receives cooling fan motor operating voltage from cooling fan control module. The revolution speed of cooling fan motor is controlled by duty cycle of the voltage.

EVAP Canister Purge Volume Control Solenoid Valve

INFOID:0000000012198182

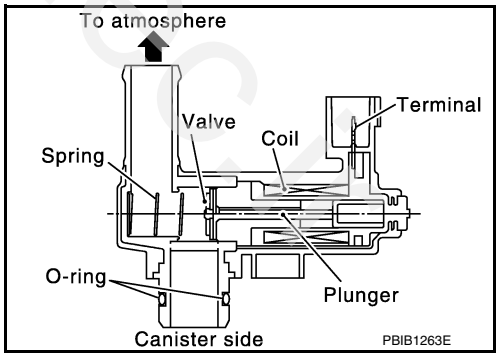
The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



EVAP Canister Vent Control Valve

INFOID:0000000012198183

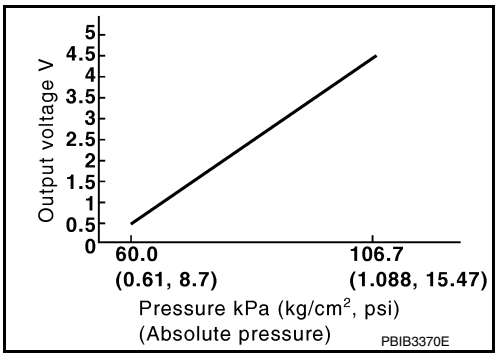
The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows “EVAP Control System” diagnosis.



EVAP Control System Pressure Sensor

INFOID:0000000012198184

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.

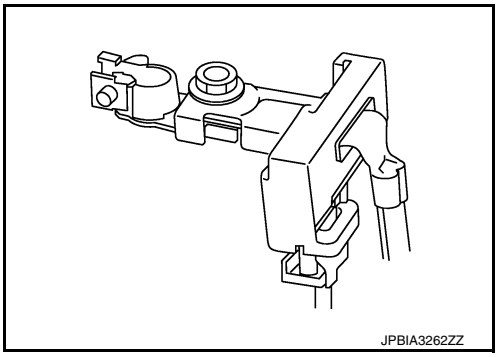


Battery Current Sensor (With Battery Temperature Sensor)

INFOID:0000000012198185

OUTLINE

The power generation voltage variable control enables fuel consumption to be decreased by reducing the engine load which is caused by the power generation of the generator.
Based on sensor signals, ECM judges whether or not the power generation voltage variable control is performed. When performing the power generation voltage variable control, ECM calculates the target power generation voltage based on the sensor signal. And ECM sends the calculated value as the power generation command value to IPDM E/R. For the details of the power generation voltage variable control, refer toCHG-8, "POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : System Description".



CAUTION:

Never connect the electrical component or the ground wire directly to the battery terminal. The connection causes the malfunction of the power generation voltage variable control, and then the battery discharge may occur.

BATTERY CURRENT SENSOR

The battery current sensor is installed to the battery negative cable. The sensor measures the charging/discharging current of the battery.

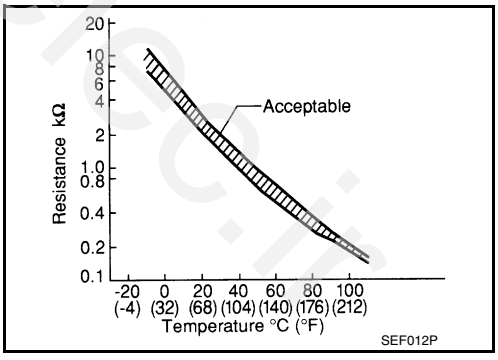
BATTERY TEMPERATURE SENSOR

Battery temperature sensor is integrated in battery current sensor.
The sensor measures temperature around the battery.
The electrical resistance of the thermistor decreases as temperature increases.

<Reference data>

Temperature [°C (°F)]	Voltage* (V)	Resistance (kΩ)
25 (77)	3.333	1.9 - 2.1
90 (194)	0.969	0.222 - 0.258

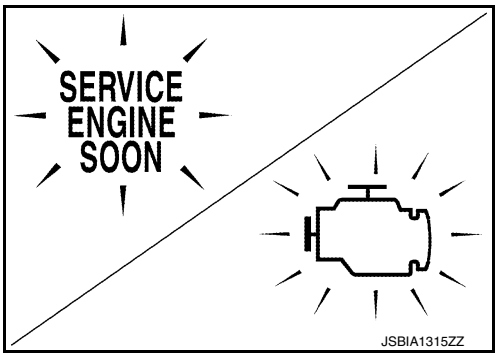
*: These data are reference values and are measured between battery temperature sensor signal terminal and sensor ground.



Malfunction Indicator lamp (MIL)

INFOID:0000000012198186

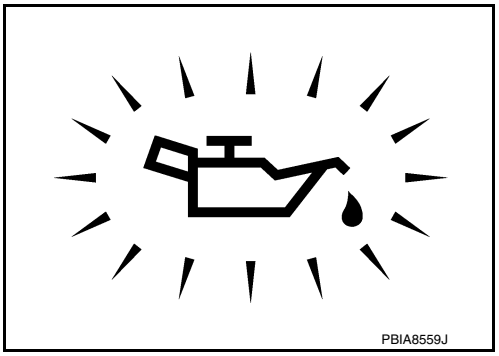
Malfunction Indicator lamp (MIL) is located on the combination meter.
MIL will illuminate when the ignition switch is turned ON without the engine running. This is a bulb check.
When the engine is started, MIL should turn OFF. If the MIL remains illuminated, the on board diagnostic system has detected an engine system malfunction.
For details, refer to EC-666, "DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)".
Control modules that a DTC of MIL ON/Blink is stored (Control module varies among DTCs.):
- ECM
- TCM



Oil Pressure Warning Lamp

INFOID:0000000012198187

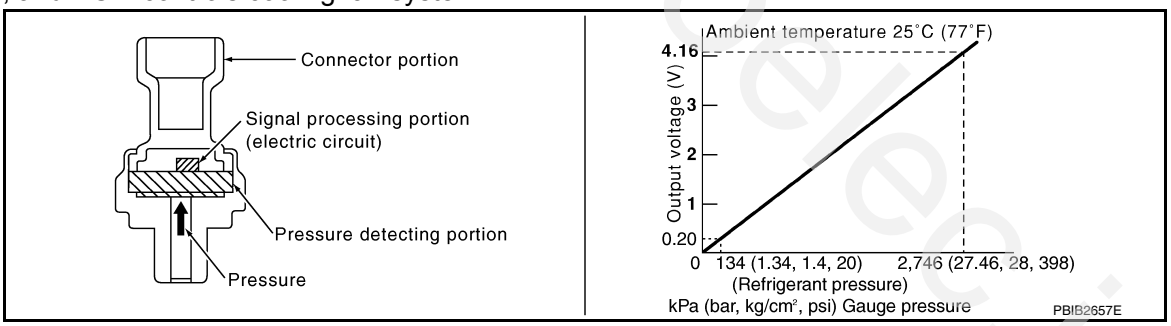
Oil pressure warning lamp is located on the combination meter.
It indicates the low pressure of the engine oil and the malfunction of the engine oil pressure system.
Combination meter turns the oil pressure warning lamp ON/OFF according to the oil pressure warning lamp signal received from ECM via CAN communication.
For details, refer to EC-644, "ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description".



Refrigerant Pressure Sensor

INFOID:0000000012198188

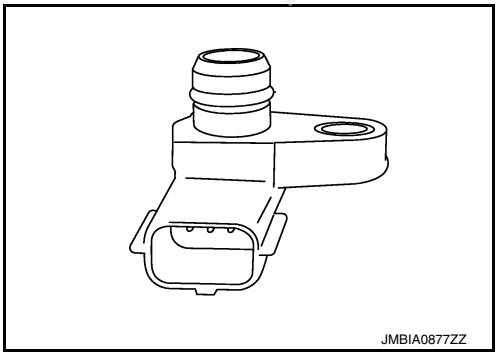
The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



Manifold Absolute Pressure Sensor

INFOID:0000000012198189

The manifold absolute pressure (MAP) sensor is placed at intake manifold collector. It detects intake manifold pressure and sends the voltage signal to the ECM.
The sensor uses a silicon diaphragm which is sensitive to the change in pressure. As the pressure increases, the voltage rises.



Stop Lamp Switch & Brake Pedal Position Switch

INFOID:0000000012198190

Stop lamp switch and brake pedal position switch are installed to brake pedal bracket.
ECM detects the state of the brake pedal by those two types of input (ON/OFF signal).

Brake pedal	Brake pedal position switch	Stop lamp switch
Released	ON	OFF
Depressed	OFF	ON

Clutch Interlock Switch

INFOID:0000000012198191

When the clutch pedal is depressed, the clutch interlock switch turns ON and the clutch interlock switch signal is sent to the ECM. The ECM judges the clutch pedal conditions via the signal (ON or OFF).

Clutch pedal	Clutch interlock switch
Released	OFF
Depressed	ON

Clutch Pedal Position Switch

INFOID:0000000012198192

When the clutch pedal is depressed, the clutch pedal position switch turns OFF and the clutch pedal position switch signal is sent to the ECM. The ECM judges the clutch pedal conditions via the signal (ON or OFF).

Clutch pedal	Clutch pedal position switch
Released	ON
Depressed	OFF

ASCD Steering Switch

INFOID:0000000012198193

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.

Information Display

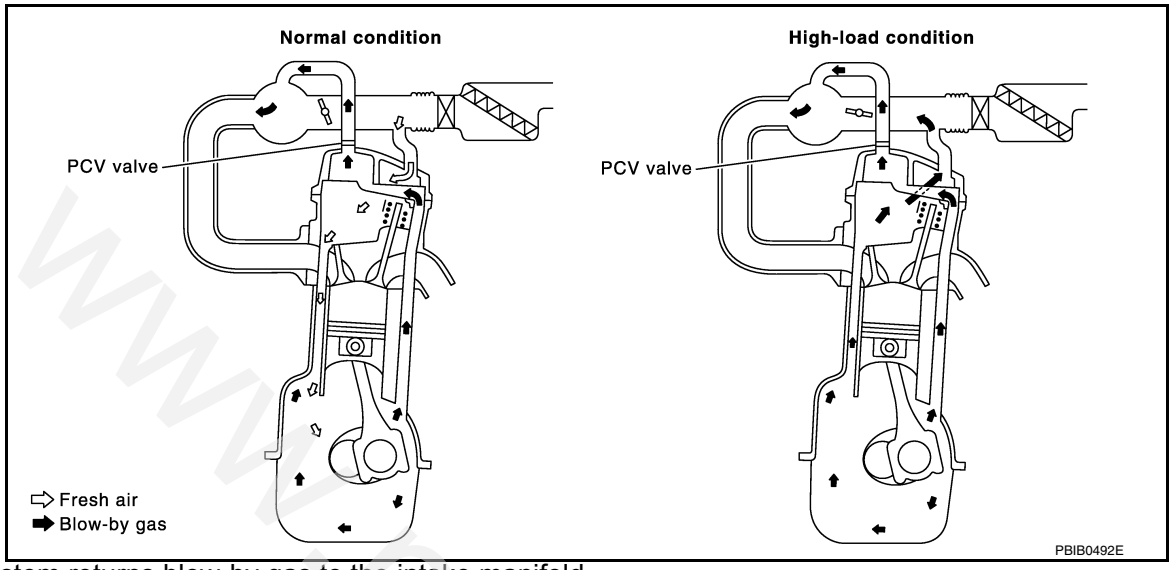
INFOID:0000000012198194

The operation mode of the ASCD is indicated on the information display in the combination meter.
ECM transmits the status signal to the combination meter via CAN communication according to ASCD operation.

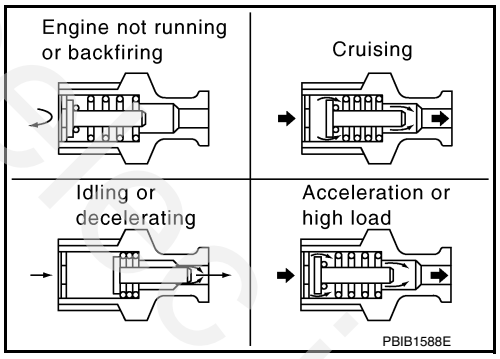
STRUCTURE AND OPERATION

Positive Crankcase Ventilation

INFOID:0000000012198195

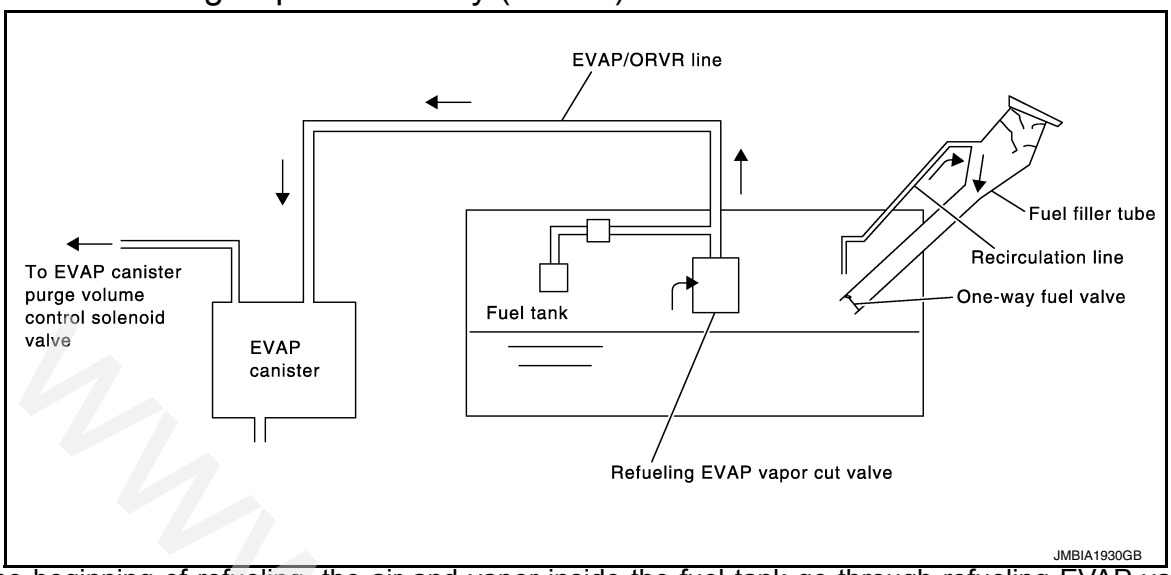


This system returns blow-by gas to the intake manifold.
The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold.
During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve.
Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air.
The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover.
Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.



On Board Refueling Vapor Recovery (ORVR)

INFOID:0000000012198196



From the beginning of refueling, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve and EVAP/ORVR line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

WARNING:

When conducting inspections below, be sure to observe the following:

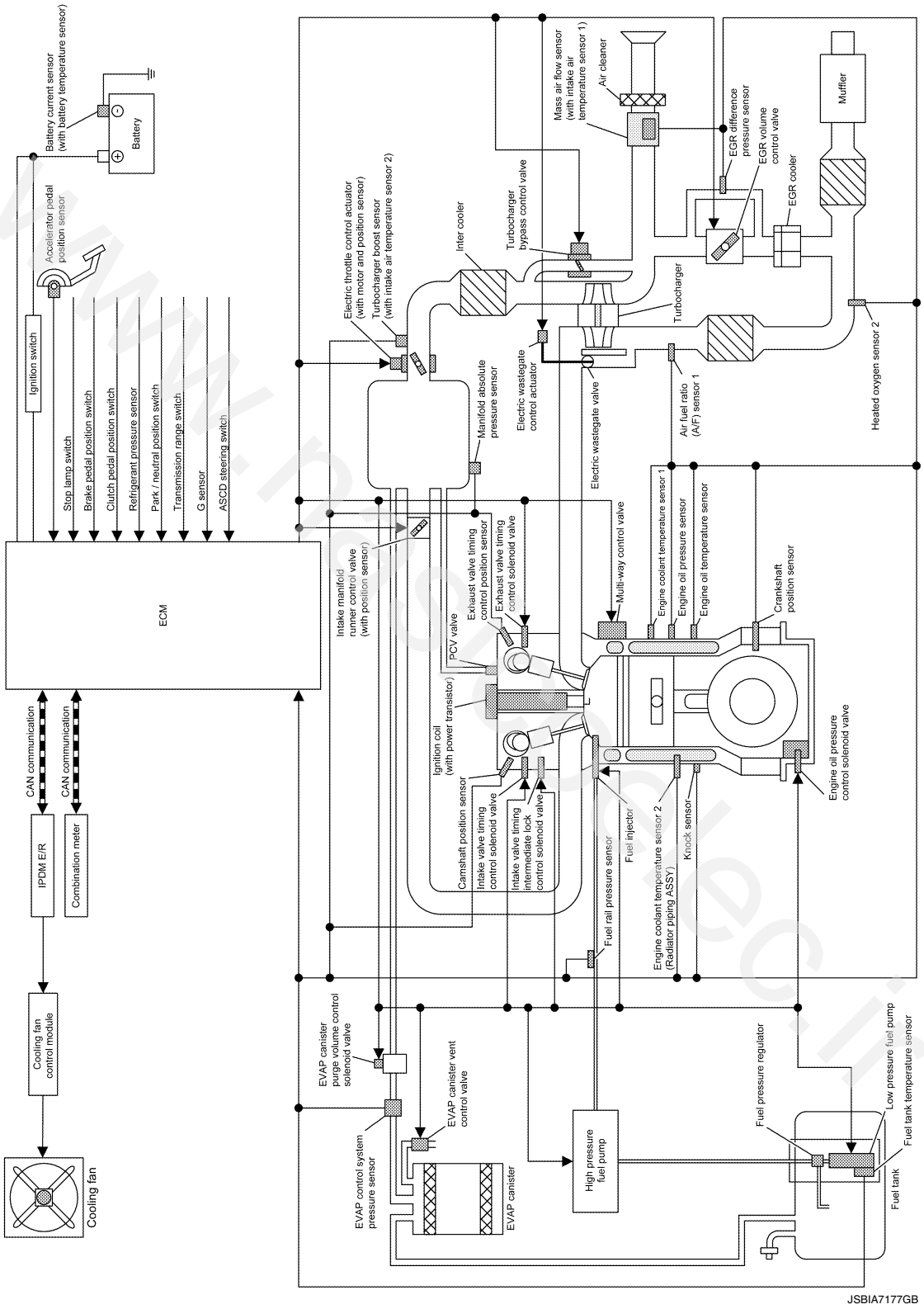
- **Put a "CAUTION: FLAMMABLE" sign in workshop.**
- **Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.**
- **Be sure to furnish the workshop with a CO_2 fire extinguisher.**

CAUTION:

- **Before removing fuel line parts, carry out the following procedures:**
  - **Put drained fuel in an explosion-proof container and put lid on securely.**
  - **Release fuel pressure from fuel line. Refer to EC-1252, "Inspection".**
  - **Disconnect battery ground cable.**
- **Always replace O-ring when the fuel gauge retainer is removed.**
- **Do not kink or twist hose and tube when they are installed.**
- **Do not tighten hose and clamps excessively to avoid damaging hoses.**
- **After installation, run engine and check for fuel leaks at connection.**
- **Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.**

SYSTEM
ENGINE CONTROL SYSTEM
ENGINE CONTROL SYSTEM : System Diagram

INFOID:0000000012198197



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ENGINE CONTROL SYSTEM : System Description

INFOID:0000000012198198

ECM controls the engine by various functions.

Function	Reference
Engine oil pressure control	EC-635, "ENGINE OIL PRESSURE CONTROL SYSTEM : System Description"
EGR system	EC-637, "EGR SYSTEM : System Description"
Intake manifold runner control	EC-643, "INTAKE MANIFOLD RUNNER CONTROL : System Description"
Thermal management control	EC-647, "THERMAL MANAGEMENT CONTROL : System Description"
Fuel injection control	EC-630, "DIRECT INJECTION GASOLINE SYSTEM : System Description"
Fuel pressure control	EC-633, "FUEL PRESSURE CONTROL : System Description"
Electric ignition control	EC-636, "ELECTRIC IGNITION SYSTEM : System Description"
Intake valve timing control	EC-639, "INTAKE VALVE TIMING CONTROL : System Description"
Exhaust valve timing control	EC-642, "EXHAUST VALVE TIMING CONTROL : System Description"
Turbocharger boost control	EC-643, "TURBOCHARGER BOOST CONTROL : System Description"
Engine protection control (Low engine oil pressure)	EC-644, "ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description"
Air conditioning cut control	EC-645, "AIR CONDITIONING CUT CONTROL : System Description"
Cooling fan control	EC-646, "COOLING FAN CONTROL : System Description"
Starter motor drive control	EC-649, "STARTER MOTOR DRIVE CONTROL : System Description"
Evaporative emission	EC-650, "EVAPORATIVE EMISSION SYSTEM : System Description"
Alternator power generation voltage variable control system	EC-651, "ALTERNATOR POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : System Description"
Fuel filler cap warning system	EC-652, "FUEL FILLER CAP WARNING SYSTEM : System Description"
ASCD (Automatic speed control device)	EC-653, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description"
Nissan dynamic control	EC-654, "INTEGRATED CONTROL SYSTEM : System Description"
CAN communication	EC-655, "CAN COMMUNICATION : System Description"

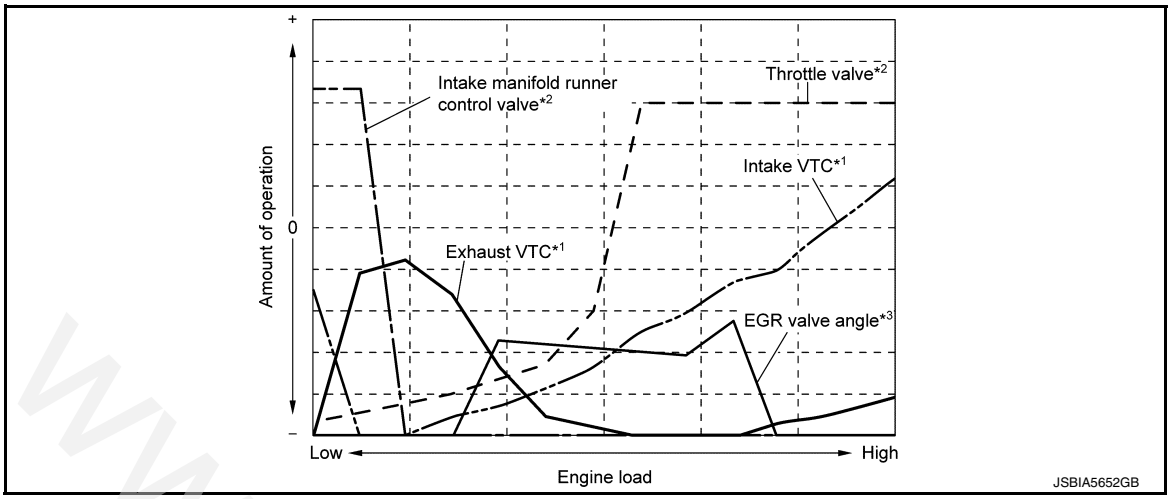
ENGINE CONTROL SYSTEM : Integrated Engine Control

INFOID:0000000012198199

SYSTEM DESCRIPTION

ECM calculates the target intake air amount and the target boost pressure according to the effective volume of cylinder, operation rate of EGR, and boost pressure to achieve driving condition requested by the driver. ECM properly combines the intake and exhaust air VTC, EGR valve, throttle valve, and turbocharger bypass control valve based on the calculations.

OPERATION IMAGE



ENGINE CONTROL SYSTEM : Fail Safe

INFOID:0000000012822745

Description

When a DTC is detected, ECM executes a mode (in the Fail-safe mode) applicable to the DTC. The fail-safe mode has the preset traveling control mode (accelerator angle variation and engine output limit) and device fix mode.

Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. **NOTE:** ECM does not control the accelerator pedal releasing speed.
	Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. • Engine output control 1: Limits the maximum speed to 120 km/h (75 MPH)* • Engine output control 2: Limits the maximum speed to 55 km/h (34 MPH)* *: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode		• This mode fixes the IVT control solenoid valve and the EVT control solenoid valve in the reference position. • A control signals is not transmitted to EGR volume control valve and the EGR volume control is deactivated. • The Intake manifold runner control valve motor is turned OFF (Intake manifold runner control valve opens).
Combustion control mode	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).
	Idle speed control	Stops feedback control of idle speed and controls with specified speed.
	Recovery speed control at decelerating	Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.
	Idle neutral control	Stops idle neutral control.
	Ignition timing correction control	Partially controls ignition timing control.
	Retardation control	Controls ignition timing delay control in the intermediate water temperature range.

Fail Safe Pattern

Pattern	Fail safe mode	
A	Traveling control mode	Accelerator angle variation control
B		Engine output control 1
C		Engine output control 2
D	Device fix mode	
E	Combustion control mode	Stratified charge combustion control at starting
F		• Idle speed control • Recovery speed control at decelerating • Idle neutral control
G		• Ignition timing correction control • Retardation control

Fail Safe List

×:Applicable —: Not applicable

DTC No.	Detected items	Vehicle behavior							
		Pattern							Others
		A	B	C	D	E	F	G	
P0011 P0075 P052A P052B	Intake valve timing control	—	—	—	×	—	—	—	—
P0014 P0078	Exhaust valve timing control	—	—	—	×	—	—	—	—
P0046	Electric wastegate control actuator	×	×	—	×	—	—	—	The ECM stops the electric wastegate actuator control, engine can not be supercharged driving.The ECM requlates engine power limiter and EGR Off.
P0087 P0090	FRP control system	×	—	×	×	×	—	—	—
P0088	FRP control system	×	—	×	—	×	—	—	—
P00B3 P00B4	Engine coolant temperature sensor 2	—	—	—	—	—	—	—	High coolant temperature control does not function.
P0101 P0102 P0103	Mass air flow sensor	×	×	—	×	×	×	×	**NOTE:** Fail-safe mode may not start depending on malfunction type of ECM
P0117 P0118	Engine coolant temperature sensor 1	—	—	—	—	×	×	—	The engine speed does not exceed 2,000 rpm due to fuel cut
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	—	—	—	×	—	—	—	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.
P0171 P0172	Fuel injection system	×	—	—	—	×	×	—	—
P0190	FRP sensor	×	×	×	×	×	×	—	High pressure fuel pump is activated at maximum discharge pressure. **NOTE:** Fail-safe mode may not start depending on malfunction type of ECM

DTC No.	Detected items	Vehicle behavior							
		Pattern							Others
		A	B	C	D	E	F	G	
P0192	FRP sensor	×	×	—	—	×	—	—	High pressure fuel pump is activated at maximum discharge pressure. **NOTE:** Fail-safe mode may not start depending on malfunction type of ECM
P0193	FRP sensor	×	×	—	—	×	—	—	High pressure fuel pump is activated at maximum discharge pressure. **NOTE:** Fail-safe mode may not start depending on malfunction type of ECM
P0196 P0197 P0198	Engine oil temperature sensor	—	—	—	—	—	—	—	Exhaust valve timing control does not function.
P0201 P0202 P0203 P0204	Injector	×	—	×	—	×	—	—	—
P0237	Turbocharger boost sensor	×	×	—	×	—	—	—	—
P0300 P0301 P0302 P0303 P0304	Misfire	×	—	—	—	×	×	—	—
P0335	Crankshaft position sensor	—	—	—	×	—	—	—	—
P0340	Camshaft position sensor	—	—	—	×	—	—	—	—
P0365	Exhaust valve timing control position sensor	—	—	—	×	—	—	—	—
P0401 P0402	EGR system	—	—	—	×	—	—	—	—
P0404	EGR volume control valve	×	—	×	×	×	×	—	—
P0407 P0408 P046E P046F P0486	EGR pressure sensor	—	—	—	×	—	—	—	—
P0448	EVAP canister vent control valve	×	—	—	×	—	—	—	—
P044A P044B P044C P044D P044E	EGR volume control valve position sensor	×	—	—	×	—	—	—	—
P0500	Vehicle speed sensor	×	—	—	—	×	×	—	—
P0501 P2159		×	—	—	—	×	—	—	
P050A	Cold start control	×	—	—	—	×	—	—	—
P0524	Engine oil pressure	—	—	—	—	—	—	—	• ECM illuminates oil pressure warning lamp on the combination meter. • Engine speed will not rise more than 4,000rpm due to the fuel cut. • Fail-safe is canceled when ignition switch OFF → ON.

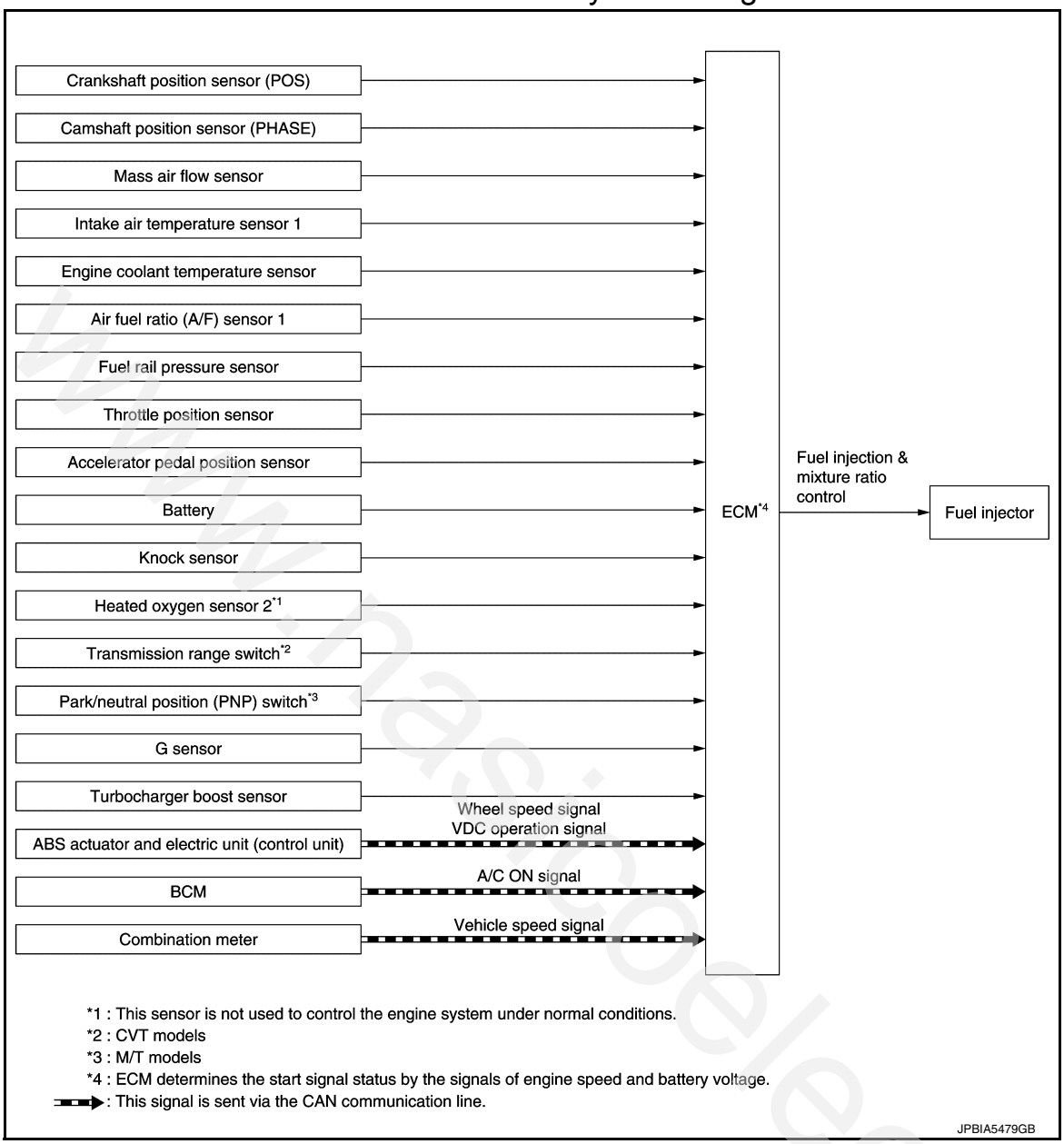
DTC No.	Detected items	Vehicle behavior							
		Pattern							Others
		A	B	C	D	E	F	G	
P0603 P0607	ECM	×	×	—	—	—	—	—	—
P0604 P0605 P0606 P060B		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P060A		×	×	—	×	—	—	—	**NOTE:** Fail-safe mode may not start depending on malfunction type of ECM
P062B		×	—	×	—	×	—	—	
P0643	Sensor power supply	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P119A	FRP sensor	×	—	—	—	×	—	—	—
P119B	FRP sensor	×	—	—	—	×	—	—	—
P119C	FRP sensor	×	—	—	—	×	—	—	—
P1197	Out of gas	—	—	×	×	—	—	—	—
P1217	Engine over temperature	—	—	—	—	—	—	—	The engine speed does not exceed 2,000 rpm due to fuel cut
P159B	G sensor	×	—	—	—	×	—	—	—
P2100 P2103	Throttle control motor relay	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P2004	Intake manifold runner control valve	—	—	—	×	—	—	—	—
P2014	Intake manifold runner control valve position sensor	—	—	—	×	—	—	—	—
P2016	Intake manifold runner control valve position sensor	—	—	—	×	—	—	—	—
P2017	Intake manifold runner control valve position sensor	—	—	—	×	—	—	—	—
P2018	Intake manifold runner control valve position sensor	—	—	—	×	—	—	—	—
P2101	Electric throttle control function	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P2118	Throttle control motor	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P2119	Electric throttle control actuator	×	×	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. **NOTE:** Fail-safe mode may not start depending on malfunction type of ECM

DTC No.	Detected items	Vehicle behavior							
		Pattern							Others
		A	B	C	D	E	F	G	
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	—	—	—	×	—	—	—	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.
P2162	Vehicle speed sensor	×	—	—	—	×	—	—	—
P2263	Turbocharger system	×	×	—	×	—	—	—	—
P2562 P2566	Electric wastegate control valve position sensor	×	×	—	×	—	—	—	The ECM stops the electric wastegate actuator control, engine can not be supercharged driving.The ECM requlates engine power limiter and EGR Off.
P2563	Electric wastegate control valve position sensor	×	×	—	×	—	—	—	—
P2564	Electric wastegate control valve position sensor	×	×	—	×	—	—	—	—
P2565	Electric wastegate control valve position sensor	×	×	—	×	—	—	—	—
P26A3 P26A5 P26A6 P26A7	Multi-way control valve	—	—	—	—	—	—	—	• When detecting a malfunction with the valve closed, ECM fully opens the valve. • When detecting a malfunction with the valve opened, ECM maintains valve angle. • When detecting a malfunction in sensor, ECM fully opens the valve. • ECM limits the engine output depending on malfunctions.

DIRECT INJECTION GASOLINE SYSTEM

DIRECT INJECTION GASOLINE SYSTEM : System Diagram

INFOID:0000000012198201



DIRECT INJECTION GASOLINE SYSTEM : System Description

INFOID:0000000012198202

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM		ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*4		Fuel injection & mixture ratio control	Fuel injector
Camshaft position sensor (PHASE)	Camshaft position			
Mass air flow sensor	Amount of intake air			
Intake air temperature sensor 1	Intake air temperature			
Engine coolant temperature sensor	Engine coolant temperature			
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas			
Fuel rail pressure sensor	Fuel rail pressure			
Throttle position sensor	Throttle position			
Accelerator pedal position sensor	Accelerator pedal position			
Battery	Battery voltage*4			
Knock sensor	Engine knocking condition			
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas			
Transmission range switch*2	Gear position			
Park/neutral position (PNP) switch*3				
G sensor	Inclination angle			
Turbocharger boost sensor	Turbocharger boost			
ABS actuator and electric unit (control unit)	CAN communication	• Wheel speed signal • VDC/TCS operation command		
BCM	CAN communication	A/C ON signal		
Combination meter	CAN communication	Vehicle speed signal		

*1: This sensor is not used to control the engine system under normal conditions.

*2: CVT models

*3: M/T models

*4: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

The adoption of the direct fuel injection method enables more accurate adjustment of fuel injection quantity by injecting atomized high-pressure fuel directly into the cylinder. This method allows high-powered engine, low fuel consumption, and emissions-reduction.

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed, intake air, fuel rail pressure and boost) from the crankshaft position sensor, camshaft position sensor, mass air flow sensor, fuel rail pressure sensor and the turbocharger boost sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

<Fuel increase>
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever position is changed from N to D (CVT models)
- High-load, high-speed operation

<Fuel decrease>
- During deceleration
- During high engine speed operation

FUEL INJECTION CONTROL

Stratified-charge Combustion

Stratified-charge combustion is a combustion method which enables extremely lean combustion by injecting fuel in the latter half of a compression process, collecting combustible air-fuel around the spark plug, and forming fuel-free airspace around the mixture.

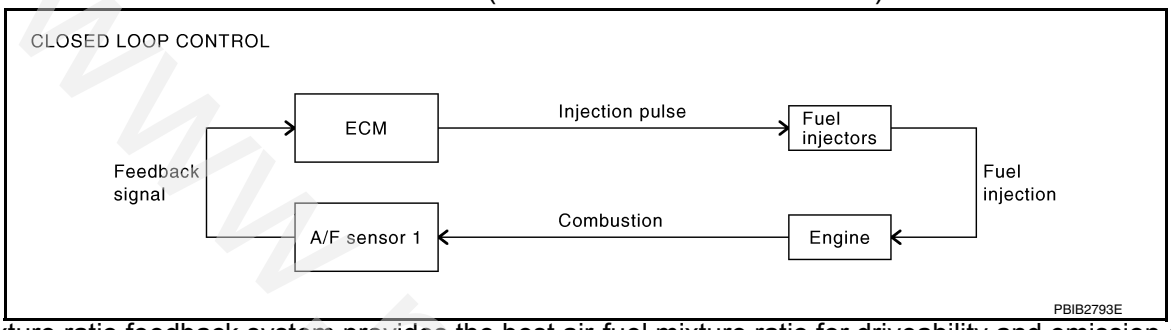
Right after a start with the engine cold, the catalyst warm-up is accelerated by stratified-charge combustion.

Homogeneous Combustion

Homogeneous combustion is a combustion method that fuel is injected during intake process so that combustion occurs in the entire combustion chamber, as is common with conventional methods.

As for a start except for starts with the engine cold, homogeneous combustion occurs.

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can better reduce CO, HC and NOx emissions. This system uses A/F sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about A/F sensor 1, refer to EC-614, "Air Fuel Ratio (A/F) Sensor 1". This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).

This stage is referred to as the closed loop control condition.

Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of A/F sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

- Open Loop Control
  The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of A/F sensor 1 or its circuit
- Insufficient activation of A/F sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (CVT models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from A/F sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio.

Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of “injection pulse duration” to automatically compensate for the difference between the two ratios.

“Fuel trim” refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes “short-term fuel trim” and “long-term fuel trim”.

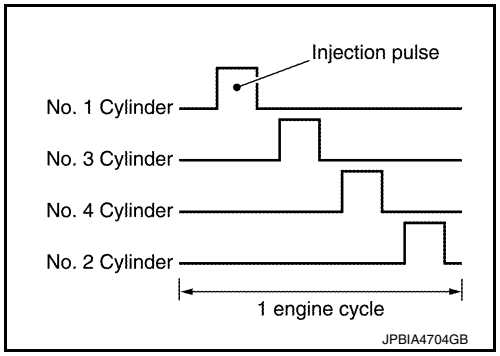
“Short term fuel trim” is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from A/F sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.

"Long-term fuel trim" is overall fuel compensation carried out over time to compensate for continual deviation of the "short-term fuel trim" from the central value. Continual deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING

Sequential Direct Injection Gasoline System

Fuel is injected into each cylinder during each engine cycle according to the ignition order.



STRATIFIED-CHARGE START CONTROL

The use of the stratified-charge combustion method enables emissions-reduction when starting the engine with engine coolant temperature between 5°C (41°F) and 40°C (104°F).

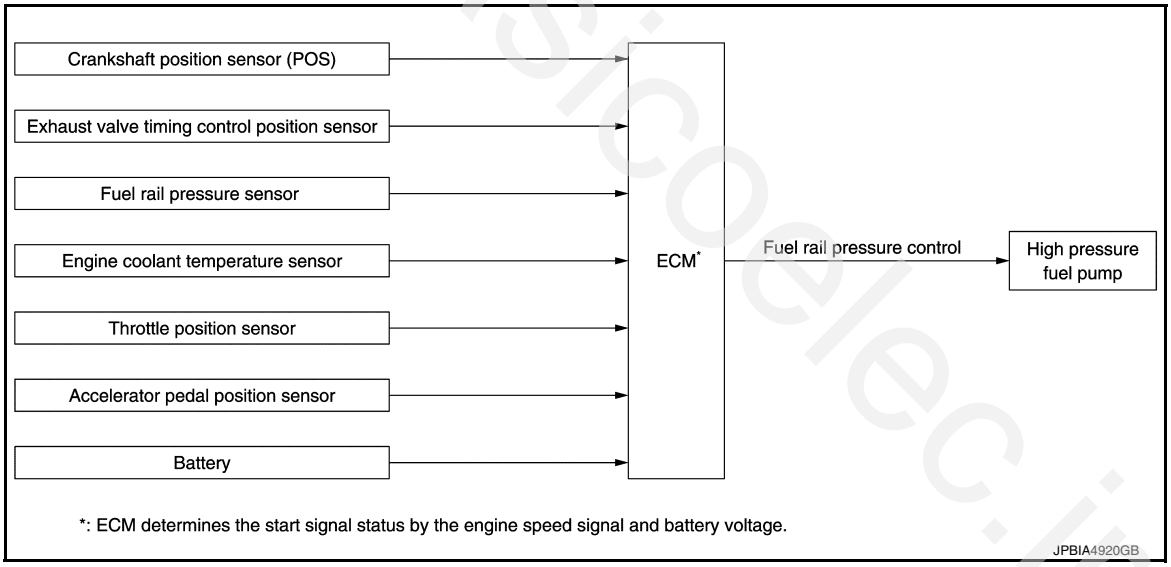
FUEL SHUT-OFF

Fuel to each cylinder is shut-off during deceleration, operation of the engine at excessively high speed or operation of the vehicle at excessively high speed.

FUEL PRESSURE CONTROL

FUEL PRESSURE CONTROL : System Diagram

INFOID:0000000012198203



FUEL PRESSURE CONTROL : System Description

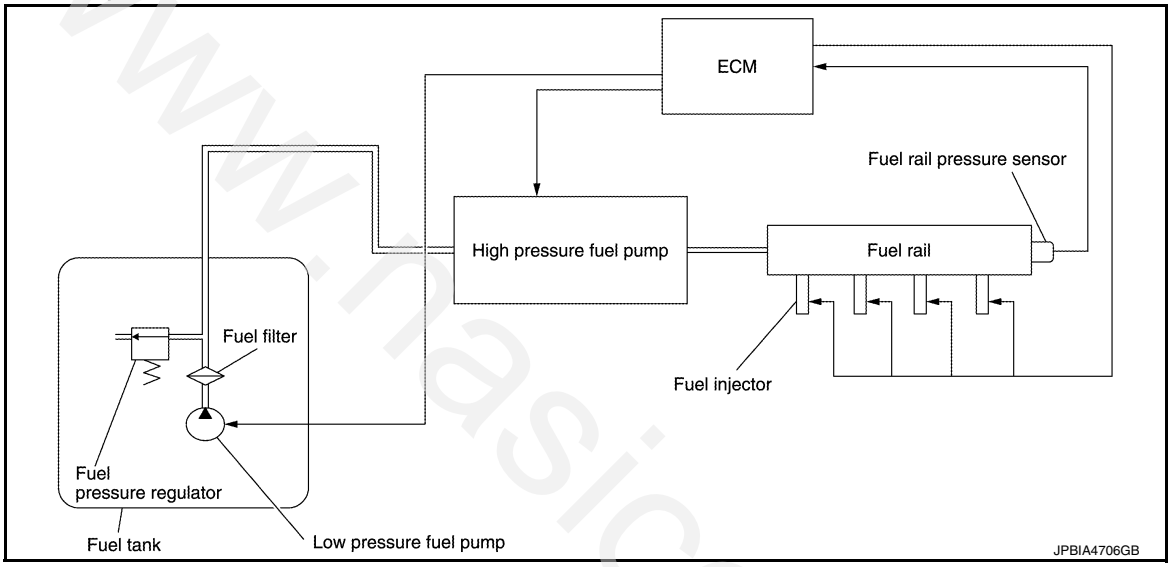
INFOID:0000000012198204

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*	Fuel rail pressure control	High pressure fuel pump
Exhaust valve timing control position sensor	Camshaft position		
Fuel rail pressure sensor	Fuel rail pressure		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*		

*: ECM determines the start signal status by the engine speed signal and battery voltage.

System Description



Low fuel pressure control

- The low fuel pressure pump is controlled by ECM. The pumped fuel passes through the fuel filter and is sent to the high pressure fuel pump.
- Low fuel pressure is adjusted by the fuel pressure regulator.

High fuel pressure control

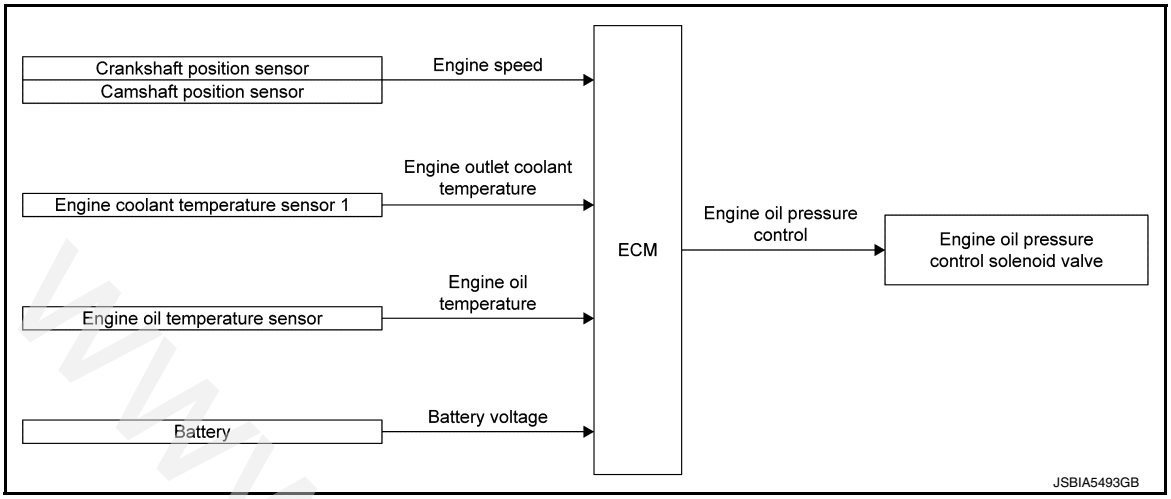
The high pressure fuel pump raises the pressure of the fuel sent from the low pressure fuel pump. Actuated by the exhaust camshaft, the high pressure fuel pump activates the high pressure fuel pump solenoid based on a signal received from ECM, and adjusts the amount of discharge by changing the timing of closing the inlet check valve to control fuel rail pressure.

ENGINE OIL PRESSURE CONTROL SYSTEM

ENGINE OIL PRESSURE CONTROL SYSTEM : System Description

INFOID:0000000012198205

SYSTEM DIAGRAM



SYSTEM DESCRIPTION

ECM performs the variable hydraulic control (low oil pressure control and high oil pressure control) based on signals from each sensor according to oil temperature and engine load. ECM activates the engine oil pressure control solenoid valve and switches to the low oil pressure control and high oil pressure control. ECM uses the low oil pressure control for 80-90 % of the operating area to maintain low oil pressure and stops piston cooling jet (i.e. achievement of less than or equal to jet injection valve opening pressure).

High oil pressure control start condition

- High oil pressure control start condition
- High engine speed
- Coolant temperature is 60°C (140°F)or more under high engine load condition

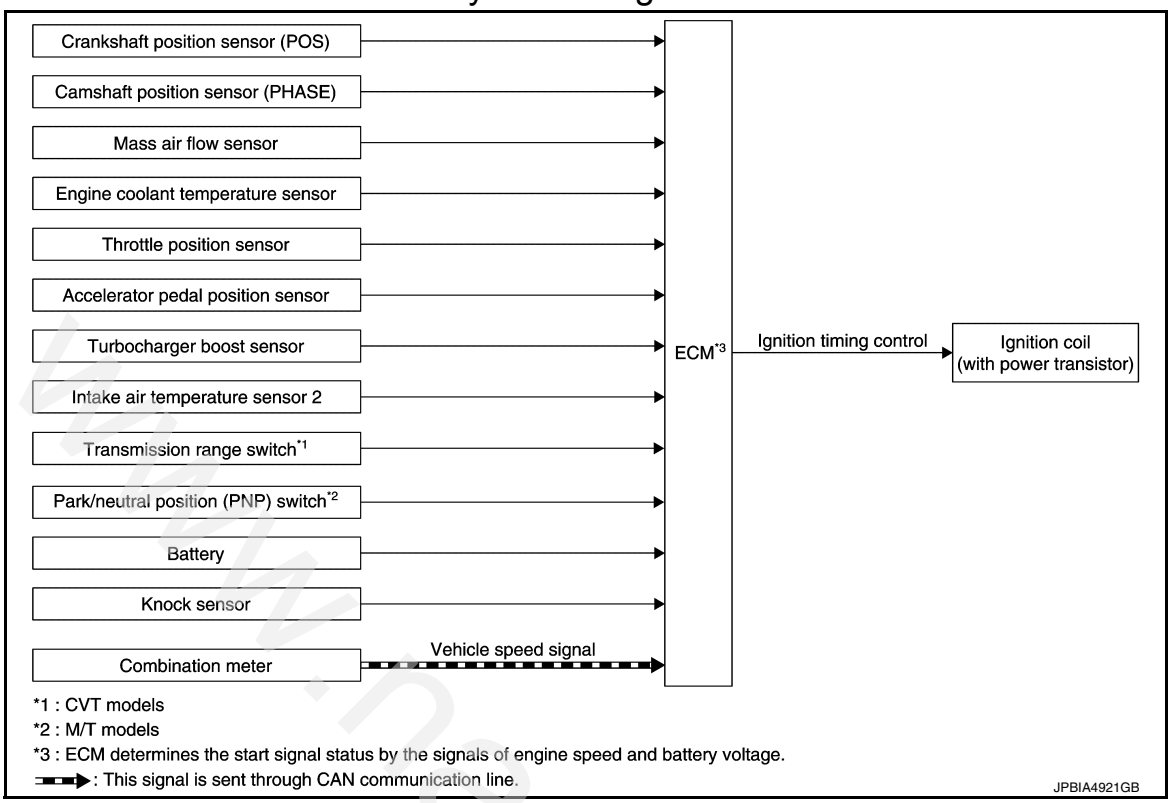
Low oil pressure control start condition

- Coolant temperature is less than 60°C (140°F) under low engine speed condition
- Coolant temperature is 60°C (140°F) or more under low engine load and low engine speed conditions

ELECTRIC IGNITION SYSTEM

ELECTRIC IGNITION SYSTEM : System Diagram

INFOID:0000000012198206



ELECTRIC IGNITION SYSTEM : System Description

INFOID:0000000012198207

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM		ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*3 Piston position		Ignition timing control	Ignition coil (with power transistor)
Camshaft position sensor (PHASE)				
Mass air flow sensor	Amount of intake air			
Engine coolant temperature sensor	Engine coolant temperature			
Throttle position sensor	Throttle position			
Accelerator pedal position sensor	Accelerator pedal position			
Turbocharger boost sensor	Turbocharger boost			
Intake air temperature sensor 2	Intake air temperature			
Transmission range switch*1	Gear position			
Park/neutral position (PNP) switch*2				
Battery	Battery voltage*3			
Knock sensor	Engine knocking condition			
Combination meter	CAN communication	Vehicle speed signal		

*1: CVT models

*2: M/T models

*3: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

Firing order: 1 - 3 - 4 - 2

The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.
The ECM receives information such as the injection pulse width and camshaft position sensor (PHASE) signal. Computing this information, ignition signals are transmitted to the power transistor.
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

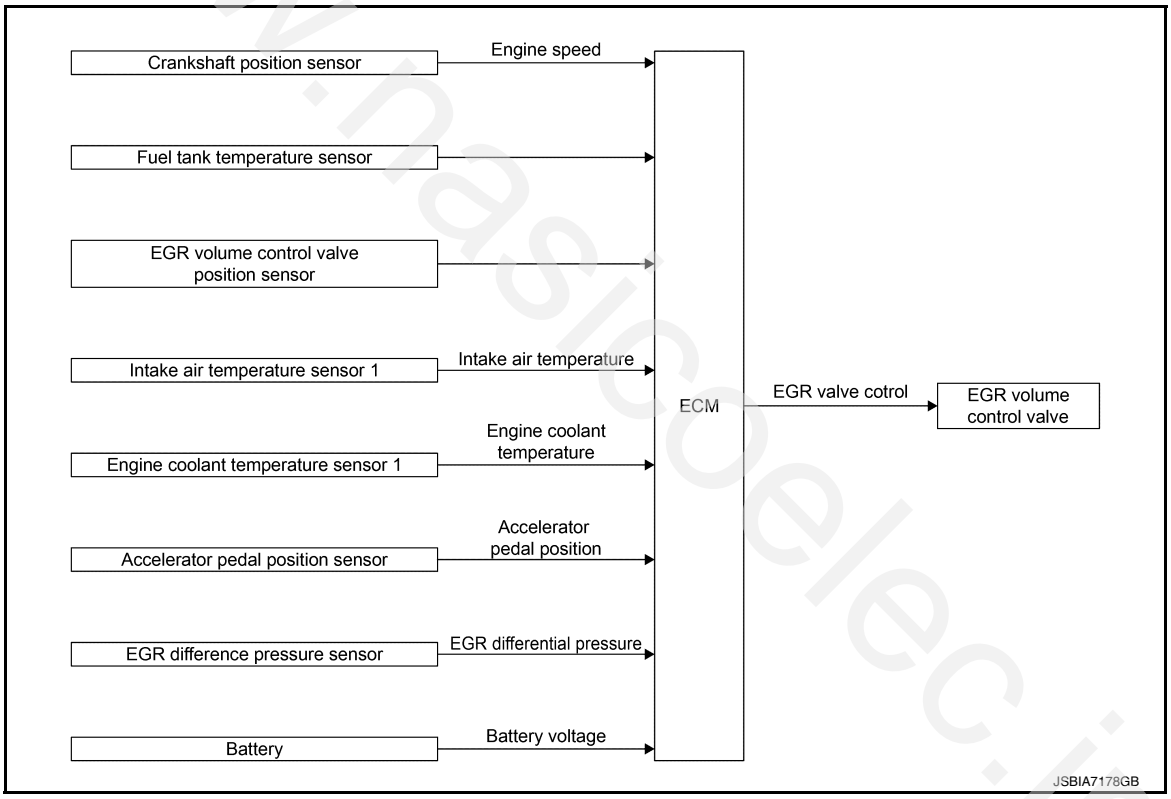
The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

EGR SYSTEM

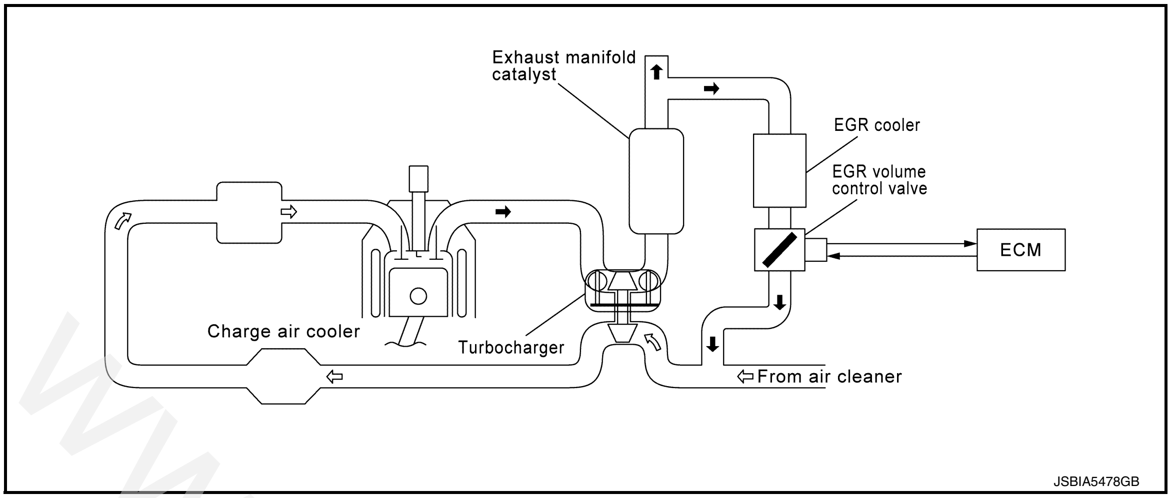
EGR SYSTEM : System Description

INFOID:0000000012198208

SYSTEM DIAGRAM



SYSTEM DESCRIPTION



EGR VOLUME CONTROL

The EGR volume control regulates the flow rate of exhaust gas flowing from downstream of exhaust manifold catalyst to intake manifold. The exhaust gas flow rate is controlled by opening/closing the EGR path in the EGR control valve.

A built-in DC motor moves the valve continuously corresponding to the ECM output signal.

The EGR volume control valve position sensor detects the valve position and sends the voltage signals to the ECM.

The adoption of water-cooled EGR cooler reduces the knocking by efficiently cooling the gas circulated by the EGR system to lower the combustion temperature and improves fuel efficiency by raising the thermal efficiency.

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 properly.

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.

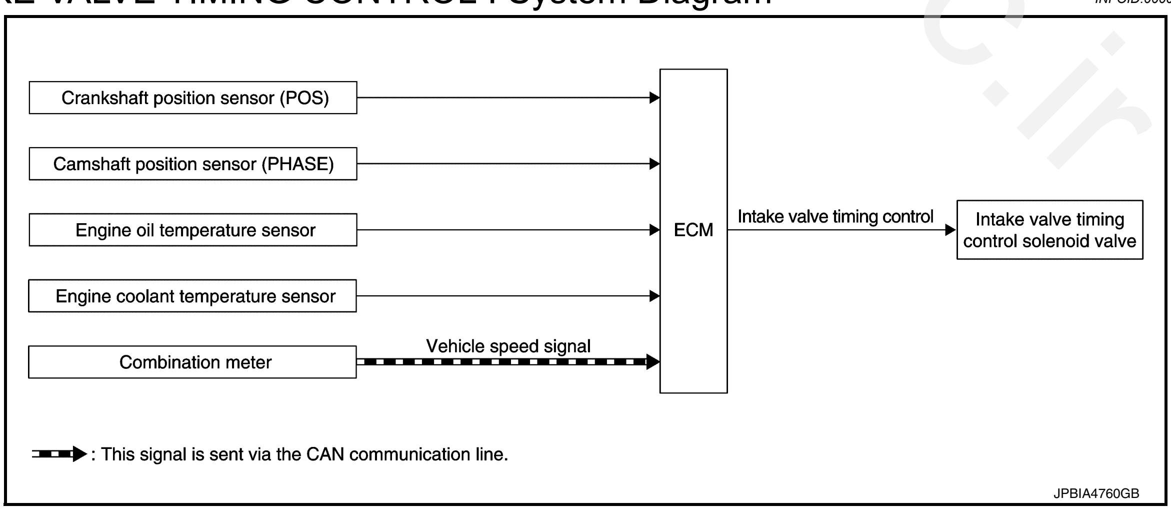
The EGR volume control valve remains close under the following conditions.

- Engine stopped
- Engine starting
- Low engine coolant temperature
- Excessively high engine coolant temperature
- High engine speed
- Accelerator pedal fully depressed
- Low intake air temperature

INTAKE VALVE TIMING CONTROL

INTAKE VALVE TIMING CONTROL : System Diagram

INFOID:0000000012198209



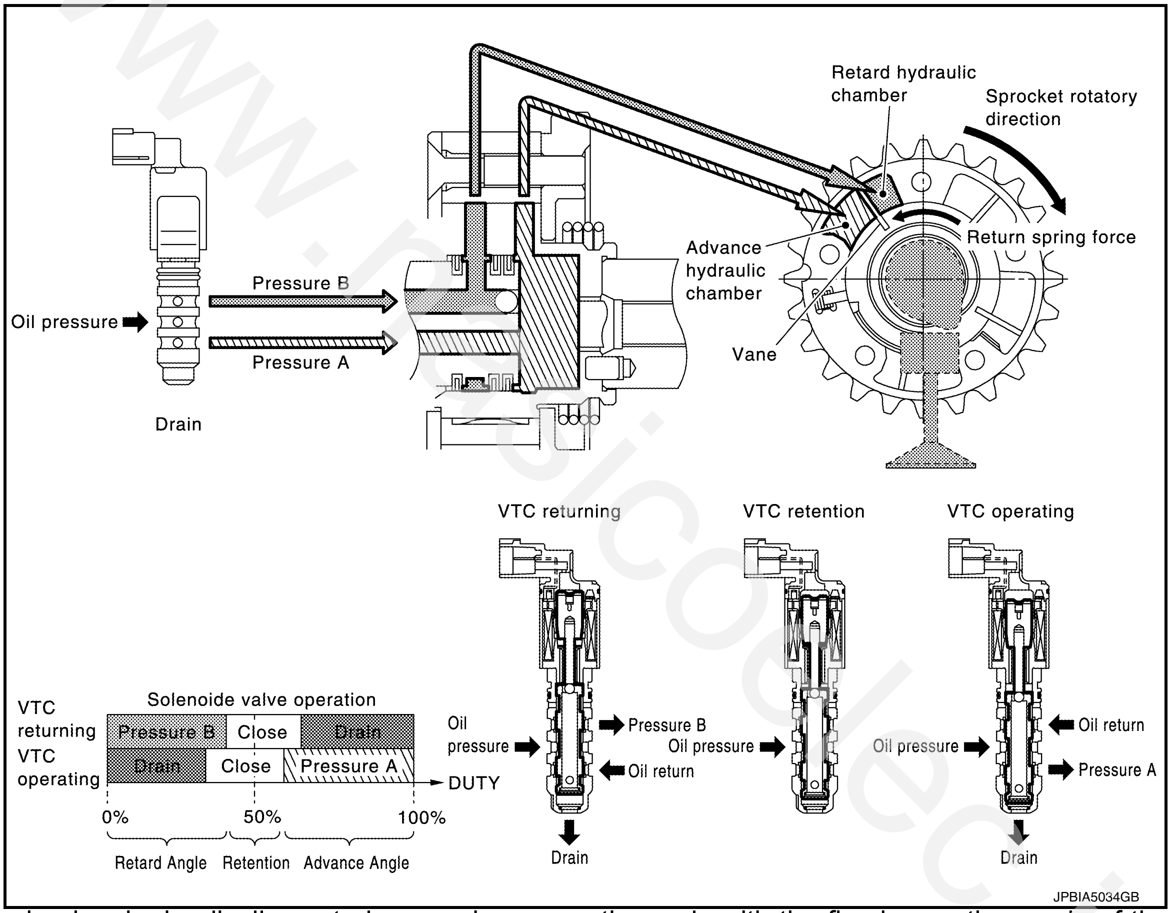
INTAKE VALVE TIMING CONTROL : System Description

INFOID:0000000012198210

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM		ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed and piston position		Intake valve timing control	Intake valve timing control solenoid valve
Camshaft position sensor (PHASE)				
Engine oil temperature sensor	Engine oil temperature			
Engine coolant temperature sensor	Engine coolant temperature			
Combination meter	CAN communication	Vehicle speed signal		

SYSTEM DESCRIPTION



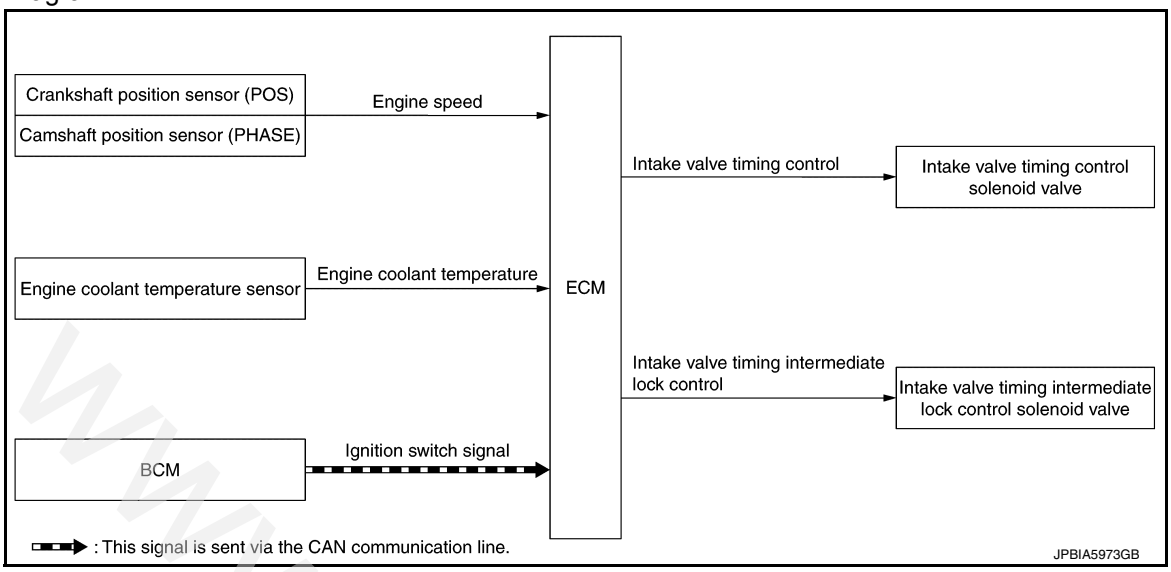
JPBIA5034GB

This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing (IVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

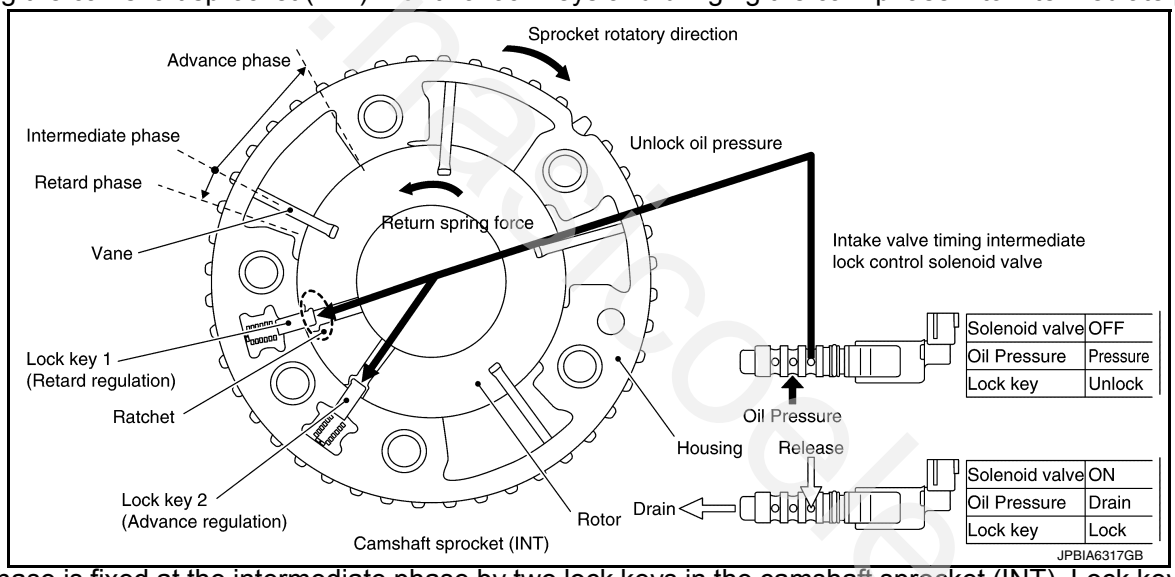
INTAKE VALVE TIMING INTERMEDIATE LOCK CONTROL

System Diagram



System Description

The intake valve timing intermediate lock control improves the cleaning ability of exhaust gas at cold starting by fixing the camshaft sprocket (INT) with two lock keys and bringing the cam phase into intermediate phase.



Cam phase is fixed at the intermediate phase by two lock keys in the camshaft sprocket (INT). Lock key 1 controls retard position and lock key 2 controls advance position.

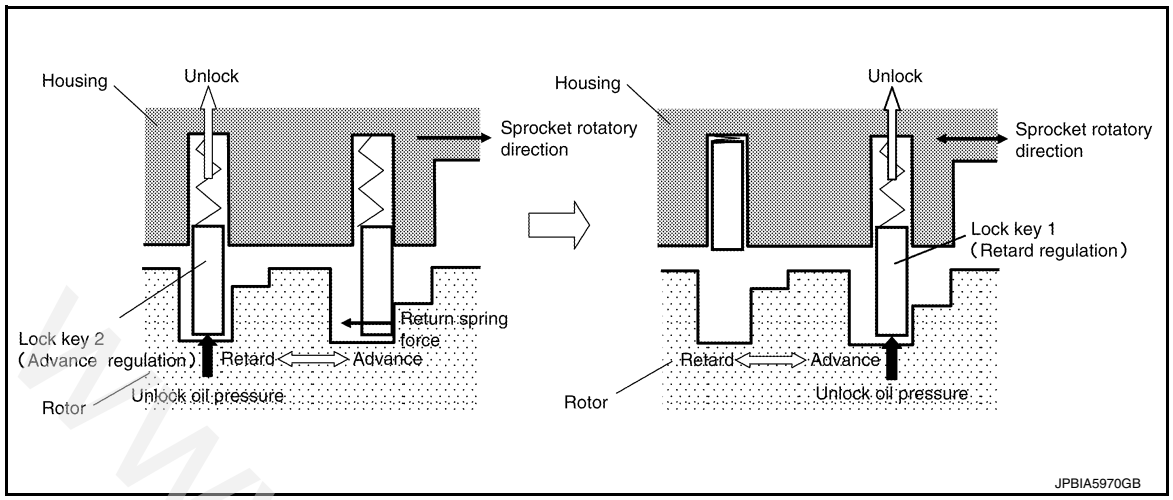
ECM controls the intermediate phase lock by opening/closing the intake valve timing intermediate lock control solenoid valve to control oil pressure acting on the lock key and locking/unlocking the lock key.

Lock/Unlock Activation

When ECM activates the intake valve timing intermediate lock control solenoid valve, oil pressure generated in the oil pump is drained through the oil pressure path in the control valve. Since oil pressure is not acted on the lock key, the lock key position is fixed by the spring tension and the cam phase is fixed at the intermediate phase.

When ECM deactivates the intake valve timing intermediate lock control solenoid valve, unlocking oil pressure acts on each lock key. Lock key 1 is not released because it is under load due to sprocket rotational force. For this reason, lock key 2 is released first by being pushed up by unlocking oil pressure. When lock key 2 is released, some clearance is formed between lock key 1 and the rotor due to sprocket rotational force and

return spring force. Accordingly, lock key 1 is pushed up by unlocking oil pressure and the intermediated phase lock is released.



When stopping the engine

When the ignition switch is turned from idle state to OFF, ECM receives an ignition switch signal from BCM via CAN communication and activates the intake valve timing intermediate lock control solenoid valve and drains oil pressure acting on the lock key before activating the intake valve timing control solenoid valve and operating the cam phase toward the advance position.

The cam phase is fixed by the lock key when shifting to the intermediated phase and ECM performs Lock judgment to stop the engine.

When starting the engine

When starting the engine by cold start, ECM judges the locked/unlocked state when ignition switch is turned ON. When judged as locked state (fixed at the intermediate phase), the intake valve timing intermediate lock control solenoid valve is activated. Since oil pressure does not act on the lock key even when the engine is started, the cam phase is fixed at the intermediate phase and the intake valve timing control is not performed.

When the engine stops without locking the cam phase at the intermediate phase due to an engine stall and the state is not judged as locked, the intake valve timing intermediate lock control solenoid valve and the intake valve timing control solenoid valve are activated and the cam phase shifts to the advanced position to be locked at the intermediate phase. Even when not locked in the intermediate lock phase due to no oil pressure or low oil pressure, a ratchet structure of the camshaft sprocket (INT) rotor allows the conversion to the intermediate phase in stages by engine vibration.

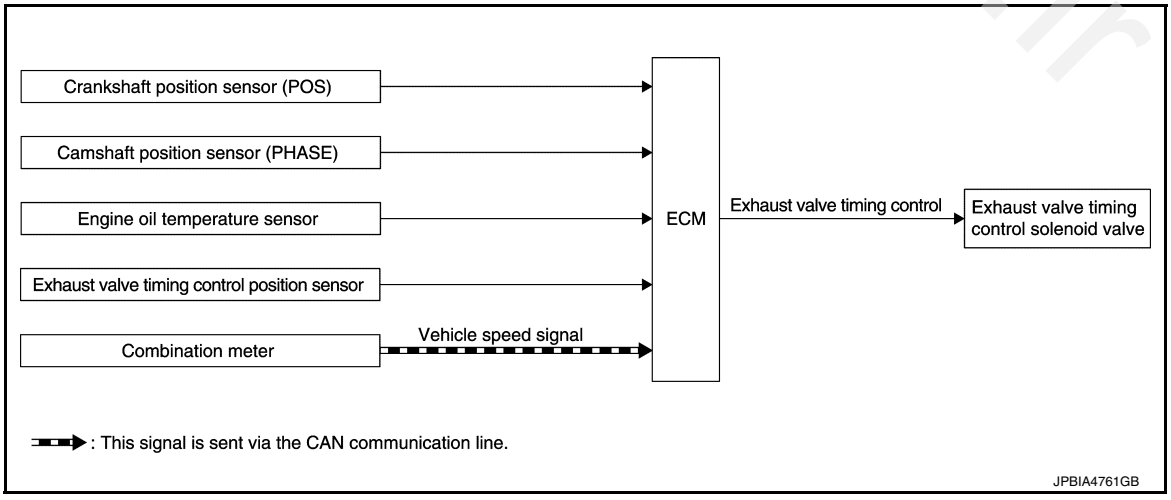
When engine coolant temperature is more than 60°C (140°F), the intake valve timing is controlled by deactivating the intake valve timing intermediate lock control solenoid valve and releasing the intermediate phase lock.

When the engine is started after warming up, ECM releases the intermediate phase lock immediately after the engine start and controls the intake valve timing.

EXHAUST VALVE TIMING CONTROL

EXHAUST VALVE TIMING CONTROL : System Diagram

INFOID:0000000012198211



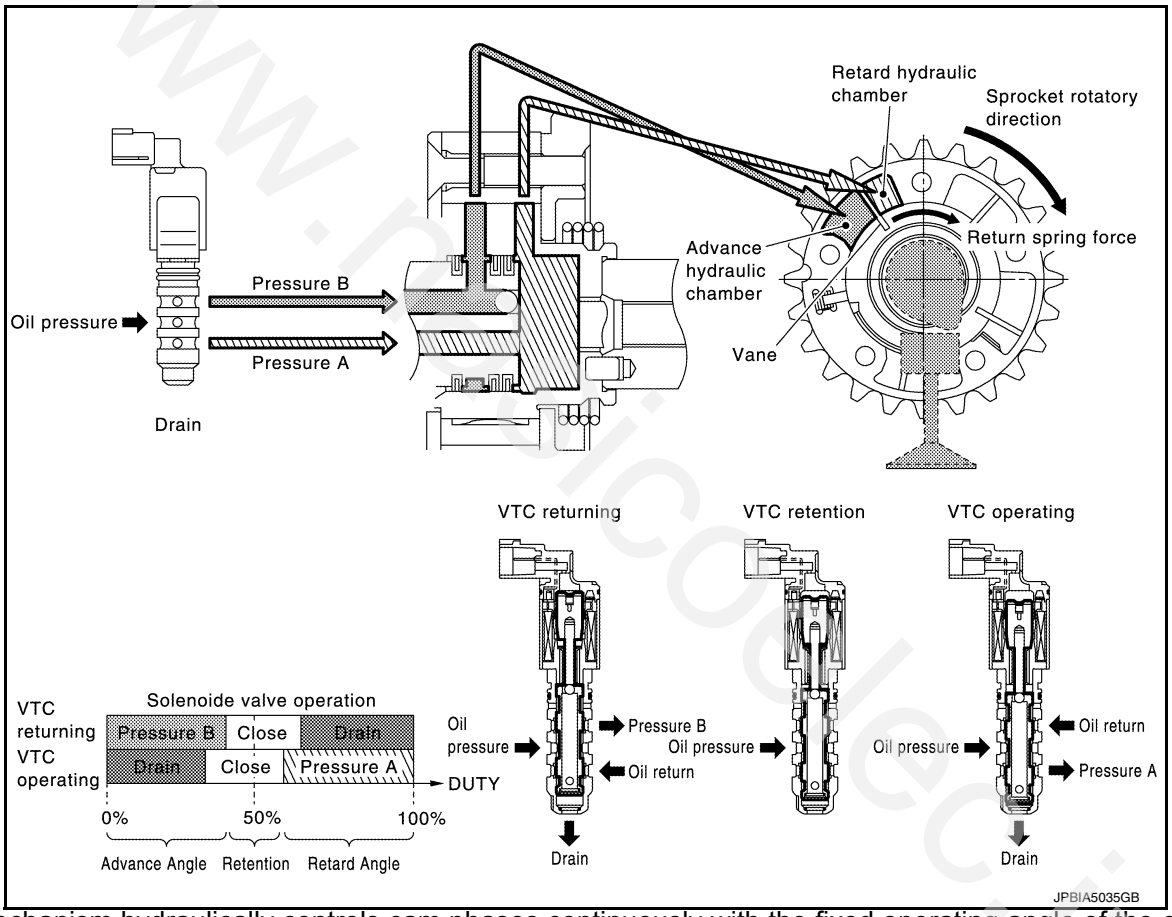
EXHAUST VALVE TIMING CONTROL : System Description

INFOID:0000000012198212

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM		ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed and piston position		Exhaust valve timing control	Exhaust valve timing control solenoid valve
Camshaft position sensor (PHASE)				
Engine oil temperature sensor	Engine oil temperature			
Exhaust valve timing control position sensor	Exhaust valve timing signal			
Combination meter	CAN communication	Vehicle speed signal		

SYSTEM DESCRIPTION



This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the exhaust valve.

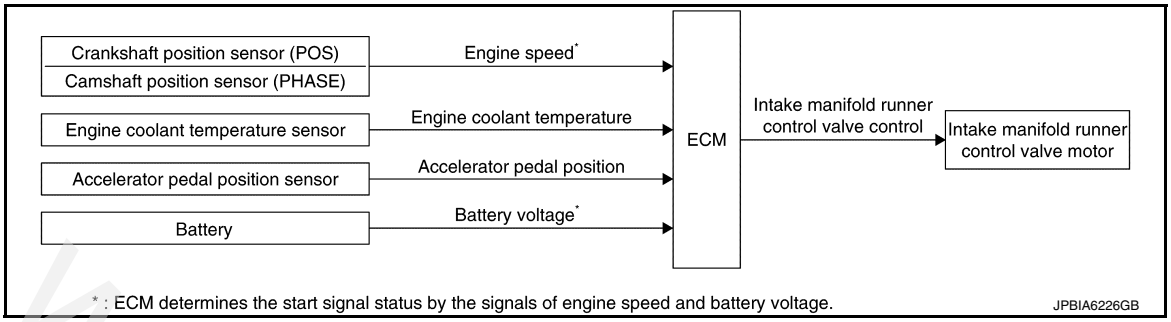
The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine oil temperature. Then, the ECM sends ON/OFF pulse duty signals to the exhaust valve timing (EVT) control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the exhaust valve to increase engine torque and output in a range of high engine speed.

INTAKE MANIFOLD RUNNER CONTROL

INTAKE MANIFOLD RUNNER CONTROL : System Description

INFOID:0000000012198213

SYSTEM DIAGRAM



*: ECM determines the start signal status by the signals of engine speed and battery voltage.

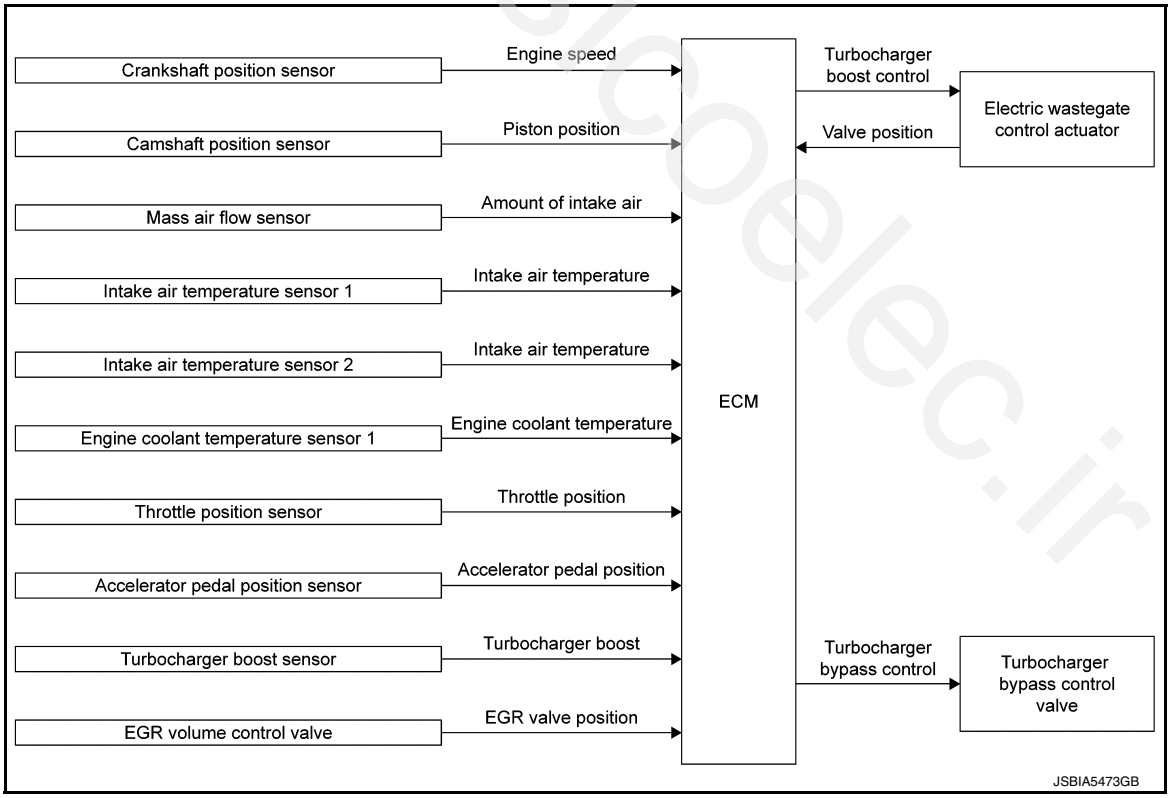
SYSTEM DESCRIPTION

Intake manifold runner control valve has a valve portion in the intake passage of each cylinder.
When the engine speed is 2800rpm or less, the intake manifold runner control valve closes. Thus the velocity of the air in the intake passage increases, promoting the vaporization of the fuel and producing a intake manifold runner in the combustion chamber.
Because of this operation, this system tends to increase the burning speed of the gas mixture, improve exhaust emission, and increase the stability in running conditions.
Also, except when idling and during low engine coolant temperature, this system opens the intake manifold runner control valve.
In this condition, this system tends to increase power by improving intake efficiency via reduction of intake flow resistance.
The intake manifold runner control valve is operated by the ECM.

TURBOCHARGER BOOST CONTROL

TURBOCHARGER BOOST CONTROL : System Diagram

INFOID:0000000012198214



TURBOCHARGER BOOST CONTROL : System Description

INFOID:0000000012198215

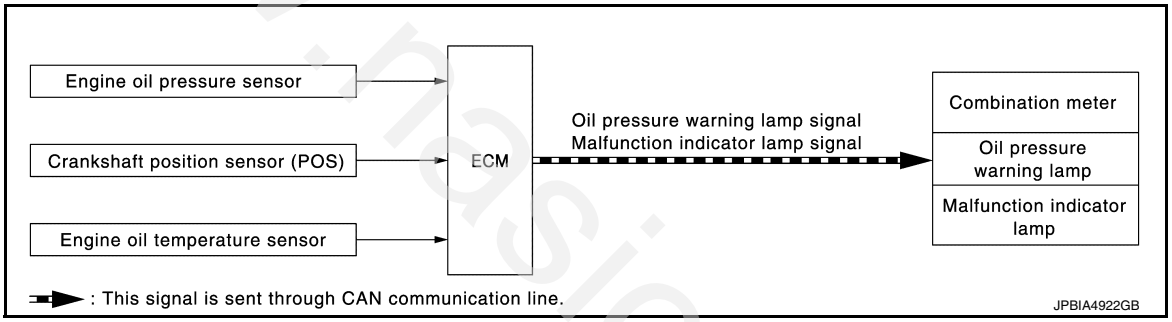
ECM controls the electric wastegate control actuator according to driving conditions.

The rod connected to the electric wastegate control actuator controls turbocharger boost by changing the angle of the wastegate valve in the exhaust side turbine.
ECM determines a target boost pressure based on engine speed, accelerator pedal position, throttle valve position, and EGR volume control valve position. ECM then calculates intake air pressure around the turbine entrance according to the amount of intake air and intake air pressure. Based on this information, ECM determines the wastegate valve angle to satisfy the target boost pressure.
The electronically-controlled wastegate control actuator enables the adjustment of wastegate valve angle, allowing the improvement of the response to driving conditions and the achievement of high-precision boost pressure control.
When the engine is cold, the wastegate valve is opened and heat loss caused by turbocharger is minimized to accelerate the warm-up (activation) of catalyst. This allows the wastegate valve to be opened in non-supercharging regions and improves the fuel economy by reducing piston pumping loss.
In addition, the adoption of the electronically-controlled turbocharger bypass control valve quickly starts opening the bypass valve when releasing the accelerator pedal, and accordingly this reduces surge sound generated by the back flow of supercharged air to the compressor fin.
NOTE:
Boost pressure varies according to the environment where the vehicle is used.

ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE

ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Diagram

INFOID:0000000012198216



ENGINE PROTECTION CONTROL AT LOW ENGINE OIL PRESSURE : System Description

INFOID:0000000012198217

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Engine oil pressure sensor	Engine pressure	Engine protection control • Oil pressure warning lamp signal • FUel cut control	Combination meter • Oil pressure warning lamp
Crankshaft position sensor (POS)	Engine speed		
Engine oil temperature sensor	Engine oil temperature		

SYSTEM DESCRIPTION

- The engine protection control at low engine oil pressure warns the driver of a decrease in engine oil pressure by the oil pressure warning lamp a before the engine becomes damaged.
- When detecting a decrease in engine oil pressure at an engine speed less than 1,000 rpm, ECM transmits an oil pressure warning lamp signal to the combination meter.The combination meter turns ON the oil pressure warning lamp, according to the signal.

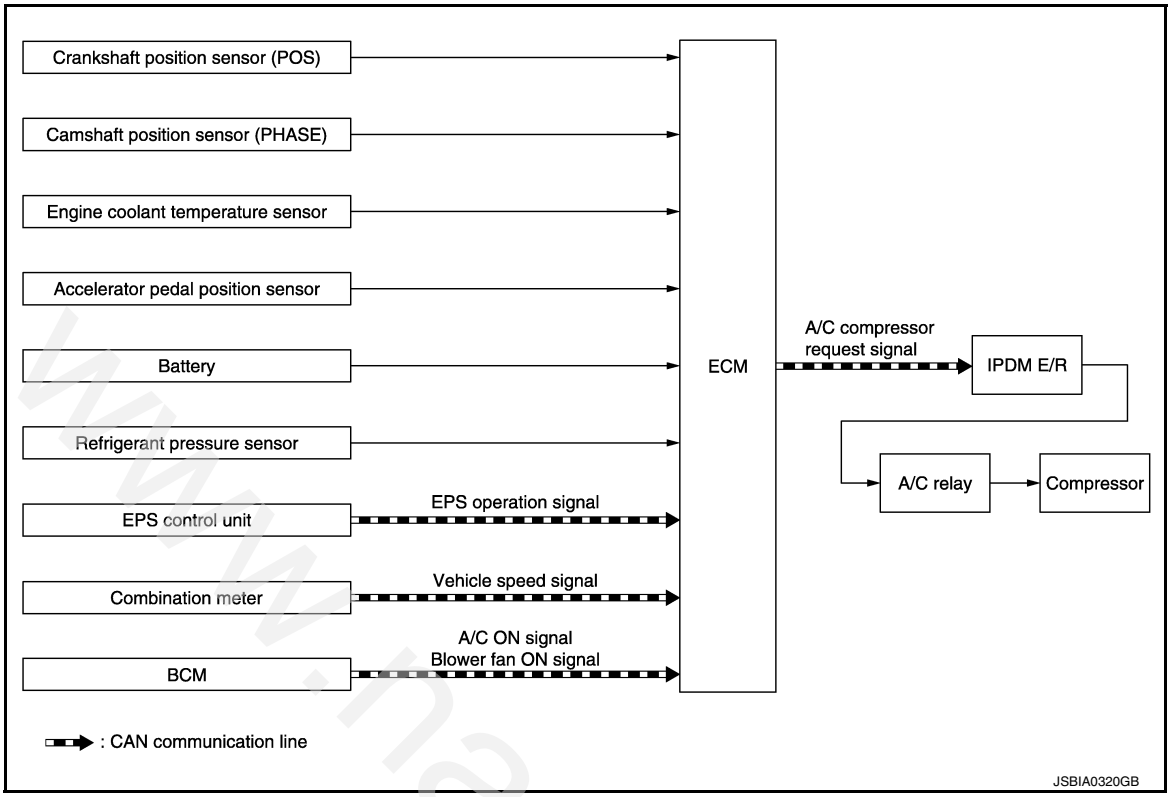
Decrease in engine oil pressure	Engine speed	Combination meter
		Oil pressure warning lamp
Detection	Less than 1,000 rpm	ON*
	1,000 rpm or more	ON

*: When detecting a normal engine oil pressure, ECM turns OFF the oil pressure warning lamp.

AIR CONDITIONING CUT CONTROL

AIR CONDITIONING CUT CONTROL : System Diagram

INFOID:0000000012198218



AIR CONDITIONING CUT CONTROL : System Description

INFOID:0000000012198219

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM		ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*		Air conditioner cut control	IPDM E/R ↓ Air conditioner relay ↓ Compressor
Camshaft position sensor (PHASE)				
Engine coolant temperature sensor	Engine coolant temperature			
Accelerator pedal position sensor	Accelerator pedal position			
Battery	Battery voltage*			
Refrigerant pressure sensor	Refrigerant pressure			
EPS control unit	CAN communication	EPS operation signal		
Combination meter	CAN communication	Vehicle speed signal		
BCM	CAN communication	• A/C ON signal • Blower fan ON signal		

*: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

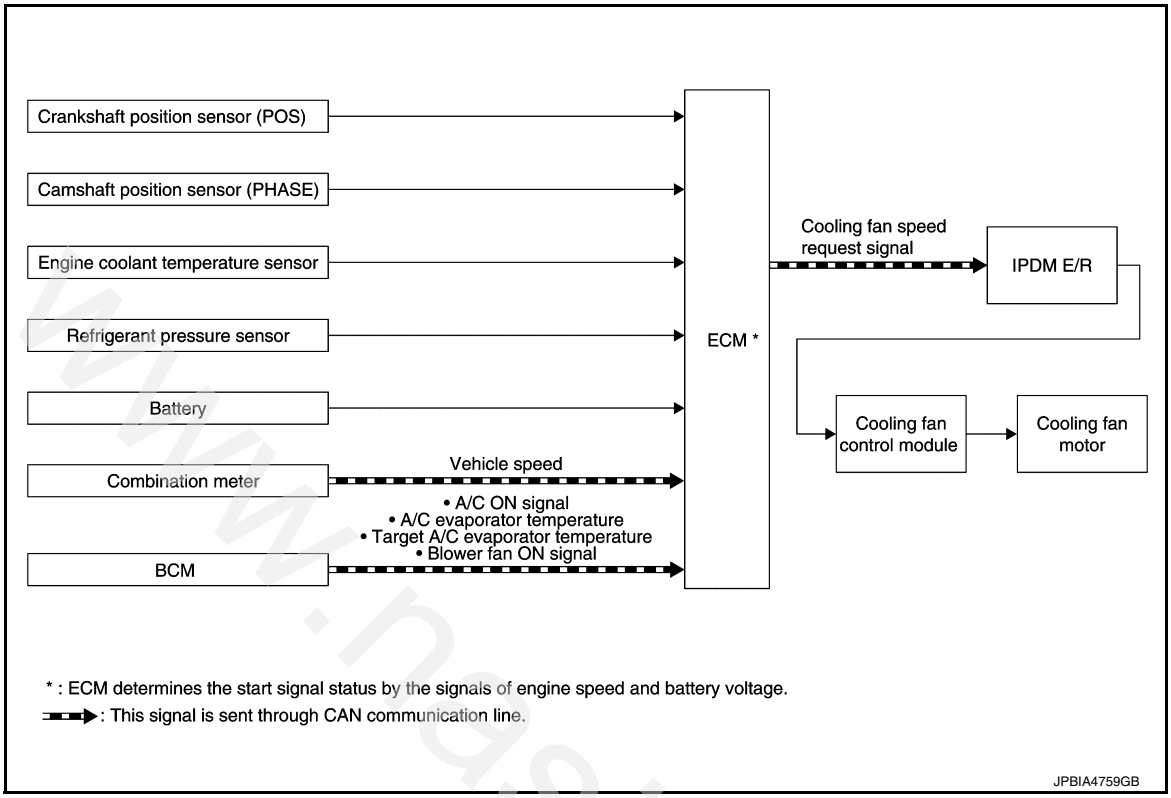
This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

COOLING FAN CONTROL

COOLING FAN CONTROL : System Diagram

INFOID:0000000012198220



COOLING FAN CONTROL : System Description

INFOID:0000000012198221

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM		ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*		Cooling fan control	IPDM E/R ↓ Cooling fan control module ↓ Cooling fan motor
Camshaft position sensor (PHASE)				
Engine coolant temperature sensor	Engine coolant temperature			
Refrigerant pressure sensor	Refrigerant pressure			
Battery	Battery voltage*			
Combination meter	CAN communication	Vehicle speed signal		
BCM	CAN communication	A/C ON signal		
		A/C evaporator temperature*		
		Target A/C evaporator temperature*		
		Blower fan ON signal*		

*: The ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

ECM controls cooling fan speed corresponding to vehicle speed, engine coolant temperature, A/C ON signal and refrigerant pressure.

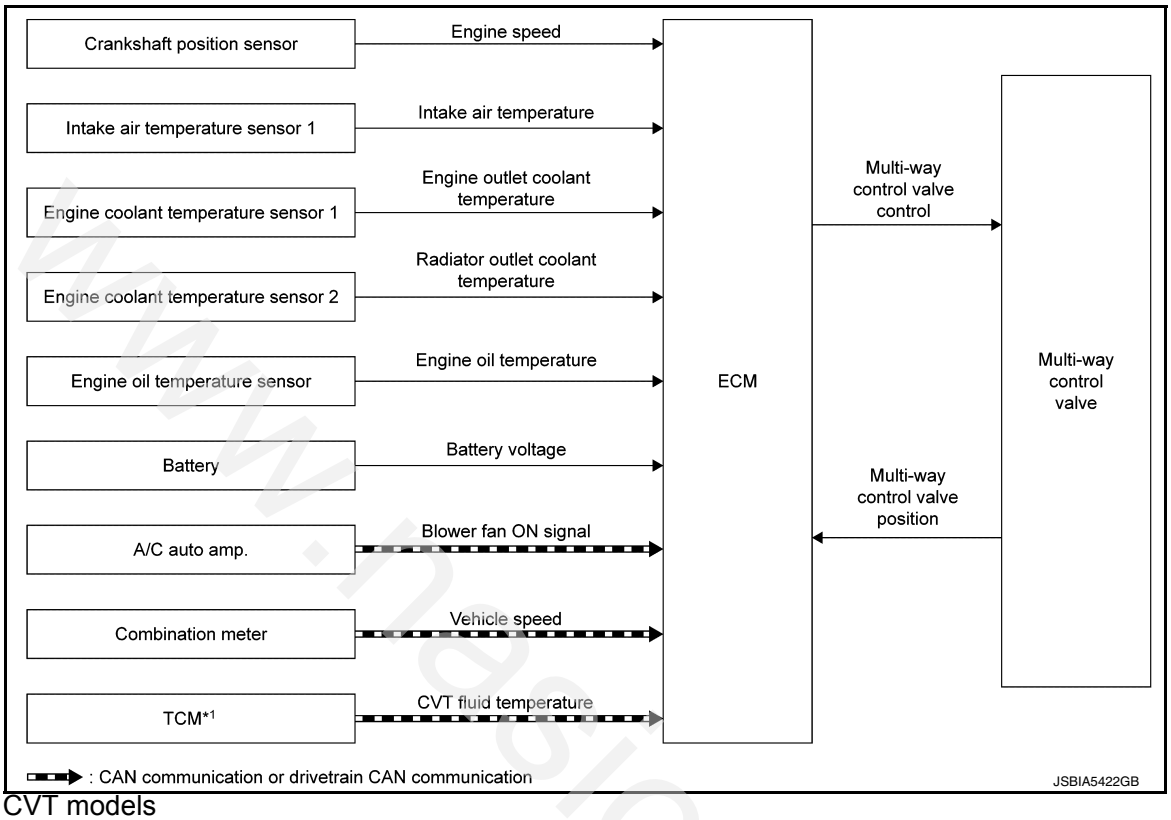
Cooling fan control signal is sent to IPDM E/R from ECM by CAN communication line. Then, IPDM E/R sends ON/OFF pulse duty signal to cooling fan control module. Corresponding to this ON/OFF pulse duty signal, cooling fan control module gives cooling fan motor operating voltage to cooling fan motors. Cooling fan speed is controlled by duty cycle of cooling fan motor operating voltage sent from cooling fan control module.

THERMAL MANAGEMENT CONTROL

THERMAL MANAGEMENT CONTROL : System Description

INFOID:0000000012198222

SYSTEM DIAGRAM



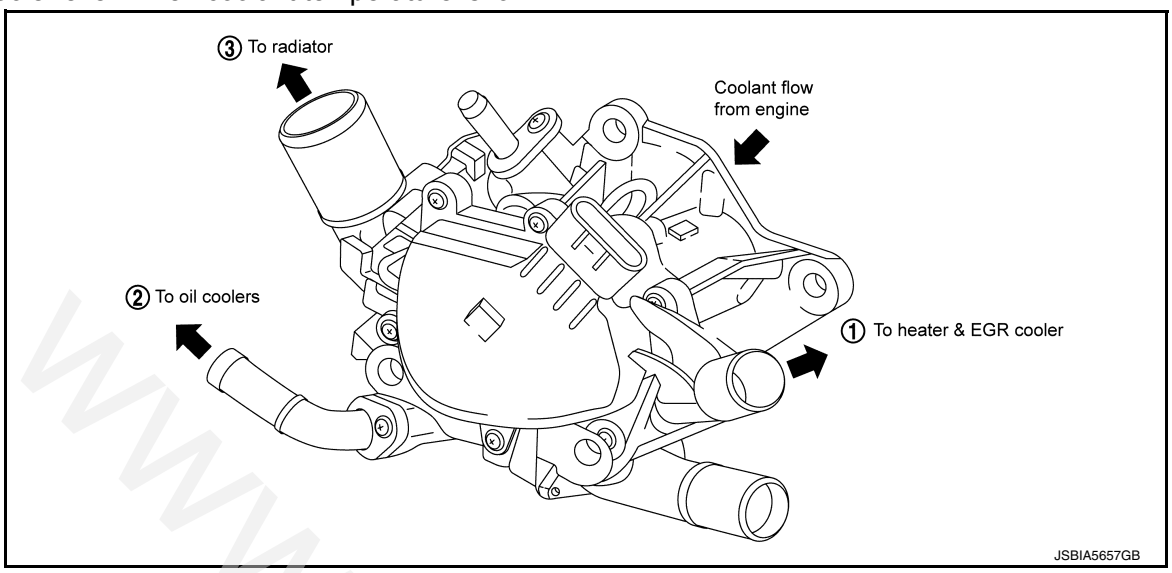
*1: For CVT models

SYSTEM DESCRIPTION

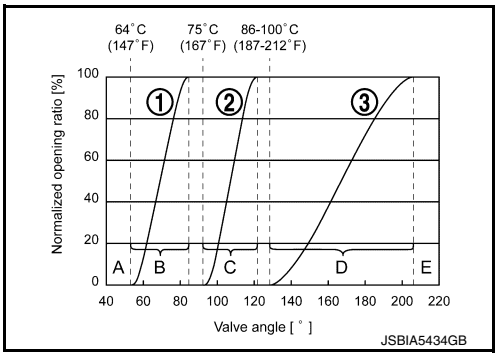
The multi-way control valve changes the paths to heater & EGR cooler, oil cooler, and radiator according to engine coolant temperature and driving conditions.
When coolant temperature is low, the paths to heater & EGR cooler, oil cooler, and radiator are closed and coolant is circulated only inside the engine to accelerate engine warm-up.
When coolant temperature is high, the paths to heater & EGR cooler, oil cooler, and radiator are opened and coolant is refrigerated. This raises the coolant temperature and oil temperature rapidly and improves the fuel economy by reducing friction among parts.

Operation
When the ignition switch is OFF, the valve is fully closed to accelerate bleeding the coolant channels.

When receiving a blower fan ON signal and/or an A/C ON signal, ECM opens the flow path to the heater & EGR cooler even when coolant temperature is low.



Valve position	①	②	③
	Heater & EGR cooler	Oil cooler	Radiator
A	Full close	Full close	Full close
B	Open	Full close	Full close
C	Full open	Open	Full close
D	Full open	Full open	Open
E	Full open	Full open	Full open



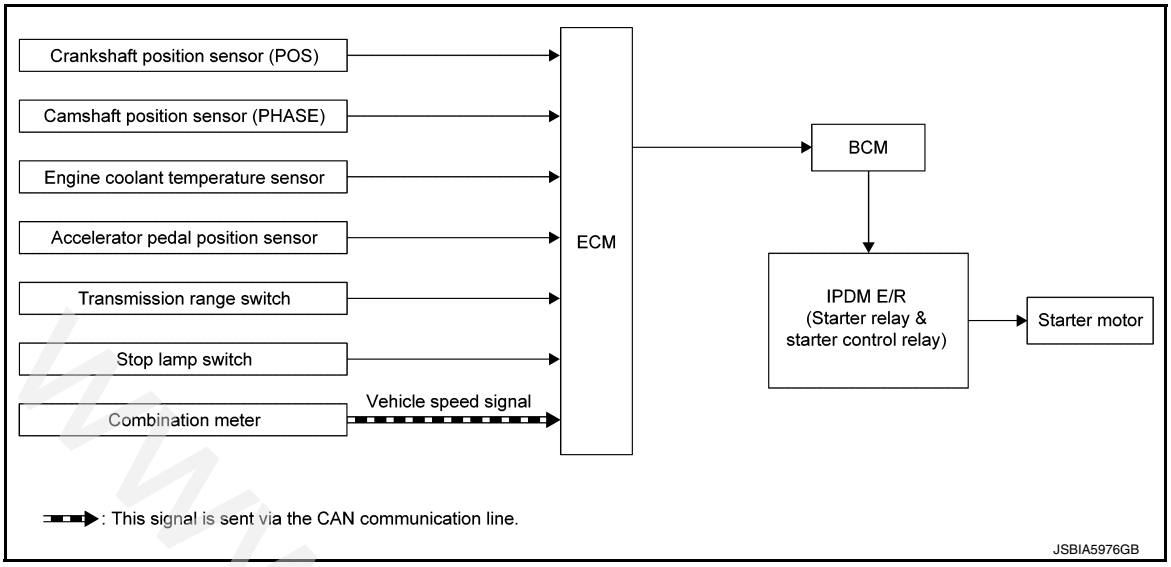
A: Closes all flow paths ①, ②, and ③ and circulates coolant only inside the engine.
B: Opens the flow path to Heater & EGR cooler and circulates coolant to Heater & EGR cooler.
C: Opens the flow path to oil cooler and circulates coolant to Heater & EGR cooler and oil cooler.
D: Opens the flow path to radiator and circulates coolant to Heater & EGR cooler, oil cooler, and radiator.
E: Opens all the flow paths ①, ②, and ③.

The high coolant temperature control is performed by opening/closing the flow path to the radiator to raise the engine oil temperature even when the coolant temperature is high. When engine load is high, the high coolant temperature control is not performed because of the knocking control.
When detecting a malfunction in multi-way control valve, ECM fully opens the valve to secure cooling paths.

STARTER MOTOR DRIVE CONTROL

STARTER MOTOR DRIVE CONTROL : System Diagram

INFOID:0000000012198223



STARTER MOTOR DRIVE CONTROL : System Description

INFOID:0000000012198224

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM		ECM function	Actuator
Crankshaft position sensor (POS)	• Engine speed • Piston position		Starter motor drive control	• BCM • IPDM E/R (Starter relay & starter control relay)
Camshaft position sensor (PHASE)				
Engine coolant temperature sensor	Engine coolant temperature			
Accelerator pedal position sensor	Accelerator pedal position			
Transmission range switch	Gear position			
Stop lamp switch	Brake pedal position			
Combination meter	CAN communication	Vehicle speed signal		

SYSTEM DESCRIPTION

When rapid deceleration occurs during engine runs or idle speed decreases due to heavy load conditions, ECM detects a decrease in idle speed and restarts the engine to secure reliability in handleability by transmitting a cranking request signal to IPDM E/R for activating the starter motor under the following conditions:

- Selector lever: P or any position other than N
- Idle switch: ON (Accelerator pedal not depressed)
- Brake switch: ON (Brake pedal depressed)

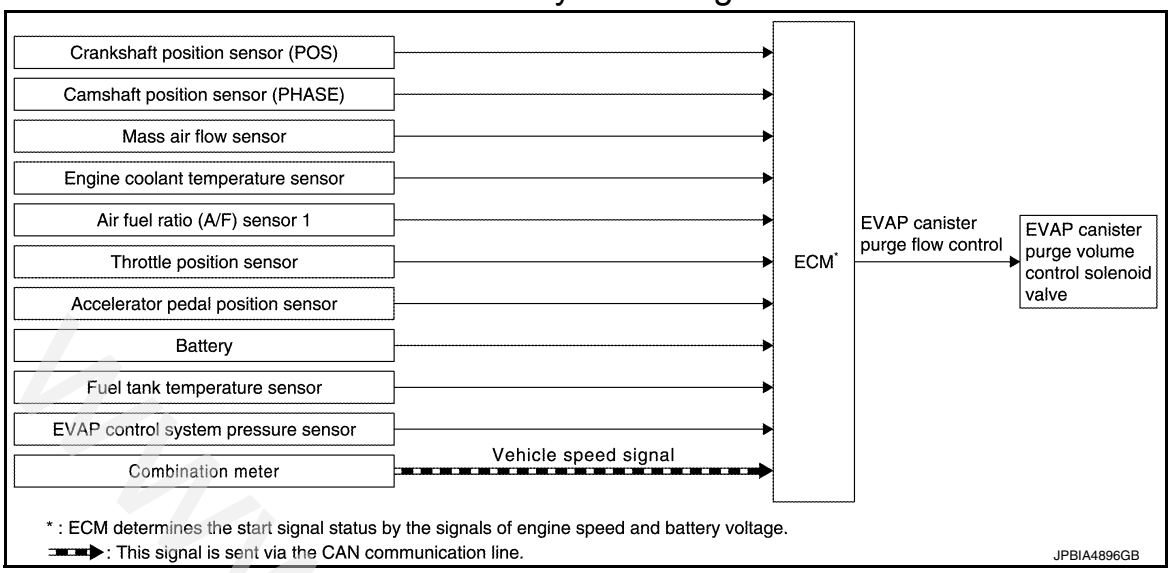
On the other hand, models with the Intelligent Key System transmit a control signal to IPDM E/R by way of BCM via CAN communication.

IPDM E/R detects an operating state of the starter motor relay and the starter motor control relay and transmits a feed back signal to ECM via CAN Communication.

EVAPORATIVE EMISSION SYSTEM

EVAPORATIVE EMISSION SYSTEM : System Diagram

INFOID:0000000012198225



EVAPORATIVE EMISSION SYSTEM : System Description

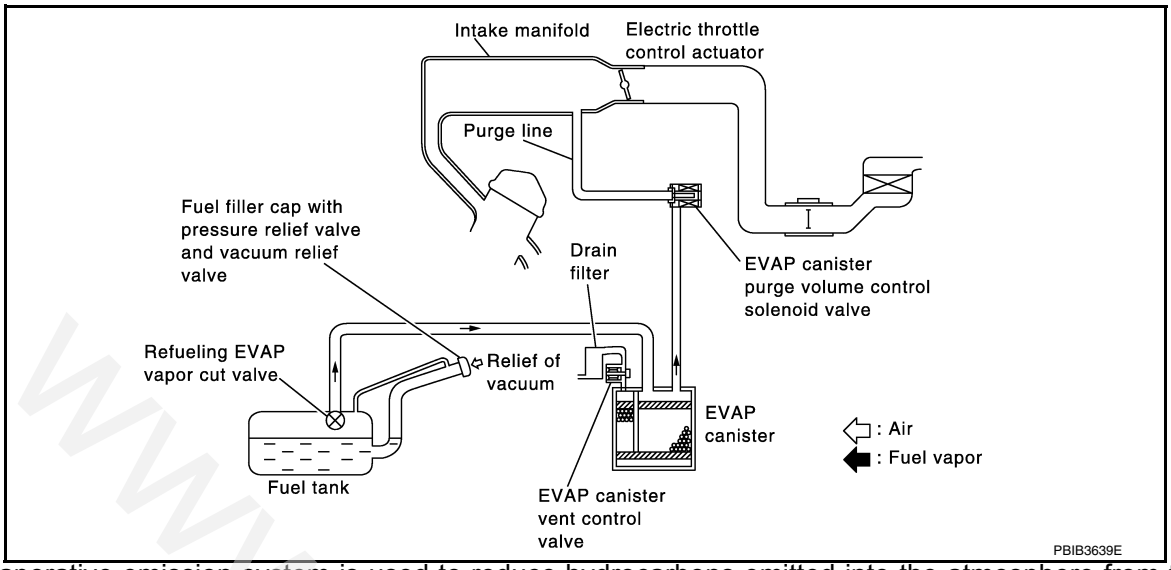
INFOID:0000000012198226

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM		ECM function	Actuator
Crankshaft position sensor (POS)	• Engine speed* • Piston position		EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Camshaft position sensor (PHASE)				
Mass air flow sensor	Amount of intake air			
Engine coolant temperature sensor	Engine coolant temperature			
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)			
Throttle position sensor	Throttle position			
Accelerator pedal position sensor	Accelerator pedal position			
Battery	Battery voltage*			
Fuel tank temperature sensor	Fuel temperature in fuel tank			
EVAP control system pressure sensor	Pressure in purge line			
Combination meter	CAN communication	Vehicle speed		

*: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION



The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating.

ALTERNATOR POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM

ALTERNATOR POWER GENERATION VOLTAGE VARIABLE CONTROL SYSTEM : System Description

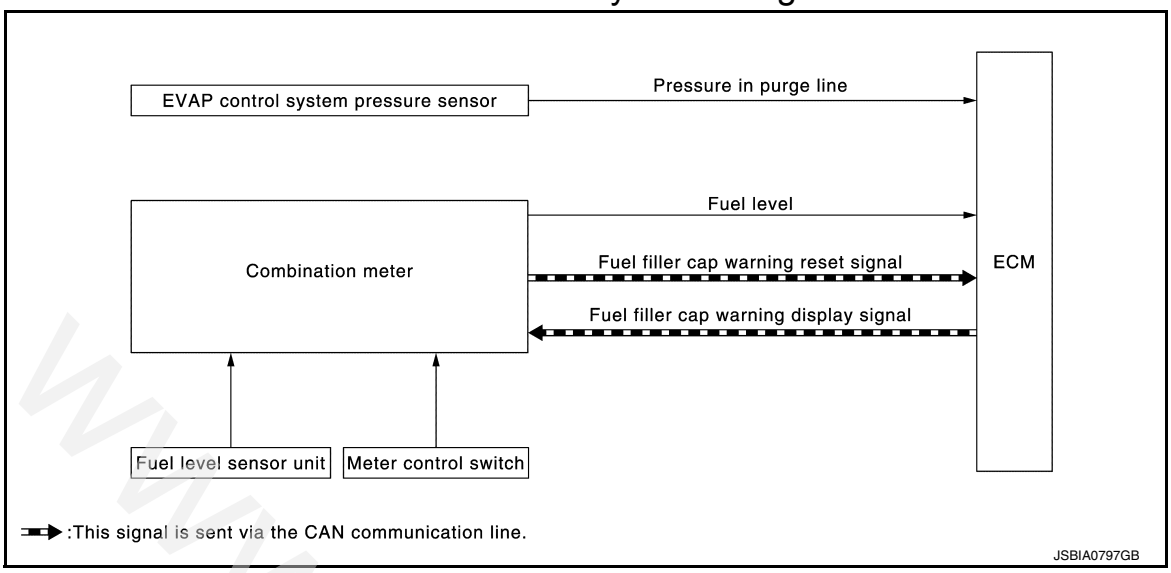
INFOID:0000000012198227

The alternator power generation voltage variable control system controls the amount of power generation, according to a battery loaded condition. ECM judges a battery condition, according to a signal received from the battery current sensor which detects a charge/discharge current. ECM then transmits a signal to IPDM E/R to command power generation via CAN communication. IPDM E/R transmits a power generation control signal to the alternator so that the system can control the amount of power generation. The voltage of power generation is lowered during battery low-load conditions and boosted under heavy load conditions. In this way, the system reduces the engine load through the adequate power generation control.

FUEL FILLER CAP WARNING SYSTEM

FUEL FILLER CAP WARNING SYSTEM : System Diagram

INFOID:0000000012198228



FUEL FILLER CAP WARNING SYSTEM : System Description

INFOID:0000000012198229

INPUT/OUTPUT SIGNAL CHART

Input

Unit/Sensor	Input signal to ECM	ECM function
EVAP control system pressure sensor	Pressure in purge line	Fuel filler cap warning control
Combination meter	Fuel level	
	Fuel filler cap warning reset signal*	

*: This signal is sent to the ECM via the CAN communication line.

Output

Unit	Output signal	Actuator
ECM	Fuel filler cap warning display signal*	Combination meter

*: This signal is sent to the combination meter via the CAN communication line.

SYSTEM DESCRIPTION

The fuel filler cap warning system alerts the driver to the prevention of the fuel filler being left uncapped and malfunction occurrences after refueling, by turning ON the fuel filler cap warning display on the combination meter.
ECM judges a refueled state, based on a fuel level signal transmitted from the combination meter.
When a very small leak is detected through the EVAP leak diagnosis performed after judging the refueled state, ECM transmits a fuel filler cap warning display signal (request for display ON) to the combination meter via CAN communication.
When receiving the signal, the combination meter turns ON the fuel filler cap warning display.

CAUTION:

Check fuel filler cap installation condition when the fuel filler cap warning display turns ON.

Reset Operation

The fuel filler cap warning lamp tunes OFF, according to any condition listed below:

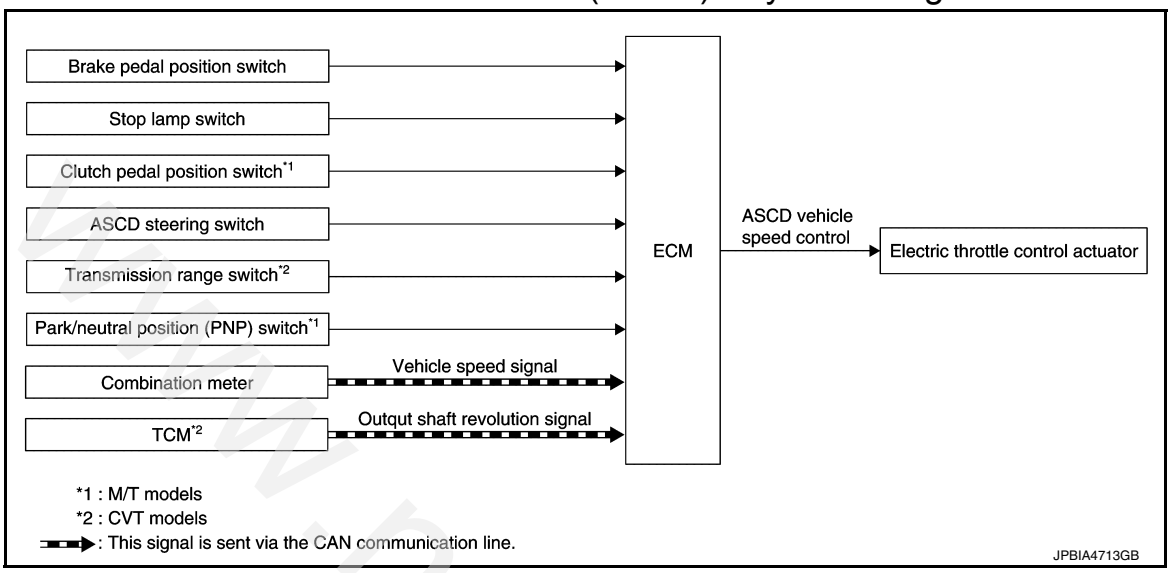
- Reset operation is performed by operating the meter control switch on the combination meter. Refer to MWI-20, "Switch Name and Function".
- When the reset operation is performed, the combination meter transmits a fuel filler cap warning reset signal to ECM via CAN communication. ECM transmits a fuel filler cap warning display signal (request for display OFF) to the combination meter via CAN communication. When receiving the signal, the combination meter turns OFF the fuel filler cap warning display.
- EVAP leak diagnosis result is normal.
- Fuel refilled.
- DTC erased by using CONSULT.

NOTE:
MIL turns ON if a malfunction is detected in leak diagnosis results again at the trip after the fuel filler cap warning display turns ON/OFF.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Diagram

INFOID:0000000012198230



AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description

INFOID:0000000012198231

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM		ECM function	Actuator
Brake pedal position switch	Brake pedal operation		ASCD vehicle speed control	Electric throttle control actuator
Stop lamp switch				
Clutch pedal position switch*1	Clutch pedal operation			
ASCD steering switch	ASCD steering switch operation			
Transmission range switch*2	Gear position			
Park/neutral position (PNP) switch*1				
Combination meter	CAN communication	Vehicle speed signal		
TCM*2	CAN communication	Output shaft revolution signal		

*1: M/T models

*2: CVT models

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.

Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 144km/h (90 MPH).

ECM controls throttle angle of electric throttle control actuator to regulate engine speed.

Operation status of ASCD is indicated by CRUISE indicator and SET indicator in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.

Refer to EC-656, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function" for ASCD operating instructions.

NOTE:

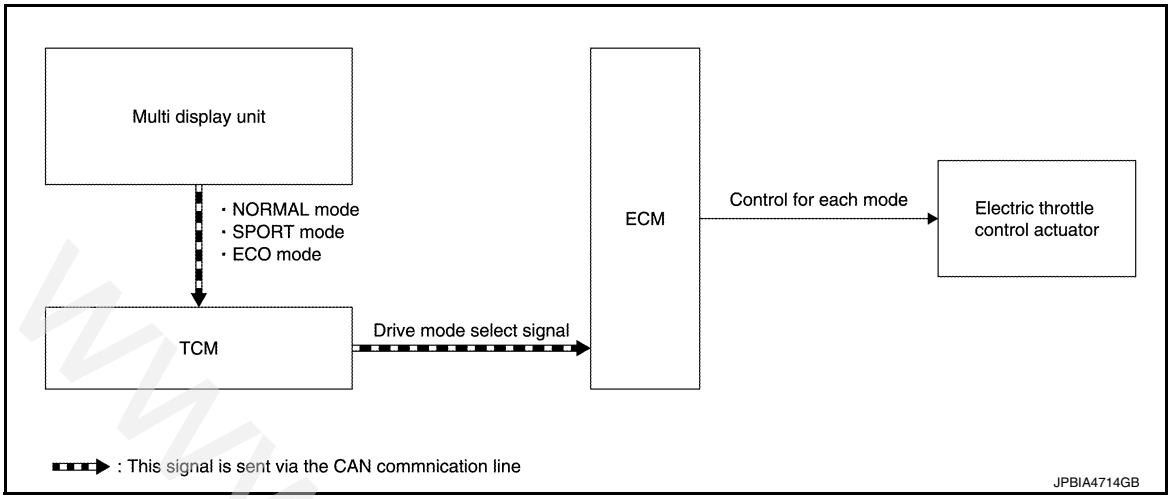
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

INTEGRATED CONTROL SYSTEM

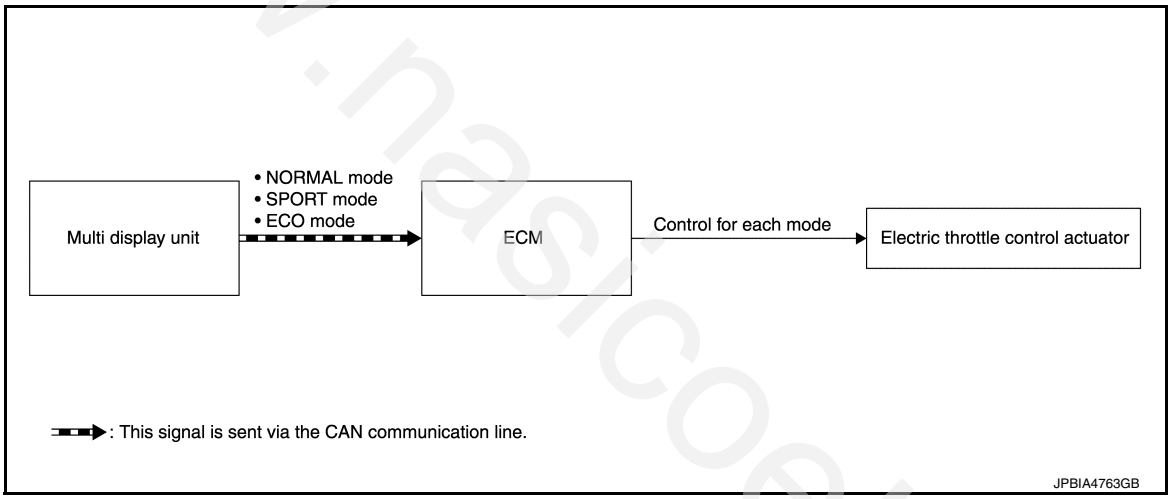
INTEGRATED CONTROL SYSTEM : System Diagram

INFOID:0000000012198232

CVT models



M/T models



INTEGRATED CONTROL SYSTEM : System Description

INFOID:0000000012198233

CVT models

System Description

TCM transmits a drive mode select signal to ECM via CAN communication, according to a NORMAL mode signal, SPORT mode signal, or ECO mode signal received from the multi display unit via CAN communication. ECM controls torque and throttle opening angle characteristics appropriate for each mode, based on a received drive mode select signal.

NOTE:

- Because of the multi display unit operation, the display may indicate that the mode is switching. However, the mode may not actually switch due to CAN communication error.
- When a CAN communication error occurs between ECM and TCM, the mode switches to NORMAL mode.

M/T models

System Description

ECM controls torque and throttle opening angle characteristics appropriate for each mode, based on a NORMAL mode signal, SPORT mode signal, or ECO mode signal received from the multi display unit via CAN communication.

NOTE:

- Because of the multi display unit operation, the display may indicate that the mode is switching. However, the mode may not actually switch due to CAN communication error.

- When a CAN communication error occurs between ECM and the multi display unit, the mode switches to NORMAL mode.

Control By Mode

Mode	Control
NORMAL mode	Offers a better balance of fuel economy and traveling performance.
SPORT mode	Allows throttle opening angle change and torque control for obtaining reality and acceleration performance appropriate to a winding run.
ECO mode	Allows throttle opening angle change and torque control for assisting better fuel efficiency.

CAN COMMUNICATION

CAN COMMUNICATION : System Description

INFOID:0000000012198234

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.
Refer to LAN-30, "CAN COMMUNICATION SYSTEM : CAN Communication Signal Chart", about CAN communication for detail.

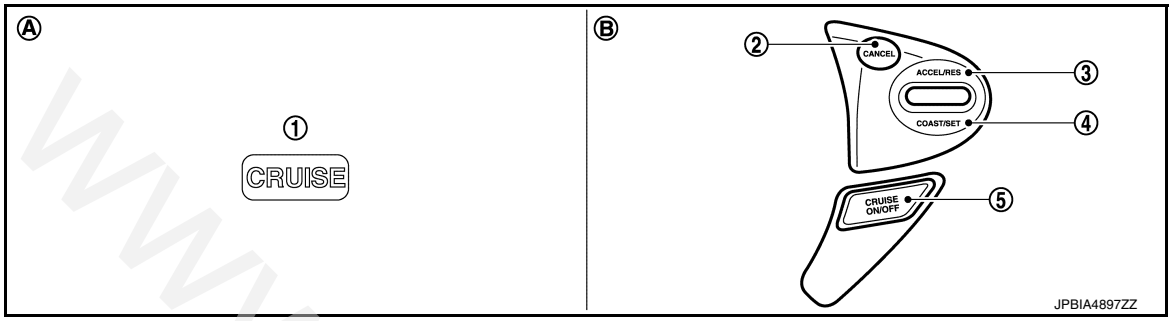
OPERATION

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

AUTOMATIC SPEED CONTROL DEVICE (ASCD) : Switch Name and Function

INFOID:0000000012198235

SWITCHES AND INDICATORS



1. CRUISE indicator
2. CANCEL switch
3. ACCEL/RES switch
4. COAST/SET switch
5. ASCD MAIN switch
A. On the combination meter
B. On the steering wheel

SET SPEED RANGE

ASCD system can be set the following vehicle speed.

Minimum speed (Approx.)	Maximum speed (Approx.)
40 km/h (25 MPH)	144 km/h (90 MPH)

SWITCH OPERATION

Item	Function
CANCEL switch	Cancels the cruise control driving.
ACCEL/RES switch	• Resumes the set speed. • Increases speed incrementally during cruise control driving.
COAST/SET switch	• Sets desired cruise speed. • Decreases speed incrementally during cruise control driving.
ASCD MAIN switch	Master switch to activate the ASCD system.

SET OPERATION

Press MAIN switch. (The CRUISE indicator in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 144 km/h (90 MPH), press COAST/SET switch.

ACCELERATE OPERATION

If the ACCEL/RES switch is pressed during the cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.
And then ASCD will keep the new set speed.

CANCEL OPERATION

• When any of following conditions exist, the cruise operation is canceled.
- CANCEL switch is pressed
- ASCD MAIN switch is pressed (Set speed is cleared)
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed is cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to neutral position. (M/T models)
- Selector lever is changed to N, P or R position (CVT models)
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- TCS system is operated

- When the ECM detects any of the following conditions, the ECM cancels the cruise operation and informs the driver by blinking CRUISE indicator lamp.
- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE indicator lamp is blinked slowly.

NOTE:
Engine coolant temperature decreases to the normal operating temperature, CRUISE indicator lamp stop blinking and the cruise operation is able to work.

- Malfunction for some self-diagnoses regarding ASCD control: CRUISE indicator will blink quickly.
- When ASCD MAIN switch is turned to OFF during the cruise control driving, all of ASCD operations is canceled and vehicle speed memory is erased.

COAST OPERATION

When the COAST/SET switch is pressed during the cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

RESUME OPERATION

- When the ACCEL/RES switch is pressed after the cancel operation other than pressing ASCD MAIN switch is performed, vehicle speed is return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.
- Brake pedal is released
- Clutch pedal is released (M/T models)
- Selector lever is in other than P and N positions (CVT models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (90 MPH)

ON BOARD DIAGNOSTIC (OBD) SYSTEM

Diagnosis Description

INFOID:0000000012198236

This system is an on board diagnostic system that records exhaust emission-related diagnostic information and detects a sensors/actuator-related malfunction. A malfunction is indicated by the malfunction indicator lamp (MIL) and stored in control module memory as a DTC.

DIAGNOSIS SYSTEM (ECM)
DIAGNOSIS DESCRIPTION
DIAGNOSIS DESCRIPTION : 1st Trip Detection Logic and Two Trip Detection Logic

INFOID:0000000012198237

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not illuminate at this stage. <1st trip>
If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL illuminates. The MIL illuminates at the same time when the DTC is stored. <2nd trip> The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to illuminate or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Illuminated	Blinking	Illuminated				
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0308 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 – P0308 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to EC-706, "DTC Index".)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

DIAGNOSIS DESCRIPTION : DTC and Freeze Frame Data

INFOID:0000000012198238

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not recur, the 1st trip DTC will not be displayed.
If a malfunction is detected during the 1st trip, the 1st trip DTC is saved in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are saved in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.
For malfunctions in which 1st trip DTCs are displayed, refer to EC-706, "DTC Index". These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT.
1st trip DTC is specified in Service $07 of SAE J1979/ISO 15031-5. 1st trip DTC detection occurs without illuminating the MIL and therefore does not warn the driver of a malfunction.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step 2, refer to EC-743, "Work Flow". Then perform DTC Confirmation Procedure or Component Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, absolute throttle position, base fuel schedule and intake air temperature at the moment a malfunction is detected.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT or GST. The 1st trip freeze frame data can only be displayed on the CONSULT screen.

Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 – P0308 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175
2		Except the above items
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was saved in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased.

DIAGNOSIS DESCRIPTION : Counter System

INFOID:0000000012198239

RELATIONSHIP BETWEEN MIL, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on.
- The MIL will turn OFF after the vehicle is driven 3 times (driving pattern B) with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

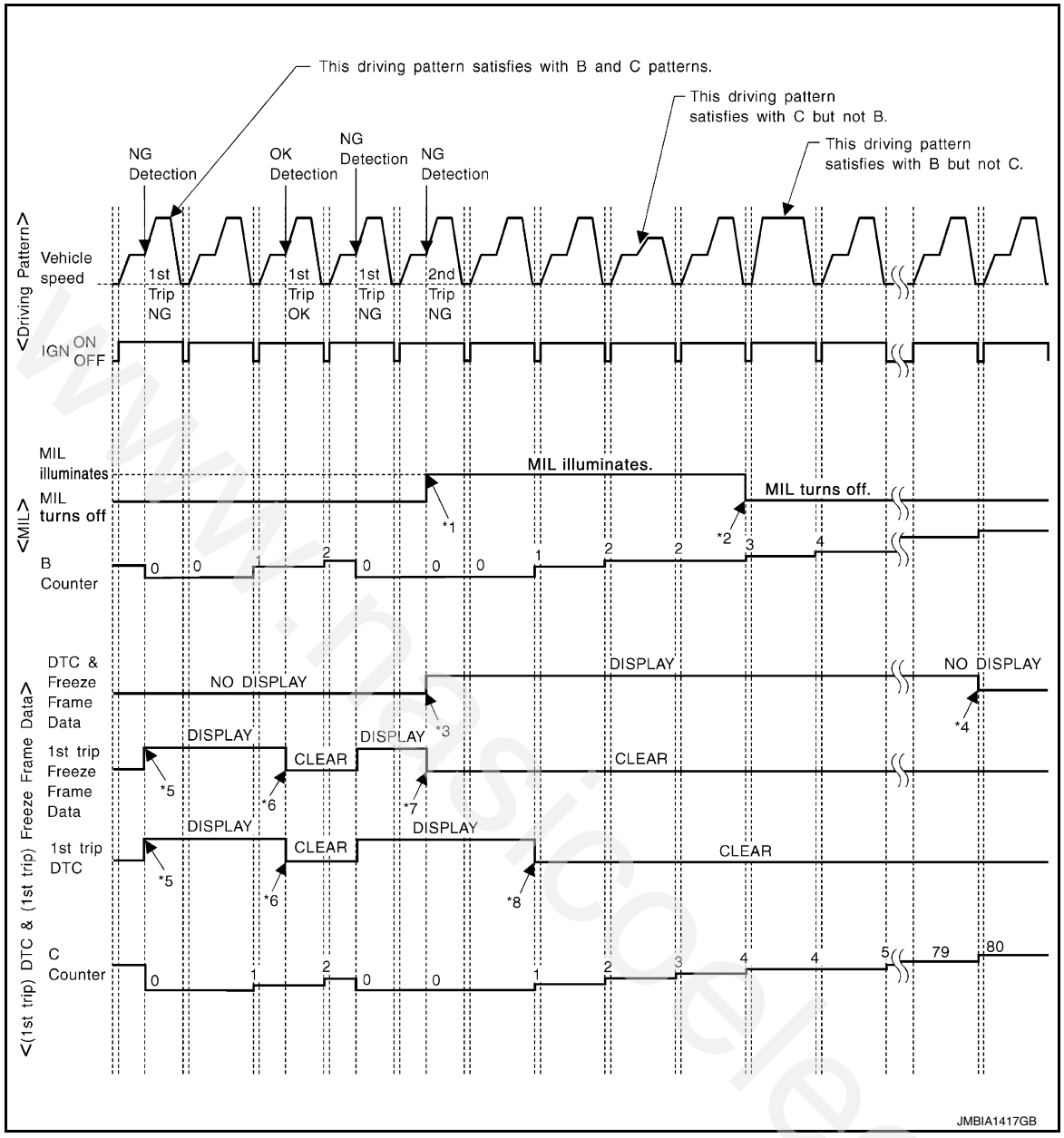
COUNTER SYSTEM CHART

Items	Fuel Injection System	Misfire	Other
MIL (turns OFF)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns B and C under “Fuel Injection System” and “Misfire”, see “EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”.
For details about patterns A and B under Other, see “EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”.

- *1: Clear timing is at the moment OK is detected.
- *2: Clear timing is when the same malfunction is detected in the 2nd trip.

Relationship Between MIL, DTC, 1st Trip DTC and Driving Patterns for “Misfire <Exhaust Quality Deterioration>”, “Fuel Injection System”



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will turn OFF after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

*8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

Explanation for Driving Patterns for “Misfire <Exhaust Quality Deterioration>”, “Fuel Injection System”

Driving Pattern B

Refer to EC-663, "DIAGNOSIS DESCRIPTION : Driving Pattern".

Driving Pattern C

Refer to EC-663, "DIAGNOSIS DESCRIPTION : Driving Pattern".

Example:

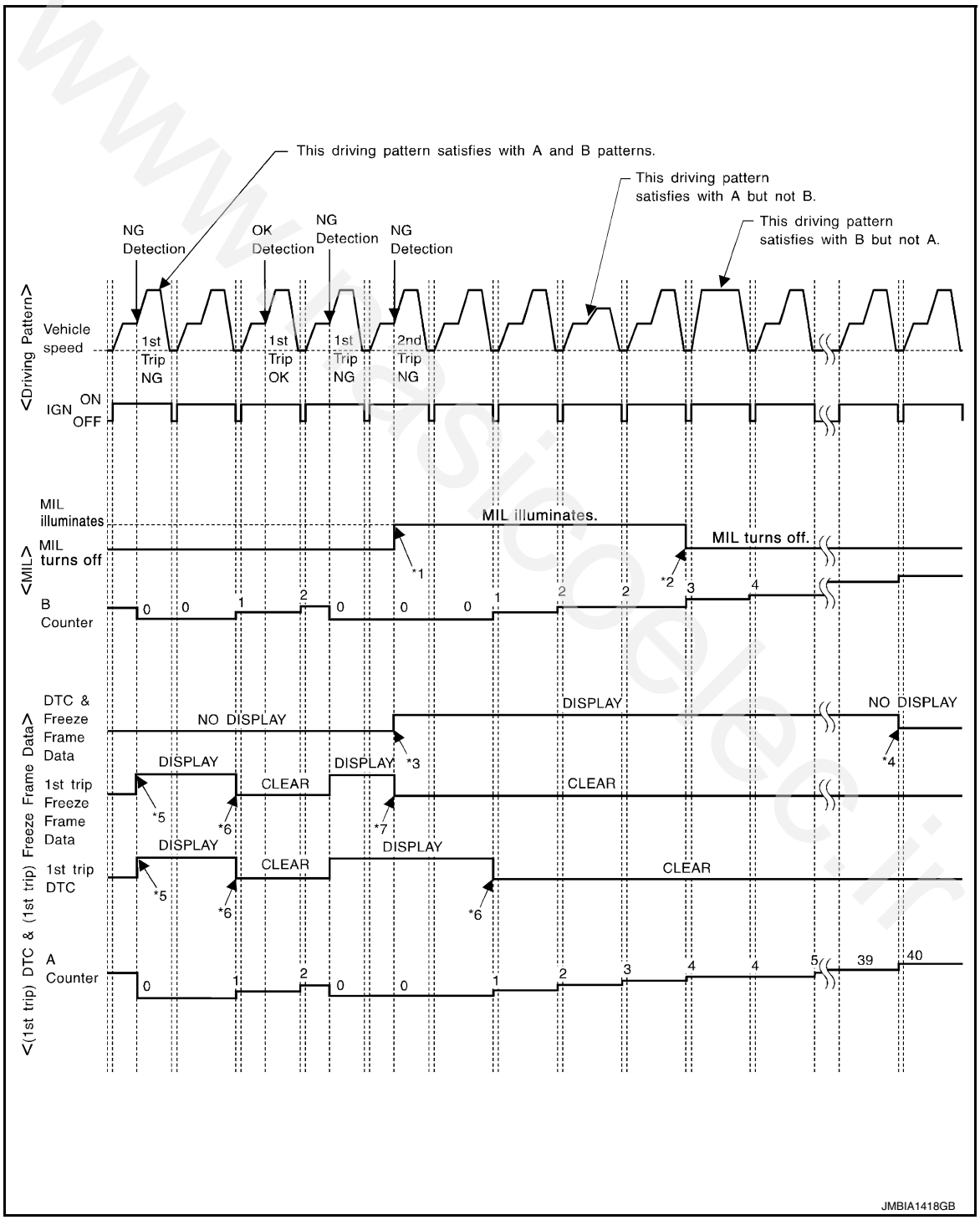
If the stored freeze frame data is as per the following:

Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)

To be satisfied with driving pattern C, the vehicle should run under the following conditions:

Engine speed: 475 – 1,225 rpm, Calculated load value: 27 – 33%, Engine coolant temperature: more than 70°C (158°F)

Relationship Between MIL, DTC, 1st Trip DTC and Driving Patterns Except For “Misfire <Exhaust Quality Deterioration>”, “Fuel Injection System”



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will turn OFF after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

Explanation for Driving Patterns Except for “Misfire <Exhaust Quality Deterioration>”, “Fuel Injection System”

Driving Pattern A
Refer to EC-663, "DIAGNOSIS DESCRIPTION : Driving Pattern".

Driving Pattern B
Refer to EC-663, "DIAGNOSIS DESCRIPTION : Driving Pattern".

DIAGNOSIS DESCRIPTION : Driving Pattern

INFOID:0000000012198240

DRIVING PATTERN A

Driving pattern A means a trip satisfying the following conditions.
- Engine speed reaches 400 rpm or more.
- Engine coolant temperature rises by 20°C (36°F) or more after starting the engine.
- Engine coolant temperature reaches 70°C (158°F) or more.
- The ignition switch is turned from ON to OFF.

NOTE:
- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern A.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern A.

DRIVING PATTERN B

Driving pattern B means a trip satisfying the following conditions.
- Engine speed reaches 400 rpm or more.
- Engine coolant temperature reaches 70°C (158°F) or more.
- Vehicle speed of 70 – 120 km/h (44 – 75 MPH) is maintained for 60 seconds or more under the control of closed loop.
- Vehicle speed of 30 – 60 km/h (19 – 37 MPH) is maintained for 10 seconds or more under the control of closed loop.
- Under the closed loop control condition, the following state reaches 12 seconds or more in total: Vehicle speed of 4 km/h (2 MPH) or less with idling condition.
- The state of driving at 10 km/h (7 MPH) or more reaches 10 minutes or more in total.
- A lapse of 22 minutes or more after engine start.

NOTE:
- Drive the vehicle at a constant velocity.
- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern B.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern B.

DRIVING PATTERN C

Driving pattern C means operating vehicle as per the following:
The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature condition:

- When the freeze frame data shows lower than 70°C (158°F), engine coolant temperature should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), engine coolant temperature should be higher than or equal to 70°C (158°F).

NOTE:
- When the same malfunction is detected regardless of the above vehicle conditions, reset the counter of driving pattern C.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern C.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

DRIVING PATTERN D

Driving pattern D means a trip satisfying the following conditions.
- The state of driving at 40 km/h (25 MPH) reaches 300 seconds or more in total.
- Idle speed lasts 30 seconds or more.
- A lapse of 600 seconds or more after engine start.

NOTE:
- When the same malfunction is detected regardless of driving conditions, reset the counter of driving pattern D.
- When the above conditions are satisfied without detecting the same malfunction, reset the counter of driving pattern D.

DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code

INFOID:0000000012198241

System Readiness Test (SRT) code is specified in Service $01 of SAE J1979/ISO 15031-5.
As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.
If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating “INCMP”, use the information in this Service Manual to set the SRT to “CMPLT”.
In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate “CMPLT” for each application system. Once set as “CMPLT”, the SRT status remains “CMPLT” until the self-diagnosis memory is erased.
Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate “INCMP” for these items.

NOTE:
The SRT will also indicate “INCMP” if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.
If, during the state emissions inspection, the SRT indicates “CMPLT” for all test items, the inspector will continue with the emissions test. However, if the SRT indicates “INCMP” for one or more of the SRT items the vehicle is returned to the customer untested.

NOTE:
If permanent DTC is stored or MIL illuminates during the state emissions inspection, the vehicle is also returned to the customeruntested even though the SRT indicates “CMPLT” for all test items. therefore, it is important to check SRT (“CMPLT”), DTC (No DTCs) and permanent DTC (No permanent DTC) before the inspection.

SRT SET TIMING

SRT is set as “CMPLT” after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

Self-diagnosis result		Example				
		Diagnosis	Ignition cycle ← ON → OFF ← ON → OFF ← ON → OFF ← ON →			
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)
		P0402	OK (1)	— (1)	— (1)	OK (2)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“CMPLT”	“CMPLT”	“CMPLT”	“CMPLT”
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)
		P0402	— (0)	— (0)	OK (1)	— (1)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“INCMP”	“INCMP”	“CMPLT”	“CMPLT”
NG exists	Case 3	P0400	OK	OK	—	—
		P0402	—	—	—	—
		P1402	NG	—	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MIL ON)
		SRT of EGR	“INCMP”	“INCMP”	“INCMP”	“CMPLT”

OK: Self-diagnosis is carried out and the result is OK.

NG: Self-diagnosis is carried out and the result is NG.

—: Self-diagnosis is not carried out.

When all SRT related self-diagnoses show OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate “CMPLT”. → Case 1 above

When all SRT related self-diagnoses show OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses have at least one OK result. → Case 2 above

If one or more SRT related self-diagnoses show NG results in 2 consecutive cycles, the SRT will also indicate “CMPLT”. → Case 3 above

The table above shows that the minimum number of cycles for setting SRT as “INCMP” is the number one (1) for each self-diagnosis (Case 1 & 2) or the number two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

- The SRT will indicate “CMPLT” at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires “CMPLT” of the SRT only with OK self-diagnosis results.
- During SRT driving pattern, the 1st trip DTC (NG) is detected prior to “CMPLT” of SRT and the self-diagnosis memory must be erased from the ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate “INCMP”.

NOTE:

SRT can be set as “CMPLT” together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates “CMPLT”.

DIAGNOSIS DESCRIPTION : Permanent Diagnostic Trouble Code (Permanent DTC)

INFOID:0000000012198242

Permanent DTC is defined in SAE J1979/ISO 15031-5 Service $0A.

ECM stores a DTC issuing a command of turning on MIL as a permanent DTC and keeps storing the DTC as a permanent DTC until ECM judges that there is no presence of malfunction.

Permanent DTCs cannot be erased by using the erase function of CONSULT or Generic Scan Tool (GST) and by disconnecting the battery to shut off power to ECM. This prevents a vehicle from passing the in-use inspection without repairing a malfunctioning part.

When not passing the in-use inspection due to more than one permanent DTC, permanent DTCs should be erased, referring to this manual.

NOTE:

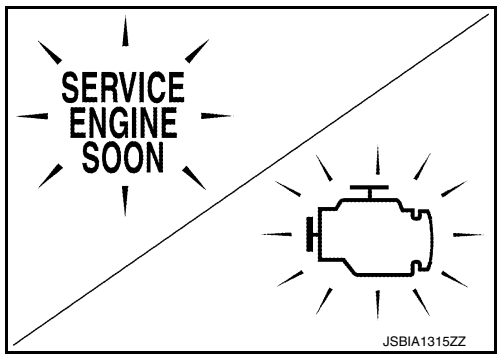
- The important items in in-use inspection are that MIL is not ON, SRT test items are set, and permanent DTCs are not included.
- Permanent DTCs do not apply for regions that permanent DTCs are not regulated by law.

PERMANENT DTC SET TIMING

The setting timing of permanent DTC is stored in ECM with the lighting of MIL when a DTC is confirmed.

DIAGNOSIS DESCRIPTION : Malfunction Indicator Lamp (MIL)

INFOID:0000000012198243



- When detecting a DTC that affects exhaust gas, the exhaust emission-related control module transmits a malfunction indicator lamp signal to ECM via CAN communication line.
  ECM prioritizes (MIL: ON/blink) the signal received from the exhaust emission-related control module and the ECM-stored DTC that affects exhaust gas and transmits a malfunction indicator lamp signal to the combination meter via CAN communication line.
  The combination meter turns ON or blinks the MIL, according to the signal transmitted from ECM, and alerts the driver of malfunction detection.
- Control modules that a DTC of MIL ON/Blink is stored (Control module varies among DTCs.):

- ECM
- TCM

1. The MIL illuminates when ignition switch is turned ON (engine is not running).
   NOTE:
   Check the MIL circuit if MIL does not illuminate. Refer to EC-1237, "Component Function Check".
2. When the engine is started, the MIL should go off.
   NOTE:
   If MIL remains ON or continues blinking, a DTC(s) that affects exhaust gas is detected. In this case, Self-diagnosis is required for performing inspection and repair.

On Board Diagnosis Function

INFOID:0000000012198244

ON BOARD DIAGNOSIS ITEM

The on board diagnostic system has the following functions.

Diagnostic test mode	Function
Bulb check	MIL can be checked.
SRT status	ECM can read if SRT codes are set.
Malfunction warning	If ECM detects a malfunction, it illuminates or blinks MIL to inform the driver that a malfunction has been detected.
Self-diagnostic results	DTCs or 1st trip DTCs stored in ECM can be read.
Accelerator pedal released position learning	ECM can learn the accelerator pedal released position. Refer to EC-753, "Description".
Throttle valve closed position learning	ECM can learn the throttle valve closed position. Refer to EC-754, "Description".
Idle air volume learning	ECM can learn the idle air volume. Refer to EC-758, "Description".
Mixture ratio self-learning value clear	Mixture ratio self-learning value can be erased. Refer to EC-762, "Description".

BULB CHECK MODE

Description

This function allows damage inspection in the MIL bulb (blown, open circuit, etc.).

Operation Procedure

1. Turn ignition switch ON.
2. The MIL on the instrument panel should stay ON.
   If it remains OFF, check MIL circuit. Refer to EC-1237, "Diagnosis Procedure".

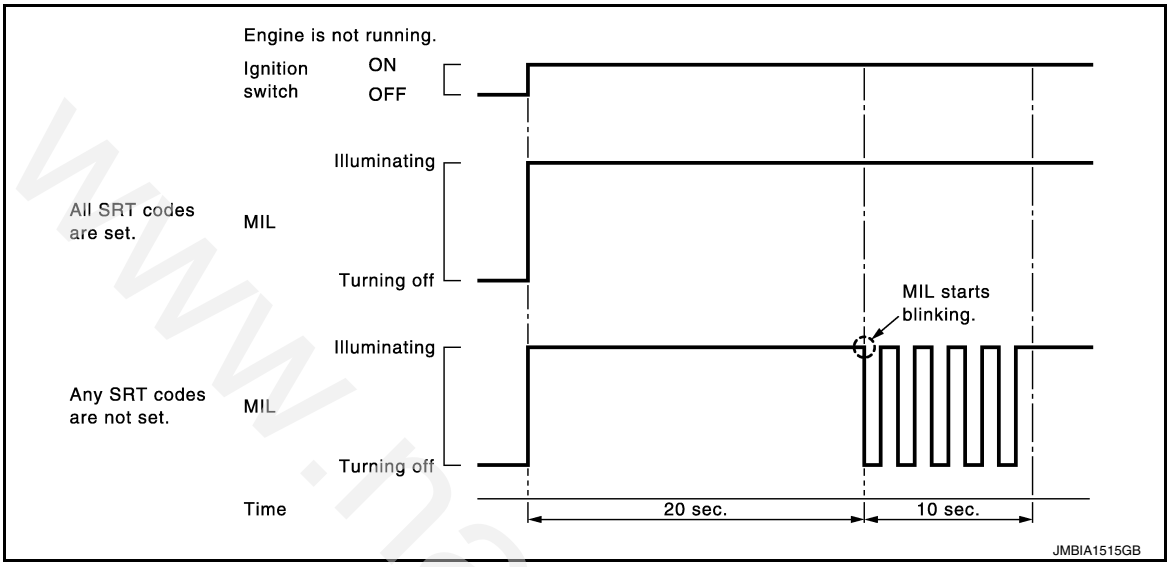
SRT STATUS MODE

Description

This function allows to read if ECM has completed the self-diagnoses of major emission control systems and components. For SRT, refer to EC-664, "DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code".

Operation Procedure

1. Turn ignition switch ON and wait 20 seconds.
2. SRT status is indicated as shown blow.
   - ECM continues to illuminate MIL if all SRT codes are set.
   - ECM blinks MIL for about 10 seconds if all SRT codes are not set.



MALFUNCTION WARNING MODE

Description

In this function ECM turns on or blinks MIL when it detects a malfunction in the emission control system components and/or the powertrain control components (which affect vehicle emissions) to inform the driver that a malfunction has been detected.

Operation Procedure

1. Turn ignition switch ON.
2. Check that MIL illuminates.
   If it remains OFF, check MIL circuit. Refer to EC-664, "DIAGNOSIS DESCRIPTION : System Readiness Test (SRT) Code".
3. Start engine and let it idle.
   - For two trip detection logic diagnoses, ECM turns on MIL when it detects the same malfunction twice in the two consecutive driving cycles.
   - For 1st trip detection logic diagnoses, ECM turns on MIL when it detects a malfunction in one driving cycle.
   - ECM blinks MIL when it detects a malfunction that may damage the three way catalyst (misfire).

CONSULT Function

INFOID:0000000012198245

FUNCTION

Diagnostic test mode	Function
Self Diagnostic Results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data Monitor	Input/Output data in the ECM can be read.
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT unit.
Active Test	Diagnostic Test Mode in which CONSULT drives some actuators apart from the ECMs and also shifts some parameters in a specified range.

Diagnostic test mode	Function
Ecu Identification	ECM part number can be read.
DTC Work Support	The status of system monitoring tests and the self-diagnosis status/results can be confirmed.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

SELF DIAGNOSTIC RESULT MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-706, "DTC Index".

How to Read DTC and 1st Trip DTC

DTCs and 1st trip DTCs related to the malfunction are displayed in “Self-diag results”.

- When ECM detects a 1st trip DTC, “1t” is displayed for “TIME”.
- When ECM has detected a current DTC, “0” is displayed for “TIME”.
- If “TIME” is neither “0” nor “1t”, the DTC occurred in the past and ECM shows the number of times the vehicle has been driven since the last detection of the DTC.

How to Erase DTC and 1st Trip DTC

NOTE:

If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	The engine control component part/control system has a trouble code the is displayed as PXXXX. (Refer to EC-706, "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.
L-FUEL TRM-B1 [%]	• “Long-term fuel trim” at the moment a malfunction is detected is displayed. • The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
L-FUEL TRM-B2 [%]	
S-FUEL TRM-B1 [%]	• “Short-term fuel trim” at the moment a malfunction is detected is displayed. • The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
S-FUEL TRM-B2 [%]	
ENGINE SPEED [rpm]	The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	The vehicle speed at the moment a malfunction is detected is displayed.
INT MANI PRES [kPa]	These items are displayed but are not applicable to this model.
ABSOL TH·P/S [%]	The throttle valve opening angle at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	The intake air temperature at the moment a malfunction is detected is displayed.

Freeze frame data item*	Description
FUEL SYS-B1	• "Fuel injection system status" at the moment a malfunction is detected is displayed. • One of the following mode is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop
FUEL SYS-B2	
COMBUST CONDITION	These items are displayed but are not applicable to this model.
FUEL RAIL PRESSURE [MPa]	• The fuel rail pressure at the moment a malfunction is detected is displayed.
TARGET FUEL RAIL PRESSURE [MPa]	• The target fuel rail pressure at the moment a malfunction is detected is displayed.
BATTERY VOLTAGE [V]	• The battery voltage at the moment a malfunction is detected is displayed.
FUEL LEVEL [%]	• The fuel level at the moment a malfunction is detected is displayed.

*: The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE

NOTE:

- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- For reference values of the following items, refer to EC-679, "Reference Value".

Monitored Item

×: Applicable

Monitored item	Unit	Description	Remarks
ENG SPEED	rpm	Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	• Accuracy becomes poor if engine speed drops below the idle rpm. • If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MASS AIR FLOW SENSOR (Hz)	Hz	The signal frequency of the mass air flow sensor is displayed.	
B/FUEL SCHDL	msec	"Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	When engine is running specification range is indicated in "SPEC".
A/F ALPHA-B1	%	The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	• When the engine is stopped, a certain value is indicated. • When engine is running specification range is indicated in "SPEC". • This data also includes the data for the air-fuel ratio learning control.
COOLAN TEMP/S	°C or °F	The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
A/F SEN1 (B1)	V	The A/F signal computed from the input signal of the air fuel ratio (A/F) sensor 1 is displayed.	
HO2S2 (B1)	V	The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S2 MNTR(B1)	RICH/LEAN	• Display of heated oxygen sensor 2 signal: - RICH: means the amount of oxygen after three way catalyst is relatively small. - LEAN: means the amount of oxygen after three way catalyst is relatively large.	When the engine is stopped, a certain value is indicated.

Monitored item	Unit	Description	Remarks
VHCL SPEED SE	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT	V	The power supply voltage of ECM is displayed.	
ACCEL SEN 1	V	The accelerator pedal position sensor signal voltage is displayed.	ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2			
TP SEN 1-B1	V	The throttle position sensor signal voltage is displayed.	TP SEN 2-B1 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
TP SEN 2-B1			
START SIGNAL	ON/OFF	Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS	ON/OFF	Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG	ON/OFF	Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
PW/ST SIGNAL	ON/OFF	[ON/OFF] condition of the power steering system (determined by the signal sent from EPS control unit) is indicated.	
LOAD SIGNAL	ON/OFF	• Indicates [ON/OFF] condition from the electrical load signal. - ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position. - OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW	ON/OFF	Indicates [ON/OFF] condition from ignition switch signal.	
HEATER FAN SW	ON/OFF	Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW	ON/OFF	Indicates [ON/OFF] condition from the stop lamp switch signal.	
IGN TIMING	BTDC	Indicates the ignition timing computed by ECM according to the input signals.	When the engine is stopped, a certain value is indicated.
COMBUSTION	—	These items are displayed but are not applicable to this model.	
CAL/LD VALUE	%	“Calculated load value” indicates the value of the current airflow divided by peak airflow.	
MASS AIRFLOW	g/s	Indicates the mass airflow computed by ECM according to the signal voltage of the mass airflow sensor.	
PURG VOL C/V	%	• Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. • The opening becomes larger as the value increases.	
INT/V TIM(B1)	°CA	Indicates [°CA] of intake camshaft advance angle.	
EXH/V TIM B1	°CA	Indicates [°CA] of exhaust camshaft retard angle.	
INT/V SOL(B1)	%	• The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signals) is indicated. • The advance angle becomes larger as the value increases.	

Monitored item	Unit	Description	Remarks
AIR COND RLY	ON/OFF	The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY	ON/OFF	Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
THRTL RELAY	ON/OFF	Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
HO2S2 HTR (B1)	ON/OFF	Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
ALT DUTY SIG	ON/OFF	• The control condition of the power generation voltage variable control (determined by ECM according to the input signals) is indicated. - ON: Power generation voltage variable control is active. - OFF: Power generation	
I/P PULLY SPD	rpm	Indicates the engine speed computed from the input speed sensor signal.	
VEHICLE SPEED	km/h or mph	The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
IDL A/V LEARN	YET/CMPLT	• Display the condition of Idle Air Volume Learning - YET: Idle air volume learning has not been performed yet. - CMPLT: Idle air volume learning has already been performed successfully.	
TRVL AFTER MIL	km/h or mph	Distance traveled while MIL is activated.	
ENG OIL TEMP	°C or °F	The engine oil temperature (determined by the signal voltage of the engine oil temperature sensor) is displayed.	
A/F S1 HTR(B1)	%	• Air fuel ratio (A/F) sensor 1 heater control value computed by ECM according to the input signals. • The current flow to the heater becomes larger as the value increases.	
INT/A TEMP SE	°C or °F	The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
SET VHCL SPD	km/h or mph	The preset vehicle speed is displayed.	
MAIN SW	ON/OFF	Indicates [ON/OFF] condition from ASCD MAIN switch signal.	
CANCEL SW	ON/OFF	Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW	ON/OFF	Indicates [ON/OFF] condition from ACCEL/RES switch signal.	
SET SW	ON/OFF	Indicates [ON/OFF] condition from COAST/SET switch signal.	
BRAKE SW1	ON/OFF	Indicates [ON/OFF] condition from brake pedal position switch signal.	
BRAKE SW2	ON/OFF	Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT	NON/CUT	• Indicates the vehicle cruise condition. - NON: Vehicle speed is maintained at the ASCD set speed. - CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	

Monitored item	Unit	Description	Remarks
LO SPEED CUT	NON/CUT	• Indicates the vehicle cruise condition. - NON: Vehicle speed is maintained at the ASCD set speed. - CUT: Vehicle speed decreased to excessively low, and ASCD operation is cut off.	
AT OD MONITOR	ON/OFF	Indicates [ON/OFF] condition of CVT O/D according to the input signal from the TCM.	For M/T models, always “OFF” is displayed.
AT OD CANCEL	ON/OFF	Indicates [ON/OFF] condition of CVT O/D cancel request signal.	For M/T models, always “OFF” is displayed.
CRUISE LAMP	ON/OFF	Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP	ON/OFF	Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
FUN DUTY	%	Indicates a command value for cooling fan. The value is calculated by ECM based on input signals.	
ALT DUTY	%	Indicates the duty ratio of the power generation command value. The ratio is calculated by ECM based on the battery current sensor signal.	
BAT CUR SEN	mV	The signal voltage of battery current sensor is displayed.	
A/F ADJ-B1	—	Indicates the correction of a factor stored in ECM. The factor is calculated from the difference between the target air-fuel ratio stored in ECM and the air-fuel ratio calculated from A/F sensor 1 signal.	
P/N POSI SW	ON/OFF	Indicates [ON/OFF] condition from the park/neutral position (PNP) signal.	
AC PRESS SEN	V	The signal voltage from the refrigerant pressure sensor is displayed.	
FUEL PRES SEN	MPa	Indicates the fuel rail pressure computed by ECM according to the input signals.	
TURBO BST SEN	V	The turbocharger boost sensor signal voltage is displayed.	
FUEL INJ TIM	BTDC	Indicates the fuel injection timing computed by ECM according to the input signals.	
FUEL INJ B1	msec	ECM-calculated injection pulse width of the fuel injector on the Bank 1 side.	
BAT TEMP SEN	V	The signal voltage from the battery temperature sensor is displayed.	
A/F SEN1 DIAG2(B1)*	INCMP/CMPLT	• Indicates DTC P0133 self-diagnosis condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
HO2 S2 DIAG1(B1)	INCMP/CMPLT	• Indicates DTC P0139 self-diagnosis (delayed response) condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
HO2 S2 DIAG2(B1)*	INCMP/CMPLT	• Indicates DTC P0139 self-diagnosis (slow response) condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
H/P FUEL PUMP DEG	deg	Displays ECM-calculated fuel discharge position of the high pressure fuel pump.	
FUEL PRES SEN V	mV	The signal voltage of FRP sensor is displayed.	
EOP SENSOR	mV	The signal voltage of EOP sensor is displayed.	

Monitored item	Unit	Description	Remarks
BOOST S/V DUTY	%	The turbocharger boost control valve control condition (determined by ECM according to the input signals) is indicated.	
ATOM PRESS SEN	V	The atmospheric pressure sensor signal voltage is displayed.	
ECM TEMP 1	°C or °F	The ECM temperature is indicated.	
ECM TEMP 2			
A/F-S ATMSPHRC CRCT B1	—	Displays a determined value of atmospheric correction factor necessary for correcting an A/F sensor signal input to ECM. The signal used for the correction is an A/F sensor signal transmitted while driving under atmospheric pressure.	
A/F-S ATMSPHRC CRCT UP B1	count	Displays the number of updates of the A/F sensor atmospheric correction factor.	
SL TRG VHCL SPD	km/h or mph	The preset speed limiter vehicle speed is displays.	• A certain constant value is displayed while mode other than speed limiter control being activated. • When the speed limiter is released by other method than the main switch, the vehicle speed indicated during the standby mode is the one that is previously set before releasing the speed limiter.
SL SET LAMP	ON/OFF	Indicates [ON/OFF] condition of speed limiter SET indicator determined by the ECM according to the input signals.	
SL LIMIT LAMP	ON/OFF	Indicates [ON/OFF] condition of speed limiter LIMIT indicator determined by the ECM according to the input signals.	
SL MAIN SW	ON/OFF	Indicates [ON/OFF] condition from speed limiter MAIN switch signals.	
KICKDOWN POS	ON/OFF	Indicates [ON/OFF] condition of kickdown determined by the ECM according to the input signals.	
EGR TEMP SEN	V	The signal voltage of EGR temperature sensor is displayed.	
EGR VALVE POSITION	deg	ECM-calculated EGR valve position is displayed.	
EGR VALVE POSITION SEN	V	The signal voltage of EGR valve position sensor is displayed.	
EGR DIFFERENTIAL PRESS	kPa	Displays ECM-calculated pressure difference between before and behind the EGR volume control valve.	
W/G ACTUATOR POSITION B1	m	Indicates real stroke position of turbocharger wastegate actuator. The value is calculated by ECM based on the difference voltage between position sensor output and valve close position.	
W/G ACTUATOR POSI SEN B1	V	Indicates position sensor output voltage of turbocharger wastegate actuator.	
W/GATE V CLSD LEARN B1	INCMP/CMPLT	Displays “full close position learning” experience of wastegate actuator. • INCMP: Learning is incomplete. There is no memory of the full close position voltage in the ECM. • CMPLT: Learning is complete. Full close position voltage is memory in the ECM.	After replacing ECM, “INCMP” is displayed.

Monitored item	Unit	Description	Remarks
RADIATOR COOLANT TEMP	°C or °F	Description: The radiator coolant temperature (determined by the signal voltage of the radiator coolant temperature sensor) is displayed.	
ENGINE COOLANT B/V POSI	deg	Description: The Multi-way Control Valve position detected by the position sensor is displayed.	
AC EVA TEMP	°C or °F	Indicates A/C evaporator temperature sent from “unified meter and A/C amp”.	
AC EVA TARGET	°C or °F	Indicates target A/C evaporator temperature sent from “unified meter and A/C amp”.	
STRT OPRTN CNTR	count	Starter motor operation counter is displayed.	Indicated multiplication value of the starter motor operation of key switch operation and the restart.
CML B/DCHG CRNT	—	Cumulative battery discharge current is displayed.	ECM judges whether stop/start system is possible according to battery state.
A/F LRN CNTR B1	—	**NOTE:** The item is indicated, but not used.	
MASS AIR FLOW SENSOR (HZ)	Hz	The value is air flow meter output frequency. This output decide fuel injection quantity.	
EXHAUST GAS TEMP SEN 1 B1	V	The signal voltage of exhaust gas temperature sensor is displayed.	
SWRL CONT S/V	—	Indicates open/close condition of intake manifold control valve.	
BATTERY STS	OK/NG	Indicated [OK/NG] condition of battery output.	
AT STOP START SW	ON/OFF	Indicates [ON/OFF] condition stop/start OFF switch signal.	
CPP SW	ON/OFF	Indicates [ON/OFF] condition from clutch pedal position switch signal.	
CLUTCH INTLCK SW	ON/OFF	Indicates [ON/OFF] condition from clutch interlock switch signal.	
THRTL STK CNT B1	—	**NOTE:** The item is indicated, but not used.	
A/F SEN1 DIAG1 (B1)	INCMP/CMPLT	• Indicates DTC P015A or P015B self-diagnosis condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
A/F SEN1 DIAG2 (B1)	INCMP/CMPLT	• Indicates DTC P014C or P014D self-diagnosis condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
A/F SEN1 DIAG3 (B1)	ABSNT/PRSNT	• Indicates DTC P014C, P014D, P015A or P015B self-diagnosis condition. - ABSNT: The vehicle condition is not within the diagnosis range. - PRSNT: The vehicle condition is within the diagnosis range.	
A/F-S ATMSPHRC CRCT B1	—	Displays a determined value of atmospheric correction factor necessary for correcting an A/F sensor signal input to ECM. The signal used for the correction is an A/F sensor signal transmitted while driving under atmospheric pressure.	
A/F-S ATMSPHRC CRCT UP B1	count	Displays the number of updates of the A/F sensor atmospheric correction factor.	
FUEL T/TMP SE	°C or °F	The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.	

Monitored item	Unit	Description	Remarks
FUEL LEVEL SE	V	The signal voltage of the fuel level sensor is displayed.	
EVAP LEAK DIAG	YET/CMPLT	• Indicates the condition of EVAP leak diagnosis. - YET: EVAP leak diagnosis has not been performed yet. - CMPLT: EVAP leak diagnosis has been performed successfully.	
EVAP DIAG READY	ON/OFF	• Indicates the ready condition of EVAP leak diagnosis. - ON: Diagnosis has been ready condition. - OFF: Diagnosis has not been ready condition.	
G SENSOR	V	The signal voltage of G sensor is displayed	
TUMBLE POS SEN	V	The intake manifold runner control valve position sensor signal voltage is displayed.	
EVAP SYS PRES	V	The signal voltage of EVAP control system pressure sensor is displayed.	
SYSTEM 1 DIAGNOSIS A B1	INCMP/CMPLT	• Indicates DTC P219A self-daiagnosis condition. - INCMP: Self-diagnosis is incomplete. - CMPLT: Self-diagnosis is complete.	
SYSTEM 1 DIAGNOSIS B B1	ABSENT/PRSENT	• Indicates DTC P219A self-daiagnosis condition. - ABSENT: Self-diagnosis standby. - PRSENT: Under self-diagnosis.	

*: The item is indicated, but not used.

NOTE:

Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

WORK SUPPORT MODE

Work Item

Work item	Condition	Usage
IDLE AIR VOL LEARN	The idle air volume that keeps the engine within the specified range is memorized in ECM.	When learning the idle air volume.
FUEL PRESSURE RELEASE	Crank a few times after engine stalls.	When releasing fuel pressure from fuel line.
TARGET IGN TIM ADJ*	Idle condition	When adjusting target ignition timing.
TARGET IDLE RPM ADJ*	Idle condition	When setting target idle speed.
SELF-LEARNING CONT	The coefficient of self-learning control mixture ratio returns to the original coefficient.	When clearing mixture ratio self-learning value.
G SENSOR CALIBRATION	• Park the vehicle on a flat road. • Adjust pressure in all tires to the specified value.	Calibrates G sensor.
WASTEGATE ACTUATOR POSI LEARN VALUE CLEAR	Ignition switch is ON and Engine running	When learning full close position of wastegate actuator after ECM or turbocharger assembly is replaced.
ENGINE COOLANT BYPASS VALVE	Condition: The valve is in the full opening position	When filing with coolant.
A/F INITIAL LEARNING	Air fuel ratio learning frequency is low while idling, learning the air fuel ratio of the idling domain in ECM.	When learning the air fuel ratio.
VALVE TIMING OFFSET DATA WRITING	Ignition switch: ON (Engine stopped)	When adjusting valve timing offset angle after ECM or engine assembly is replaced.
VALVE TIMING OFFSET DATA CLEAR	Ignition switch: ON (Engine stopped)	When clear the valve timing offset angle data after replacing the camshaft or timing chain.

Work item	Condition	Usage
CLSD THL POS LEARN	Ignition on and engine stopped.	When learning the throttle valve closed position
EVAP SYSTEM CLOSE	Close the EVAP canister vent control valve in order to make EVAP system close under the following conditions. • Ignition switch ON • Engine not running • Ambient temperature is above 0°C (32°F) • No vacuum and no high pressure in EVAP system • Fuel tank temperature is more than 0°C (32°F) • Within 10 minutes after starting “EVAP SYSTEM CLOSE” • When trying to execute “EVAP SYSTEM CLOSE” under the condition except above, CONSULT will discontinue it and display appropriate instruction. **NOTE:** When starting engine, CONSULT may display “Battery voltage is low. Charge battery”, even in using charged battery.	When detecting EVAP vapor leak point of EVAP system
VIN REGISTRATION	In this mode, VIN is registered in ECM.	When registering VIN in ECM
SAVING DATA FOR REPLC CPU	In this mode, save data that is in ECM.	When ECM is replaced.
WRITING DATA FOR REPLC CPU	In this mode, write data stored by “SAVE DATA FOR CPU REPLC” in work support mode to ECM.	When ECM is replaced.

*: This function is not necessary in the usual service procedure.

ACTIVE TEST MODE

Test Item

Test item	Condition	Judgement	Check item (Remedy)
ENG COOLANT TEMP	• Engine: Return to the original trouble condition • Change the engine coolant temperature using CONSULT.	If trouble symptom disappears, see Check item.	• Harness and connectors • Engine coolant temperature sensor • Fuel injector
FUEL INJECTION	• Engine: Return to the original trouble condition • Change the amount of fuel injection using CONSULT.	If trouble symptom disappears, see Check item.	• Harness and connectors • Fuel injector • Air fuel ratio (A/F) sensor 1
PURG VOL CONT/V	• Engine: After warming up, run engine at 1,500 rpm. • Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT.	Engine speed changes according to the opening percent.	• Harness and connectors • Solenoid valve
FUEL PUMP RELAY	• Ignition switch: ON • Engine stopped • Turn the fuel pump relay “ON” and “OFF” using CONSULT and listen to operating sound.	Fuel pump relay makes the operating sound.	• Harness and connectors • Fuel pump relay
IGNITION TIMING	• Engine: Return to the original trouble condition • Timing light: Set • Retard the ignition timing using CONSULT.	If trouble symptom disappears, see Check item.	Perform Idle Air Volume Learning.
FAN DUTY CONTROL*	• Ignition switch: ON • Change duty ratio using CONSULT.	Cooling fan speed changes.	• Harness and connectors • Cooling fan motor • Cooling fan relay • Cooling fan control module • IPDM E/R

Test item	Condition	Judgement	Check item (Remedy)
ALTERNATOR DUTY	• Ignition switch: ON • Change duty ratio using CONSULT.	Battery voltage changes.	• Harness and connectors • Alternator • IPDM E/R
POWER BALANCE	• Engine: After warming up, idle the engine. • A/C switch OFF • Shift lever: P or N (CVT), Neutral (M/T) • Cut off each fuel injector signal one at a time using CONSULT.	Engine runs rough or dies.	• Harness and connectors • Compression • Fuel injector • Power transistor • Spark plug • Ignition coil
EGR CONTROL VALVE	• Ignition switch: ON • Engine stopped • Change valve target angle using CONSULT	Valve opening angle changes according to target angle (from 0deg to 70deg)	• Harness and connectors • EGR valve
VALVE TIMING OFFSET DATA WRITING	• Ignition switch: ON • Engine stopped • Change the wastegate target stroke using CONSULT	Wastegate position sensor output voltage changes according to target stroke value.	• Harness and connectors • Wastegate actuator (Removal wastegate actuator from turbocharger is NG) • Turbocharger assembly
TC BYPASS VALVE	• Ignition switch: ON • Engine stopped or Engine running (idling, less than 1200rpm) • Input “ON” “OFF” signal using CONSULT	Bypass valve makes the operating sound.	• Harness and connectors • Turbocharger bypass valve (Removal bypass valve from Turbocharger is NG) • Turbocharger assembly
ENGINE OIL PRESSURE CONTROL SOLENOID VALVE	• Water temperature: > –10°C • Engine oil temperature: < 120°C (248°F) • Engine speed: < 4000rpm	Engine oil pressure change	• Harness and connectors • Engine oil pressure control solenoid valve • Engine oil pressure sensor • Engine oil pump
SWRL CONT S/V VALVE	• Ignition switch: ON • Engine stopped • Turn the intake manifold runner control valve “ON” and “OFF” using CONSULT to open or close.	Touch the intake manifold runner control valve motor and check the operating vibration and sound.	• Harness and connectors • Intake manifold runner control valve • Intake manifold runner control valve motor
AUTO STOP START	• Engine: After warming up, run engine at idle • Shift lever: Neutral position • “Start” and “Cancel” using CONSULT.	Check the stop/start system operate and restart.	• Harness and connectors • IPDM E/R • Starter motor • Engine restart relay • Starter control relay • DC/DC converter • Battery
	CAUTION: **Be careful so that a hood operates in the opened state when carry out work.**		
WASTEGATE ACTUATOR	• Ignition switch: ON • Engine stopped • Change valve of wastegate actuator target angle using CONSULT	Wastegate valve position sensor voltage changes according to valve target angle	• Harness and connectors • Electric wastegate control actuator (Removal bypass valve from turbocharger is NG) • Turbocharger assembly
VENT CONTROL/V	• Ignition switch: ON • Engine stopped • Turn solenoid valve ON and OFF with the CONSULT and listen to operating sound.	Solenoid valve makes an operating sound.	• Harness and connectors • EVAP canister vent control solenoid valve

*: Leaving cooling fan OFF with CONSULT while engine is running may cause the engine to overheat.

DTC WORK SUPPORT MODE

Test Item

Test mode	Test item	Corresponding DTC No.	Reference page
EVAPORATIVE SYSTEM	PURG VOL CN/V P1444	P0443	EC-977
	PURG FLOW P0441	P0441	EC-971
HO2S2	HO2S2 (B1) P1146	P0138	EC-887
	HO2S2 (B1) P1147	P0137	EC-881
	HO2S2 (B1) P0139	P0139	EC-894
A/F SEN1	A/F SEN1 (B1) P1278/P1279	—	
	A/F SEN1 (B1) P1276	P0130	EC-871

SRT & P-DTC MODE

SRT STATUS Mode

- For items whose SRT codes are set, “CMPLT” is displayed on the CONSULT screen; for items whose SRT codes are not set, “INCMP” is displayed.
- “SRT STATUS” provides the presence or absence of permanent DTCs stored in ECM memory.

PERMANENT DTC STATUS Mode

How to display permanent DTC status

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “PERMANENT DTC STATUS” in “DTC & SRT CONFIRMATION” mode with CONSULT.

NOTE:
Permanent DTCs stored in ECM memory are displayed on the CONSULT screen to show if a driving pattern required for erasing permanent DTCs is complete (CMPLT) or incomplete (INCMP).

CAUTION:
Since the “PERMANENT DTC STATUS” screen displays the previous trip information, repeat the following twice to update the information: “Ignition switch OFF”, “Wait for more than 10 seconds” and “Ignition switch ON”.

PERMANENT DTC & SRT CONFIRMATION : PERMANENT DTC STATUS

CAUTION:
Turn ignition switch from ON to OFF twice to update the information on the status screen.

PERMANENT DTC	DRIVING PATTERN B	DRIVING PATTERN D
XXXX	INCMP	INCMP
XXXX	CMPLT	INCMP
XXXX	INCMP	CMPLT
XXXX	CMPLT	INCMP
XXXX	INCMP	INCMP
XXXX	INCMP	INCMP

The previous trip information is displayed.

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NOTE:
This mode is not used in regions that permanent DTCs are not regulated by law.

SRT WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

PERMANENT DTC WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to complete the driving pattern that is required for erasing permanent DTC.

NOTE:
This mode is not used in regions that permanent DTCs are not regulated by law.

ECU DIAGNOSIS INFORMATION

ECM

Reference Value

INFOID:0000000012198246

VALUES ON THE DIAGNOSIS TOOL

NOTE:

- The following table includes information (items) inapplicable to this vehicle. For information (items) applicable to this vehicle, refer to CONSULT display items.
- Numerical values in the following table are reference values.
- These values are input/output values that ECM receives/transmits and may differ from actual operations.
  Example: The ignition timing shown by the timing light may differ from the ignition timing displayed on the data monitor.
  This occurs because the timing light shows a value calculated by ECM according to signals received from the camshaft position sensor and other sensors related to ignition timing.
- For outlines of following items, refer to EC-667, "CONSULT Function".

Monitor Item	Condition		Values/Status
ENG SPEED	Run engine and compare CONSULT value with the tachometer indication.		Almost the same speed as the tachometer indication.
MASS AIR FLOW SENSOR (Hz)	See EC-786, "Diagnosis Procedure".		
B/FUEL SCHDL	See EC-786, "Diagnosis Procedure".		
A/F ALPHA-B1	See EC-786, "Diagnosis Procedure".		
COOLANT TEMP/S	Engine: After warming up		More than 70°C (158°F)
RADIATOR COOLANT TEMP	Engine: running		0 - 4.8 V
ENGINE COOLANT B/V POSI	• Ignition switch: ON • Cold condition		Approx. 207 deg
	Engine: Idle	Engine coolant temperature: 64°C (148°F)	Approx. 63 deg
		Engine coolant temperature: 75°C (167°F)	Approx. 99 deg
		Engine coolant temperature: 86-100°C (187- 212°F)	Approx. 163 deg
A/F SEN1 (B1)	Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5 V
HO2S2 (B1)	• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		0 - 0.3 V ←→ Approx. 0.6 - 1.0 V
HO2S2 MNTR(B1)	• Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. - Engine: After warming up - After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		LEAN ←→ RICH
VHCL SPEED SE	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as speedometer indication
BATTERY VOLT	Ignition switch: ON (Engine stopped)		11 - 14 V
ACCEL SEN 1	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.6 - 0.9 V
		Accelerator pedal: Fully depressed	4.0 - 4.8 V
ACCEL SEN 2*1	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	Approx. 0.8 V
		Accelerator pedal: Fully depressed	Approx. 4.6 V

Monitor Item	Condition		Values/Status
TP SEN 1-B1	• Ignition switch: ON (Engine stopped) • Selector lever: D (CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36 V
		Accelerator pedal: Fully depressed	Less than 4.75 V
TP SEN 2-B1*	• Ignition switch: ON (Engine stopped) • Selector lever: D (CVT), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36 V
		Accelerator pedal: Fully depressed	Less than 4.75 V
START SIGNAL	Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF
AIR COND SIG	Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
PW/ST SIGNAL	Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON
LOAD SIGNAL	Ignition switch: ON	Rear window defogger switch: ON and/or Lighting switch: 2nd position	ON
		Rear window defogger switch and lighting switch: OFF	OFF
IGNITION SW	Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	Engine: After warming up, idle the engine	Heater fan switch: ON	ON
		Heater fan switch: OFF	OFF
BRAKE SW	Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
IGN TIMING	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	5° - 15° BTDC
		2,000 rpm	30° - 50° BTDC
COMBUSTION	—		These items are displayed but are not applicable to this model.
CAL/LD VALUE	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Approx. 21% (CVT models) Approx. 17% (M/T models)
		2,500 rpm	Approx. 15%
MASS AIRFLOW	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Approx. 1.6 g/s
		2,500 rpm	Approx. 5.0 g/s
PURG VOL C/V	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle (Accelerator pedal: Not depressed even slightly, after engine starting.)	0 - 1%
		2,000 rpm	1% - 90%
INT/V TIM(B1)	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Approx. 36°CA
		2,000 rpm	Approx. 18°CA

Monitor Item	Condition		Values/Status
EXH/V TIM B1	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	–5° - 5°CA
		Around 2,500 rpm while the engine speed is rising	Approx. 0° - 30°CA
INT/V SOL(B1)	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Approx. 46%
		2,000 rpm	Approx. 46%
AIR COND RLY	Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	• For 1 seconds after turning ignition switch: ON • Engine running or cranking		ON
	Except above		OFF
THRTL RELAY	Ignition switch: ON		ON
HO2S2 HTR (B1)	• Engine speed: Below 3,600 rpm after the following conditions are met. - Engine: After warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		ON
	Engine speed: Above 3,600 rpm		OFF
W/GATE V CLSD LEARN B1	Ignition switch: ON	Waste gate valve closed learning has not been performed yet.	INCMP
		Waste gate valve closed learning has already been performed successfully.	CMPLT
W/G ACTUATOR POSITION B1	Ignition switch: ON		Approx. 0.008 m
	Engine: After warming up	Idle	Approx. 0.008 m
		2,000 rpm	Approx. 0.008 m
		4,000 rpm	Approx. 0.008 m
W/G ACTUATOR POSI SEN B1	Ignition switch: ON		Approx. 4.0 V
	Engine: After warming up	Idle	Approx. 4.0 V
		2,000 rpm	Approx. 4.0 V
		4,000 rpm	Approx. 4.0 V
EGR VALVE POSITION	Ignition switch: ON		Approx. 1 deg
	Engine: After warming up	Idle	Approx. 0 deg
		2,000 rpm	Approx. 0 deg
		4,000 rpm	Approx. 0 deg
EGR VALVE POSITION SEN	Ignition switch: ON		Approx. 1.26 V
	Engine: After warming up	Idle	Approx. 1.20 V
		2,000 rpm	Approx. 1.26 V
		4,000 rpm	Approx. 1.26 V
EGR DIFFERENTIAL PRESS	Engine: After warming up	Idle	Approx. 1 kPa
		2,000 rpm	Approx. 1 kPa
		4,000 rpm	Approx. 3 kPa
ALT DUTY SIG	Power generation voltage variable control: Operating		ON
	Power generation voltage variable control: Not operating		OFF
I/P PULLY SPD	Vehicle speed: More than 20 km/h (12 MPH)		Almost the same speed as the tachometer indication

Monitor Item	Condition		Values/Status
VEHICLE SPEED	Turn drive wheels and compare CONSULT value with the speedometer indication.		Almost the same speed as the speedometer indication
IDL A/V LEARN	Engine: running	Idle air volume learning has not been performed yet.	YET
		Idle air volume learning has already been performed successfully.	CMPLT
TRVL AFTER MIL	Ignition switch: ON	Vehicle has traveled after MIL has illuminated.	0 - 65,535 km (0 - 40,723 miles)
ENG OIL TEMP	Engine: After warming up		More than 70°C (158°F)
A/F S1 HTR(B1)	Engine: After warming up, idle the engine (More than 260 seconds after starting engine)		4 - 100%
INT/A TEMP SE	Ignition switch: ON		Indicates intake air temperature
SET VHCL SPD	Engine: Running	ASCD: Operating	The preset vehicle speed is displayed
MAIN SW	Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	Ignition switch: ON	ACCEL/RES switch: Pressed	ON
		ACCEL/RES switch: Released	OFF
SET SW	Ignition switch: ON	COAST/SET switch: Pressed	ON
		COAST/SET switch: Released	OFF
BRAKE SW1 (Brake pedal position switch)	Ignition switch: ON	Brake pedal: Fully released	ON
		Brake pedal: Slightly depressed	OFF
BRAKE SW2 (Stop lamp switch)	Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
VHCL SPD CUT	Ignition switch: ON		NON
LO SPEED CUT	Ignition switch: ON		NON
AT OD MONITOR	Ignition switch: ON		OFF
AT OD CANCEL	Ignition switch: ON		OFF
CRUISE LAMP	Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	• MAIN switch: ON • When vehicle speed is between 40 km/h (25 MPH) and 194 km/h (120 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF
FAN DUTY	Engine: Running		0 - 100%
ALT DUTY	Engine: Idle		0 - 80%
BAT CUR SEN	• Engine speed: Idle • Battery: Fully charged*2 • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load		Approx. 2,600 - 3,500 mV
A/F ADJ-B1	Engine: Running		−0.450 - 0.330
P/N POSI SW	Ignition switch: ON	Selector lever: P or N (CVT), Neutral (M/T)	ON
		Selector lever: Except above	OFF

Monitor Item	Condition		Values/Status
AC PRESS SEN	• Engine: Idle • Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0 V
FUEL PRES SEN	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Approx. 5.0 MPa
		2,000 rpm	Approx. 2.5 MPa
TURBO BST SEN	• Engine speed: Idle • Selector lever: D (CVT), Neutral (M/T) • Fuel: Premium gasoline	• The accelerator pedal is depressed to a half stroke position or more. • The readings of boost in the multi-function meter are the same as the ambient pressure or more. • Engine speed: More than 3,000 rpm	3.07 - 3.15 V
	• Engine speed: Idle • Selector lever: D (CVT), Neutral (M/T) • Fuel: Regular gasoline	• The accelerator pedal is depressed to a half stroke position or more. • The readings of boost in the multi-function meter are the same as the ambient pressure or more. • Engine speed: More than 3,000 rpm	2.91 - 2.99 V
FUEL INJ TIM	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Approx. 108 BTDC
		2,000 rpm	Approx. –68 BTDC
FUEL INJ B1	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Approx. 1.1 msec
		2,000 rpm	Approx. 1.2 msec
BAT TEMP SEN	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Approx. 0.68 V
A/F SEN1 DIAG1 (B1)	DTC P015A and P015B self-diagnosis is incomplete.		INCMP
	DTC P015A and P015B self-diagnosis is complete.		CMPLT
A/F SEN1 DIAG2 (B1)	DTC P014C and P014D self-diagnosis is incomplete.		INCMP
	DTC P014C and P014D self-diagnosis is complete.		CMPLT
A/F SEN1 DIAG3 (B1)	The vehicle condition is not within the diagnosis range of DTC P014C, P014D, P015A or P015B.		ABSNT
	The vehicle condition is within the diagnosis range of DTC P014C, P014D, P015A or P015B.		PRSNT
HO2 S2 DIAG1(B1)	DTC P0139 self-diagnosis (delayed response) has not been performed yet.		INCMP
	DTC P0139 self-diagnosis (delayed response) has already been performed successfully.		CMPLT
HO2 S2 DIAG2(B1)	DTC P0139 self-diagnosis (slow response) has not been performed yet.		INCMP
	DTC P0139 self-diagnosis (slow response) has already been performed successfully.		CMPLT
H/P FUEL PUMP DEG	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	Approx. 241 deg
		2,000 rpm	Approx. 245 deg

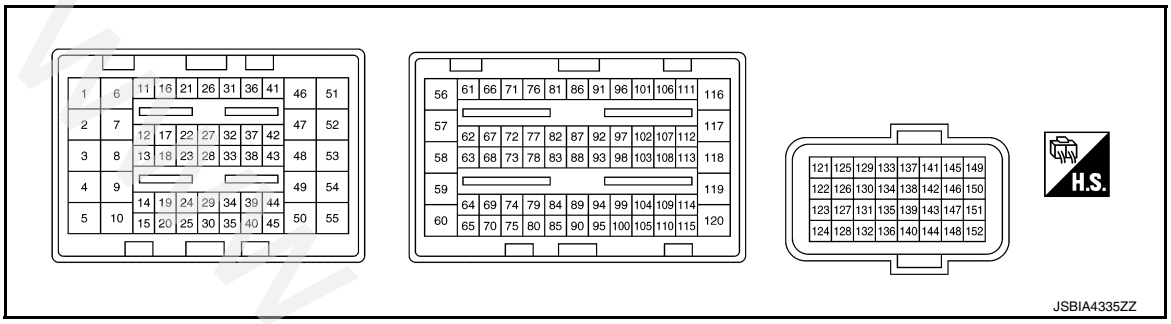
Monitor Item	Condition		Values/Status
FUEL PRES SEN V	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	1,140 - 1,460 mV
		Revving engine from idle to 4,000 rpm quickly	1,3000 - 2,900 mV
EOP SENSOR	• Engine: After warming up • Selector lever: P or N (CVT), Neutral (M/T) • Air conditioner switch: OFF • No load	Idle	1,250 - 1,400 mV
		2,000 rpm	1,400 - 2,200 mV
BOOST S/V DUTY	Engine: After warming up	Idle	0 %
		• The accelerator pedal is depressed to a half stroke position or more. • Engine speed: Below 3,000 rpm	100 %
		• The accelerator pedal is depressed to a half stroke position or more. • Engine speed: More than 3,000 rpm	30 - 60 %
ATOM PRES SEN	Ignition switch: ON		3.15 - 4.60 V
A/F-S ATMSPHRC CRCT B1	Engine: After warming up, idle the engine.		Varies depending on vehicle environment.
A/F-S ATMSPHRC CRCT UP B1	Engine: Running		Varies depending on the number of updates.
ECM TEMP 1	• Engine: After cooling • Ignition switch: ON		Indicates the temperature around the ECM.
ECM TEMP 2	• Engine: After cooling • Ignition switch: ON		Indicates the temperature around the ECM.
SL TRG VHCL SPD	Ignition switch: ON	Speed limiter operating	The preset vehicle speed is displayed
SL SET LAMP	• Ignition switch: ON • Speed limiter MAIN switch: ON	Speed limiter: Not operating	OFF
		Speed limiter: Operating	ON
SL LIMIT LAMP	Ignition switch: ON	Speed limiter MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SL MAIN SW	Ignition switch: ON	Speed limiter MAIN switch: Pressed	ON
		Speed limiter MAIN switch: Released	OFF
KICKDOWN POS	Ignition switch: ON	Accelerator pedal: Fully released	OFF
		Accelerator pedal: Fully depressed	ON
THRTL STK CNT B1	**NOTE:** The item is indicated, but not used.		—
FUEL T/TMP SE	Ignition switch: ON		Indicates fuel tank temperature.
FUEL LEVEL SE	Ignition switch: ON		Depending on fuel level of fuel tank
EVAP LEAK DIAG	Ignition switch: ON		Indicates the condition of EVAP leak diagnosis.
EVAP DIAG READY	Ignition switch: ON		Indicates the ready condition of EVAP leak diagnosis.
G SENSOR	Vehicle is level		Approx. 2.5 V
TUMBLE POS SEN	• Ignition switch: ON • Engine coolant temperature: Between –)7°C (19°F) – (+)60°C (140°F)	Accelerator pedal: Fully released	Less than 1.4 V
		Accelerator pedal: Fully depressed	More than 2.8 V
EVAP SYS PRES	Ignition switch: ON		Approx 0.5 - 4.6 V

Monitor Item	Condition	Values/Status
SYSTEM 1 DIAGNOSIS A B1	DTC P219A self-diagnosis is incomplete.	INCMP
	DTC P219A self-diagnosis is complete.	CMPLT
SYSTEM 1 DIAGNOSIS B B1	DTC P219A self-diagnosis is on standby.	ABSENT
	DTC P219A self-diagnosis is under diagnosis.	PRSENT

*1: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

*2: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-97, "How to Handle Battery".

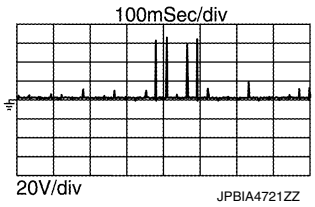
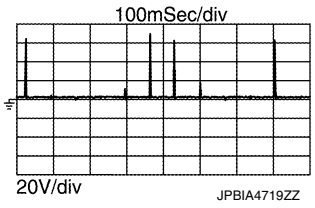
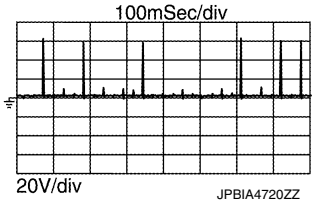
TERMINAL LAYOUT

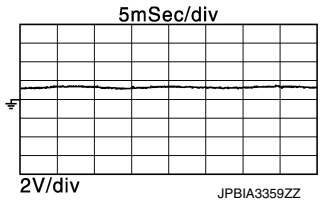
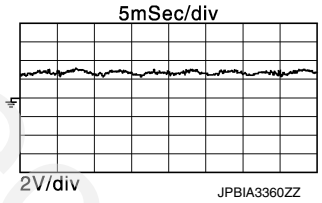


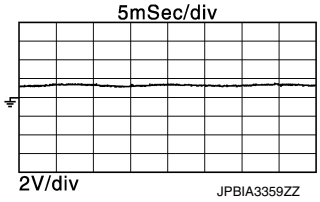
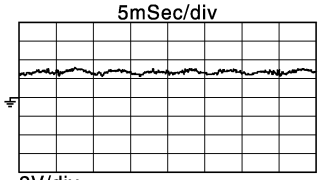
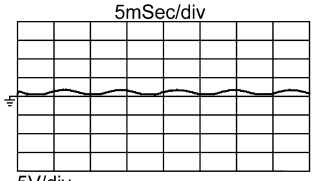
PHYSICAL VALUES

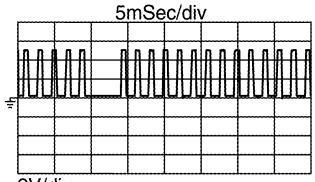
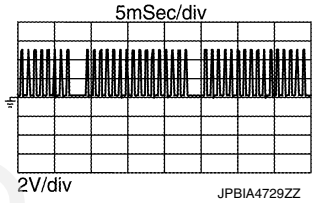
NOTE:
- ECM is located in the engine room left side near battery.
- Specification data are reference values and are measured between each terminal and ground.
- Pulse signal is measured by CONSULT.

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
1 (GR)	10 (B)	Fuel injector No. 1, 4 (HI)	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	2.7 V ★ 100mSec/div 20V/div JPBIA4718ZZ
2 (SB)	10 (B)	Fuel injector No. 2 (LO)	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	2.7 V ★ 100mSec/div 20V/div JPBIA4720ZZ
3 (W)	10 (B)	Fuel injector No. 3 (LO)	Output	[Engine is running] • Engine speed is 2,000 rpm	3 V ★ 100mSec/div 20V/div JPBIA4721ZZ

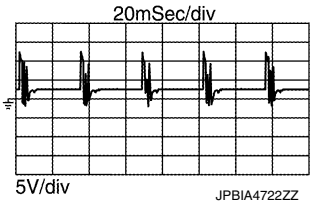
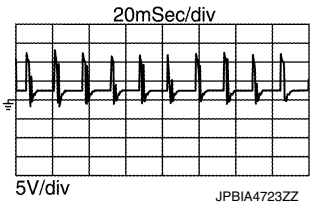
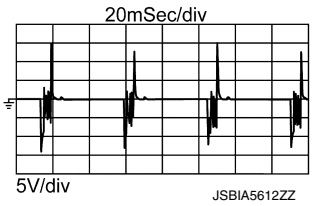
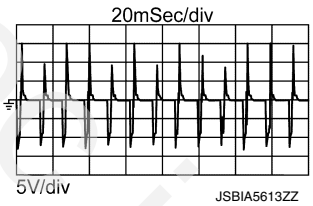
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
4 (G)	10 (B)	Fuel injector driver power supply 1	Input	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
5 (BR)	10 (B)	Fuel injector driver power supply 2	Input	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
6 (R)	10 (B)	Fuel injector No. 4 (LO)	Output	[Engine is running] • Engine speed is 2,000 rpm	3 V ★ 
7 (LG)	10 (B)	Fuel injector No. 2, 3 (HI)	Output	[Engine is running] • Engine speed is 2,000 rpm	3 V ★ 
8 (BR)	10 (B)	Fuel injector No. 1 (LO)	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	2.7 V ★ 
9 (GR)	—	ECM ground	—	—	—
10 (B)	—	ECM ground	—	—	—
11 (W)	13 (V)	Turbocharger boost sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.9 V
				[Engine is running] • Warm-up condition • Engine speed is 2,000 rpm	2.0 V
12 (P)	13 (V)	Refrigerant pressure sensor	Input	[Engine is running] • Warm-up condition • Both A/C switch and blower fan motor switch: ON (Compressor operates)	1.0 - 4.0 V

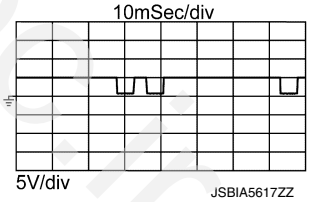
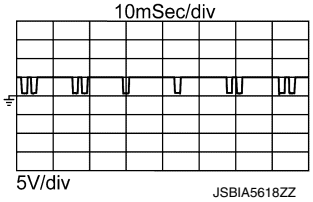
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	−	Signal name	Input/ Output		
13 (V)	—	Sensor ground • G sensor • Refrigerant pressure sensor • Fuel rail pressure sensor • Engine oil pressure sensor • Intake air temperature sensor 2 • Turbocharger boost sensor	—	—	—
14 (—)	—	Shield	—	—	—
15 (W)	20 (B)	Knock sensor	Input	[Engine is running] • Idle speed	2.5 V
20 (B)	—	Sensor ground (Knock sensor)	—	—	—
22 (Y)	45 (P)	Engine oil temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine oil temperature.
23 (G)	13 (V)	Engine oil pressure sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.3 V★ 
				[Engine is running] • Warm-up condition • Engine speed is 2,000 rpm	2.7 V★ 

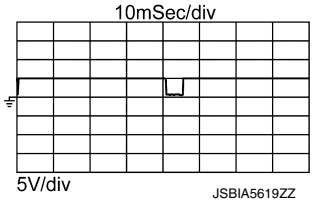
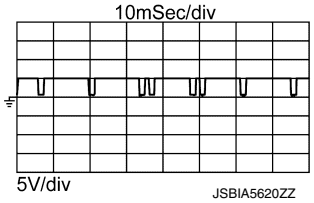
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
24 (G)	43 (BR)	EGR pressure sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.3 V★ 5mSec/div  2V/div JPBIA3359ZZ
				[Engine is running] • Warm-up condition • Engine speed is 2,000 rpm	2.7 V★ 5mSec/div  2V/div JPBIA3360ZZ
				[Engine is running] • Warm-up condition • Engine speed is 4,000 rpm	1 V★ 5mSec/div  5V/div JSBIA5611ZZ
25 (GR)	13 (V)	Fuel rail pressure sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.14 - 1.46 V
				[Engine is running] • Warm-up condition • Revving engine from idle to 4,000 rpm quickly	1.3 - 2.9 V
26 (R)	42 (W)	Sensor power supply (Mass air flow sensor)	—	[Ignition switch: ON]	5 V
27 (G)	44 (W)	Sensor power supply (Crankshaft position sensor)	—	[Ignition switch: ON]	5 V
29 (L)	13 (V)	Sensor power supply • G sensor • Refrigerant pressure sensor • Fuel rail pressure sensor • Engine oil pressure sensor • Turbocharger boost sensor	—	[Ignition switch: ON]	5 V

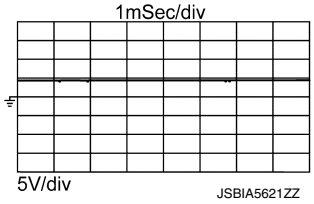
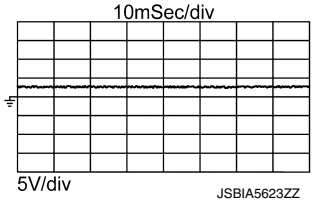
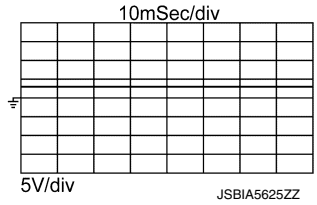
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
30 (Y)	43 (BR)	Sensor power supply • Battery current sensor • EGR pressure sensor • Intake manifold runner control valve position sensor • Manifold absolute pressure sensor • EGR volume control valve	—	[Ignition switch: ON]	5 V
31 (W)	43 (BR)	Manifold absolute pressure sensor	Input	[Engine is running] • Warm-up condition • Idle speed	1.0 V
				[Engine is running] • Warm-up condition • Engine speed is 2,000 rpm	0.9 V
32 (BG)	43 (BR)	Battery temperature sensor	Input	[Engine is running] • Battery temperature: 20°C (68°F) • Idle speed	2.2 V
33 (R)	44 (W)	Crankshaft position sensor	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	4.0 V★ 5mSec/div  2V/div JPBIA4728ZZ
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	4.0 V★ 5mSec/div  2V/div JPBIA4729ZZ
34 (G)	13 (V)	G sensor	Input	[Engine is running] • Warm-up condition • Idle speed	2.5 V
35 (L)	45 (P)	Engine coolant temperature sensor 1	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.
36 (Y)	42 (W)	Intake air temperature sensor 1	Input	[Engine is running]	0 - 4.8 V Output voltage varies with intake air temperature.

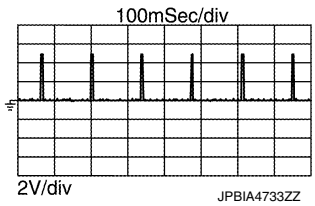
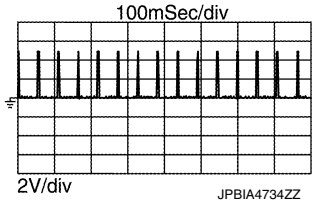
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
37 (G)	42 (W)	Mass air flow sensor	Input	[Ignition switch: ON] • Engine stopped	Approx. 3,700 Hz
				[Engine is running] • Warm-up condition • Idle speed	5,100 – 5,500 Hz
				[Engine is running] • Warm-up condition • Engine speed: 2,500 rpm	6,100 – 6,500 Hz
				[Engine is running] • Warm-up condition • Engine is revving from idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*
38 (G)	43 (BR)	Battery current sensor	Input	[Engine is running] • Battery: Fully charged* • Idle speed	2.6 - 3.5 V
39 (BR)	43 (BR)	Intake manifold runner control valve position sensor	Input	[Ignition switch ON] • Engine coolant temperature: Between -7°C (19°F) and 60°C (140°F) • Accelerator pedal: Fully released	Less than 1.4 V
				[Ignition switch ON] • Engine coolant temperature: Between -7°C (19°F) and 60°C (140°F) • Accelerator pedal: Slightly depressed	More than 2.8 V
40 (W)	45 (P)	Engine coolant temperature sensor 2	Input	[Engine is running]	0 - 4.8 V Output voltage varies with engine coolant temperature.
42 (W)	—	Sensor ground (Mass air flow sensor, intake air temperature sensor1)	—	—	—
43 (BR)	—	Sensor ground • Battery current sensor • Battery temperature sensor • EGR pressure sensor • Intake manifold runner control valve position sensor • Manifold absolute pressure sensor • EGR volume control valve	—	—	—
44 (W)	—	Sensor ground (Crankshaft position sensor)	—	—	—
45 (P)	—	Sensor ground • Engine oil temperature sensor • Engine coolant temperature sensor 1 • Engine coolant temperature sensor 2	—	—	—
46 (R)	152 (GR)	Multi-way control valve power supply	Input	[Ignition switch: ON]	

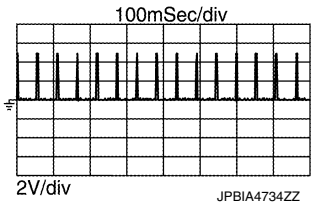
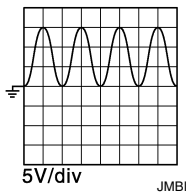
Terminal No. (Wire color) +	Terminal No. (Wire color) –	Description Signal name	Description Input/ Output	Condition	Value (Approx.)
47 (R)	152 (GR)	High pressure fuel pump driver power supply	Input	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
48 (BR)	49 (Y)	High pressure fuel pump (HI)	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14 V) ★ 
				[Engine is running] • Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14 V) ★ 
49 (Y)	48 (BR)	High pressure fuel pump (LO)	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14 V) ★ 
				[Engine is running] • Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14 V) ★ 
50 (B)	—	ECM ground	—	—	—
51 (Y)	52 (G)	Multi-way control valve motor (–)	Output	[Ignition switch: ON] • Cold condition	0 V
52 (G)	51 (Y)	Multi-way control valve motor (+)	Output	[Ignition switch: ON] • Cold condition	0 V
53 (R)	152 (GR)	Intake manifold runner control valve power supply	Input	[Ignition switch: ON]	Battery voltage (11 - 14 V)
54 (B)	55 (W)	Intake manifold runner control valve (Open)	Output	[Ignition switch ON] • Engine coolant temperature: Between -7°C (19°F) and 39°C (102°F) • Accelerator pedal: Fully released → depressed	0 V

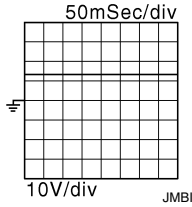
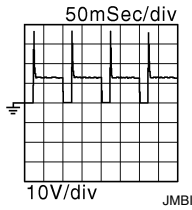
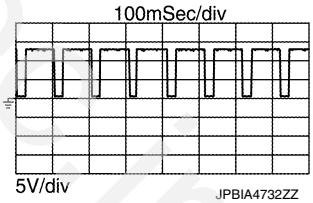
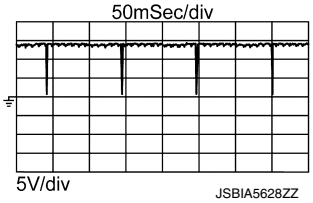
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
55 (W)	54 (B)	Intake manifold runner control valve (Close)	Output	[Ignition switch ON] • Engine coolant temperature: Between -7°C (19°F) and 39°C (102°F) • Accelerator pedal: Depressed → fully released	0 V
56 (R)	152 (GR)	EGR volume control valve power supply	Input	[Ignition switch: ON]	Battery voltage (11 - 14 V)
57 (W)	58 (R)	EGR volume control valve motor (+)	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	1.1 V
58 (R)	57 (W)	EGR volume control valve motor (–)	Output	[Ignition switch: ON]	0 V
				[Engine is running] • Warm-up condition • Idle speed	1.1 V
60 (B)	—	ECM ground	—	—	—
61 (W)	72 (B)	Sensor power supply (Electric wastegate position sensor, Multi-way control valve position sensor)	—	[Ignition switch: ON]	5 V
63 (L)	—	Sensor ground (Exhaust valve timing control position sensor)	—	—	—
64 (—)	—	Shield	—	—	—
65 (R)	72 (B)	Electric wastegate position sensor	Input	[Ignition switch: ON]	4 V
66 (G)	71 (L)	Sensor power supply (Camshaft position sensor)	—	[Ignition switch: ON]	5 V
67 (BR)	71 (L)	Camshaft position sensor	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 2.0★ 10mSec/div  5V/div JSBIA5617ZZ
				[Engine is running] • Engine speed is 2,000 rpm	1.0 - 2.0★ 10mSec/div  5V/div JSBIA5618ZZ
68 (GR)	43 (BR)	EGR volume control valve position sensor	Input	[Ignition switch: ON]	1.2 V

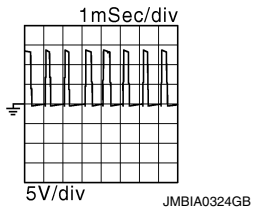
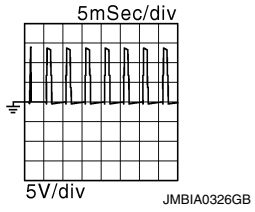
Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
69 (LG)	63 (L)	Exhaust valve timing control position sensor	Input	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 2.0★ 10mSec/div  5V/div JSBIA5619ZZ
				[Engine is running] • Engine speed is 2,000 rpm	1.0 - 2.0★ 10mSec/div  5V/div JSBIA5620ZZ
71 (L)	—	Sensor ground (Camshaft position sensor)	—	—	—
72 (B)	—	Sensor ground (Electric wastegate position sensor, Multi-way control valve position sensor)	—	—	—
73 (GR)	63 (L)	Sensor power supply (Exhaust valve timing control position sensor)	—	[Ignition switch: ON]	5 V
74 (B)	152 (GR)	A/F sensor 1	Input	[Ignition switch: ON]	2.2 V

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
75 (L)	72 (B)	Multi-way control valve position sensor	Input	[Ignition switch: ON] • Cold condition	4.5 V★ 
				[Engine is running] • Engine speed: Idle speed • Engine coolant temperature: 64°C (148°F)	1.8 V
				[Engine is running] • Engine speed: Idle speed • Engine coolant temperature: 75°C (167°F)	2.4 V★ 
				[Engine is running] • Engine speed: Idle speed • Engine coolant temperature: 86-100°C (187- 212°F)	2.8 V★ 
77 (V)	13 (V)	Intake air temperature sensor 2	Input	[Engine is running] • Warm-up condition • Idle speed	0 - 4.8 V Output voltage varies with intake air temperature.
78 (R)	—	Sensor ground (Heated oxygen sensor 2)	—	—	—
79 (W)	152 (GR)	A/F sensor 1	Input	[Engine is running] • Engine speed is 2,000 rpm	2.3 V Output voltage varies with air fuel ratio.
80 (W)	85 (R)	Throttle position sensor 2	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT) • Accelerator pedal: Fully released	Less than 4.75 V
				[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT) • Accelerator pedal: Fully depressed	More than 0.36 V
81 (BR)	152 (GR)	ECM relay (Self shut-off)	Output	[Engine is running] [Ignition switch: OFF] • A few seconds after turning ignition switch OFF	0 - 1.0 V
				[Ignition switch: OFF] • More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14 V)

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
82 (Y)	152 (GR)	Fuel pump relay	Output	[Ignition switch: ON] • For 1 second after turning ignition switch ON [Engine is running]	0 - 1.0 V
83 (B)	152 (GR)	Sensor power supply (Throttle position sensor)	—	[Ignition switch: ON]	5 V
84 (W)	78 (R)	Heated oxygen sensor 2	Input	[Engine is running] • Revving engine from idle to 3,000 rpm quickly after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.7 V
85 (R)	—	Sensor ground (Throttle position sensor 1, 2)	—	—	—
88 (G)	85 (R)	Throttle position sensor 1	Input	[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	More than 0.36 V
				[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully depressed	Less than 4.75 V
95 (LG)	152 (GR)	Ignition signal No. 2	Output	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.3 V★ 
96 (R)		Ignition signal No. 1			
97 (Y)	152 (GR)	Throttle control motor relay	Output	[Ignition switch: OFF]	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON]	0 - 1.0 V
98 (R)	152 (GR)	Engine oil pressure control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	10 V
				[Engine is running] • Warm-up condition • Engine speed: 4,500 rpm or more	BATTERY VOLTAGE (11 - 14 V)
101 (SB)	152 (GR)	Ignition signal No. 4	Output	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.2 - 0.5 V★ 

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
103 (BR)	152 (GR)	PNP signal	Input	[Ignition switch: ON] • Selector lever: P or N (CVT), Neutral (M/T)	BATTERY VOLTAGE (11 - 14 V)
				[Ignition switch: ON] • Selector lever: Except above	0 V
104 (P)	152 (GR)	Ignition signal No. 3	Output	[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.2 - 0.5 V★ 
105 (BR)	152 (GR)	Turbocharger bypass control valve	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
106 (R)	152 (GR)	Electric wastegate control actuator power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
107 (L/Y)	108 (P/L)	Electric wastegate control actuator motor (+)	Output	[Ignition switch: ON]	0.7 V
				[Engine is running] • Warm-up condition • Idle speed	0.7 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0 V
				[Engine is running] • Warm-up condition • Engine speed: 4,000 rpm	0 V
108 (P/L)	107 (L/Y)	Electric wastegate control actuator motor (–)	—	[Ignition switch: ON]	0.4 V
				[Engine is running] • Warm-up condition • Idle speed	0 V
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	0.4 V
				[Engine is running] • Warm-up condition • Engine speed: 4,000 rpm	0.5 V
110 (B)	—	ECM ground	—	—	—
111 (W)	152 (GR)	Intake valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	9 V
				[Engine is running] • Warm-up condition • When revving engine up to 2,000rpm Quickly	BATTERY VOLTAGE (11 - 14 V)★ 

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
112 (G)	152 (GR)	Exhaust valve timing control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
				[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	9 V
113 (Y)	152 (GR)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
114 (L)	152 (GR)	Intake valve timing intermediate lock control solenoid valve	Output	[Engine is running] • Warm-up condition • Idle speed	BATTERY VOLTAGE (11 - 14 V)
				[Engine is running] • Cold condition [Engine coolant temperature: below 60°C (140°F)] • Idle speed	Battery voltage (11 - 14 V)
115 (L)	152 (GR)	EVAP canister purge volume control solenoid valve	Output	[Engine is running] • Idle speed • Accelerator pedal: Not depressed even slightly, after engine starting	BATTERY VOLTAGE (11 - 14 V)★  JMBIA0327GB
				[Engine is running] • Engine speed: About 2,000 rpm (More than 100 seconds after starting engine.)	10 V★  JMBIA0328GB
116 (G)	152 (GR)	A/F sensor 1 heater	Input	[Engine is running] • Warm-up condition • Idle speed (More than 260 seconds after starting engine)	2.9 - 8.8 V★  JPBIA4732ZZ
117 (G)	78 (R)	Heated oxygen sensor 2 heater	Output	[Engine is running] • Engine speed: Below 3,600 rpm after the following conditions are met - Engine: after warming up - Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	10 V★  JSBIA5628ZZ
				[Ignition switch: ON] • Engine stopped [Engine is running] • Engine speed: Above 3,600 rpm	BATTERY VOLTAGE (11 - 14 V)
118 (GR)	152 (GR)	Throttle control motor power supply	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
119 (GR)	120 (BR)	Throttle control motor (Open)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT) • Accelerator pedal: Fully depressed	3.2 V★ 
120 (BR)	119 (GR)	Throttle control motor (Close)	Output	[Ignition switch: ON] • Engine stopped • Selector lever: D (CVT), 1st (M/T) • Accelerator pedal: Fully released	1.8 V★ 
121 (L)	148 (Y)	EVAP control system pressure sensor	Input	[Ignition switch: ON]	0.5 - 4.6 V
123 (P)	—	CAN communication line (CAN-L)	Input/ Output	—	—
124 (L)	—	CAN communication line (CAN-H)	Input/ Output	—	—
125 (G)	148 (Y)	Sensor power supply (EVAP control system pressure sensor)	—	[Ignition switch: ON]	5 V
128 (SB)	148 (Y)	Fuel tank temperature sensor	Input	[Engine is running]	0 - 4.8 V Output voltage varies with fuel tank temperature
132 (GR)	152 (GR)	Clutch pedal position switch	Input	[Ignition switch: ON] • Clutch pedal: Fully released	0 V
				[Ignition switch: ON] • Clutch pedal: Fully depressed	BATTERY VOLTAGE (11 - 14 V)
133 (LG)	152 (GR)	Ignition switch	Input	[Ignition switch: OFF]	0 V
				[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
134 (P)	135 (B)	ASCD steering switch	Input	[Ignition switch: ON] • ASCD steering switch: OFF	4 V
				[Ignition switch: ON] • MAIN switch: Pressed	0 V
				[Ignition switch: ON] • CANCEL switch: Pressed	1 V
				[Ignition switch: ON] • ACCEL/RES switch: Pressed	3 V
				[Ignition switch: ON] • COAST/SET switch: Pressed	2 V
135 (B)	—	Sensor ground (ASCD steering switch)	—	—	—
139 (R)	152 (GR)	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)

Terminal No. (Wire color)		Description		Condition	Value (Approx.)
+	–	Signal name	Input/ Output		
140 (G)	152 (GR)	Brake pedal position switch	Input	[Ignition switch: OFF] • Brake pedal: Fully released	0 V
				[Ignition switch: ON] • Brake pedal: Slightly depressed	0 V
141 (L)	152 (GR)	EVAP canister vent control valve	Output	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
142 (O)	144 (Y)	Sensor power supply (Accelerator pedal position sensor 2)	—	[Ignition switch: ON]	5 V
143 (W)	144 (Y)	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 - 2.1 V
144 (Y)	—	Sensor ground (Accelerator pedal position sensor 2)	—	—	—
145 (G)	152 (GR)	Power supply for ECM	Input	[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14 V)
146 (V)	151 (GR)	Sensor power supply (Accelerator pedal position sensor 1)	—	[Ignition switch: ON]	5 V
147 (GR)	—	ECM ground	—	—	—
148 (Y)	—	Sensor ground (EVAP control system pressure sensor, Fuel tank temperature sensor)	—	—	—
149 (GR)	—	ECM ground	—	—	—
150 (R)	151 (GR)	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
151 (GR)	—	Sensor ground (Accelerator pedal position sensor 1)	—	—	—
152 (GR)	—	ECM ground	—	—	—

Fail Safe

INFOID:0000000012198247

Description

When a DTC is detected, ECM executes a mode (in the Fail-safe mode) applicable to the DTC. The fail-safe mode has the preset traveling control mode (accelerator angle variation and engine output limit) and device fix mode.

Fail safe mode		Vehicle behavior
Traveling control mode	Accelerator angle variation control	ECM controls the accelerator pedal depression speed to make it slower than actual speed. This causes a drop in accelerating performance and encourages the driver to repair malfunction. **NOTE:** ECM does not control the accelerator pedal releasing speed.
	Engine output control	ECM reduces the engine output, according to the rise in engine speed. This reduces the vehicle speed to encourage the driver to repair malfunction. • Engine output control 1: Limits the maximum speed to 120 km/h (75 MPH)* • Engine output control 2: Limits the maximum speed to 55 km/h (34 MPH)* *: This value is a reference value converted from engine power to vehicle speed. Actual power limitation value differs due to the malfunctioning part and driving condition.
Device fix mode		• This mode fixes the IVT control solenoid valve and the EVT control solenoid valve in the reference position. • A control signals is not transmitted to EGR volume control valve and the EGR volume control is deactivated. • The Intake manifold runner control valve motor is turned OFF (Intake manifold runner control valve opens).
Combustion control mode	Stratified charge combustion control at starting	No stratified charge combustion at starting (cold start).
	Idle speed control	Stops feedback control of idle speed and controls with specified speed.
	Recovery speed control at decelerating	Stops recovery speed control by the fuel cut at decelerating and controls with specified speed.
	Idle neutral control	Stops idle neutral control.
	Ignition timing correction control	Partially controls ignition timing control.
	Retardation control	Controls ignition timing delay control in the intermediate water temperature range.

Fail Safe Pattern

Pattern	Fail safe mode	
A	Traveling control mode	Accelerator angle variation control
B		Engine output control 1
C		Engine output control 2
D	Device fix mode	
E	Combustion control mode	Stratified charge combustion control at starting
F		• Idle speed control • Recovery speed control at decelerating • Idle neutral control
G		• Ignition timing correction control • Retardation control

Fail Safe List

×:Applicable —: Not applicable

DTC No.	Detected items	Vehicle behavior							
		Pattern							Others
		A	B	C	D	E	F	G	
P0011 P0075 P052A P052B	Intake valve timing control	—	—	—	×	—	—	—	—
P0014 P0078	Exhaust valve timing control	—	—	—	×	—	—	—	—
P0046	Electric wastegate control actuator	×	×	—	×	—	—	—	The ECM stops the electric wastegate actuator control, engine can not be supercharged driving.The ECM requlates engine power limiter and EGR Off.
P0087 P0090	FRP control system	×	—	×	×	×	—	—	—
P0088	FRP control system	×	—	×	—	×	—	—	—
P00B3 P00B4	Engine coolant temperature sensor 2	—	—	—	—	—	—	—	High coolant temperature control does not function.
P0101 P0102 P0103	Mass air flow sensor	×	×	—	×	×	×	×	**NOTE:** Fail-safe mode may not start depending on malfunction type of ECM
P0117 P0118	Engine coolant temperature sensor 1	—	—	—	—	×	×	—	The engine speed does not exceed 2,000 rpm due to fuel cut
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	—	—	—	×	—	—	—	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.
P0171 P0172	Fuel injection system	×	—	—	—	×	×	—	—
P0190	FRP sensor	×	×	×	×	×	×	—	High pressure fuel pump is activated at maximum discharge pressure. **NOTE:** Fail-safe mode may not start depending on malfunction type of ECM
P0192	FRP sensor	×	×	—	—	×	—	—	High pressure fuel pump is activated at maximum discharge pressure. **NOTE:** Fail-safe mode may not start depending on malfunction type of ECM
P0193	FRP sensor	×	×	—	—	×	—	—	High pressure fuel pump is activated at maximum discharge pressure. **NOTE:** Fail-safe mode may not start depending on malfunction type of ECM
P0196 P0197 P0198	Engine oil temperature sensor	—	—	—	—	—	—	—	Exhaust valve timing control does not function.
P0201 P0202 P0203 P0204	Injector	×	—	×	—	×	—	—	—
P0237	Turbocharger boost sensor	×	×	—	×	—	—	—	—

DTC No.	Detected items	Vehicle behavior							
		Pattern							Others
		A	B	C	D	E	F	G	
P0300 P0301 P0302 P0303 P0304	Misfire	×	—	—	—	×	×	—	—
P0335	Crankshaft position sensor	—	—	—	×	—	—	—	—
P0340	Camshaft position sensor	—	—	—	×	—	—	—	—
P0365	Exhaust valve timing control position sensor	—	—	—	×	—	—	—	—
P0401 P0402	EGR system	—	—	—	×	—	—	—	—
P0404	EGR volume control valve	×	—	×	×	×	×	—	—
P0407 P0408 P046E P046F P0486	EGR pressure sensor	—	—	—	×	—	—	—	—
P0448	EVAP canister vent control valve	×	—	—	×	—	—	—	—
P044A P044B P044C P044D P044E	EGR volume control valve position sensor	×	—	—	×	—	—	—	—
P0500	Vehicle speed sensor	×	—	—	—	×	×	—	—
P0501 P2159		×	—	—	—	×	—	—	
P050A	Cold start control	×	—	—	—	×	—	—	—
P0524	Engine oil pressure	—	—	—	—	—	—	—	• ECM illuminates oil pressure warning lamp on the combination meter. • Engine speed will not rise more than 4,000rpm due to the fuel cut. • Fail-safe is canceled when ignition switch OFF → ON.
P0603 P0607	ECM	×	×	—	—	—	—	—	—
P0604 P0605 P0606 P060B		—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P060A		×	×	—	×	—	—	—	**NOTE:** Fail-safe mode may not start depending on malfunction type of ECM
P062B		×	—	×	—	×	—	—	
P0643	Sensor power supply	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P119A	FRP sensor	×	—	—	—	×	—	—	—
P119B	FRP sensor	×	—	—	—	×	—	—	—
P119C	FRP sensor	×	—	—	—	×	—	—	—
P1197	Out of gas	—	—	×	×	—	—	—	—

DTC No.	Detected items	Vehicle behavior							
		Pattern							Others
		A	B	C	D	E	F	G	
P1217	Engine over temperature	—	—	—	—	—	—	—	The engine speed does not exceed 2,000 rpm due to fuel cut
P159B	G sensor	×	—	—	—	×	—	—	—
P2100 P2103	Throttle control motor relay	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P2004	Intake manifold runner control valve	—	—	—	×	—	—	—	—
P2014	Intake manifold runner control valve position sensor	—	—	—	×	—	—	—	—
P2016	Intake manifold runner control valve position sensor	—	—	—	×	—	—	—	—
P2017	Intake manifold runner control valve position sensor	—	—	—	×	—	—	—	—
P2018	Intake manifold runner control valve position sensor	—	—	—	×	—	—	—	—
P2101	Electric throttle control function	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P2118	Throttle control motor	—	—	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P2119	Electric throttle control actuator	×	×	—	×	—	—	—	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. **NOTE:** Fail-safe mode may not start depending on malfunction type of ECM
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	—	—	—	×	—	—	—	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.
P2162	Vehicle speed sensor	×	—	—	—	×	—	—	—
P2263	Turbocharger system	×	×	—	×	—	—	—	—
P2562 P2566	Electric wastegate control valve position sensor	×	×	—	×	—	—	—	The ECM stops the electric wastegate actuator control, engine can not be supercharged driving.The ECM requlates engine power limiter and EGR Off.
P2563	Electric wastegate control valve position sensor	×	×	—	×	—	—	—	—
P2564	Electric wastegate control valve position sensor	×	×	—	×	—	—	—	—

DTC No.	Detected items	Vehicle behavior							
		Pattern							Others
		A	B	C	D	E	F	G	
P2565	Electric wastegate control valve position sensor	×	×	—	×	—	—	—	—
P26A3 P26A5 P26A6 P26A7	Multi-way control valve	—	—	—	—	—	—	—	• When detecting a malfunction with the valve closed, ECM fully opens the valve. • When detecting a malfunction with the valve opened, ECM maintains valve angle. • When detecting a malfunction in sensor, ECM fully opens the valve. • ECM limits the engine output depending on malfunctions.

DTC Inspection Priority Chart

INFOID:0000000012198248

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

Priority	Detected items (DTC)
1	• U0101 U0122 U1000 CAN communication line • P0096 P0097 P0098 Intake air temperature sensor 2 • P00B3 P00B4 Engine coolant temperature sensor 2 • P0101 P0102 P0103 Mass air flow sensor • P0106 Turbocharger boost sensor • P010A Manifold absolute pressure sensor • P0111 P0112 P0113 P0127 Intake air temperature sensor 1 • P0116 P0117 P0118 P0125 Engine coolant temperature sensor 1 • P011C Intake air temperature sensor • P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor • P0181 P0182 P0183 Fuel tank temperature sensor • P0190 P0192 P0193 P119A P119B P119C FRP sensor • P0196 P0197 P0198 Engine oil temperature sensor • P0327 P0328 Knock sensor • P0335 Crankshaft position sensor (POS) • P0340 P0365 Camshaft position sensor (PHASE) • P0407 P0408 P046E P046F P0486 EGR pressure sensor • P044A P044B P044C P044D P044E EGR volume control valve position sensor • P0460 P0461 P0462 P0463 Fuel level sensor • P0500 P0501 P2159 P2162 Vehicle speed sensor • P0520 Engine oil pressure sensor • P0603 P0604 P0605 P0606 P0607 P060A P060B P0611 P062B P2610 ECM • P062F Control module • P0643 Sensor power supply • P06DA P06DB Engine oil pressure control solenoid valve • P0850 Park/neutral position (PNP) switch • P1197 Out of gas* • P1550 P1551 P1552 P1553 P1554 Battery current sensor • P1556 P1557 Batter temperature sensor • P158A P159B P159C P159D G sensor • P1610 - P1612 NATS • P2014 P2016 P2017 P2018 Intake manifold runner control valve position sensor • P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor • P2562 P2563 P2564 P2565 P2566 Electric wastegate control valve position sensor • P2610 ECM • P26A5 P26A6 P26A7 P26AB Multi-way control valve position sensor

Priority	Detected items (DTC)
2	• P0030 P0031 P0032 Air fuel ratio (A/F) sensor 1 heater • P0037 P0038 Heated oxygen sensor 2 heater • P0046 Electric wastegate control actuator • P0075 Intake valve timing control solenoid valve • P0078 Exhaust valve timing control solenoid valve • P0090 FRP control system • P00C1 P00C2 Turbocharger bypass valve • P0130 P0131 P0132 P014C P014D P015A P015B P2096 P2097 Air fuel ratio (A/F) sensor 1 • P0137 P0138 P0139 Heated oxygen sensor 2 • P0235 P0237 P0238 Turbocharger boost sensor • P0402 P0404 EGR valve • P0441 EVAP control system purge flow monitoring • P0443 P0444 P0445 EVAP canister purge volume control solenoid valve • P0447 P0448 EVAP canister vent control valve • P0451 P0452 P0453 EVAP control system pressure sensor • P1217 Engine over temperature (OVERHEAT) • P1451 Pressure sensor • P1805 Brake switch • P2004 Intake manifold runner control valve • P2100 P2103 Throttle control motor relay • P2101 Electric throttle control function • P2118 Throttle control motor • P26A3 Multi-way control valve
3	• P0011 P052A P052B Intake valve timing control • P0014 Exhaust valve timing control • P0087 P0088 FRP control system • P0171 P0172 Fuel injection system function • P0201 P0202 P0203 P0204 Injector • P0234 P2263 Turbocharger system • P0300 P0301 P0302 P0303 P0304 Misfire • P0401 EGR system • P0420 Three way catalyst function • P0456 EVAP control system (VERY SMALL LEAK) • P0506 P0507 Idle speed control system • P050A P050B P050E P1423 P1424 Cold start control • P0524 Engine oil pressure • P100C Valve timing offset data not written • P1148 Closed loop control • P1212 TCS communication line • P1564 ASCD steering switch • P1572 ASCD brake switch • P1574 ASCD vehicle speed sensor • P2119 Electric throttle control actuator • P219A Air fuel ratio sensor

NOTE:
*: If “P1197” is displayed with other DTC in priority 1, perform trouble diagnosis for “P1197” first.

DTC Index

INFOID:0000000012198249

×:Applicable —: Not applicable

DTC[*1]		Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group[*8]	Reference page
CONSULT GST[*2]	ECM[*3]						
U0101	0101	LOST COMM (TCM)	—	1	×	B	EC-796
U0122	0122	VDC MDL	—	2	×	B	EC-797
U1000	1000[*4]	CAN COMM CIRCUIT	—	2	—	—	EC-798
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	Flashing[*7]	—	—
P0011	0011	INT/V TIM CONT-B1	×	2	×	B	EC-799

DTC[*1]		Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group[*8]	Reference page
CONSULT GST[*2]	ECM[*3]						
P0014	0014	EXH/V TIM CONT-B1	×	2	×	B	EC-802
P0030	0030	HO2S1 HTR B1	—	2	×	B	EC-805
P0031	0031	A/F SEN1 HTR (B1)	—	2	×	B	EC-805
P0032	0032	A/F SEN1 HTR (B1)	—	2	×	B	EC-805
P0037	0037	HO2 HTR (B1)	—	2	×	B	EC-808
P0038	0038	HO2 HTR (B1)	—	2	×	B	EC-808
P0046	0046	TC/SC BOOST CONTROL A	—	2	×	B	EC-811
P0075	0075	INT/V TIM V/CIR-B1	—	2	×	B	EC-813
P0078	0078	EX V/T ACT/CIRC-B1	—	2	×	B	EC-816
P0087	0087	LOW FUEL PRES	—	2	×	A or B	EC-819
P0088	0088	HIGH FUEL PRES	—	2	×	A or B	EC-823
P0090	0090	FUEL PUMP	—	2	×	B	EC-826
P0096	0096	IAT SENSOR 2 B1	—	2	×	B	EC-829
P0097	0097	IAT SENSOR 2 B1	—	2	×	B	EC-831
P0098	0098	IAT SENSOR 2 B1	—	2	×	B	EC-831
P00B3	00B3	RADIATOR COOLANT TEMP SEN	—	2	—	B	EC-834
P00B4	00B4	RADIATOR COOLANT TEMP SEN	—	2	—	B	EC-834
P00C1	00C1	TC/SC BYPASS VALVE B	—	2	×	B	EC-836
P00C2	00C2	TC/SC BYPASS VALVE B	—	2	×	B	EC-836
P0101	0101	MAF SEN/CIRCUIT-B1	—	2	×	B	EC-838
P0102	0102	MAF SEN/CIRCUIT-B1	—	1	×	B	EC-843
P0103	0103	MAF SEN/CIRCUIT-B1	—	1	×	B	EC-843
P0106	0106	ABSL PRES SEN/CIRC	—	2	×	B	EC-848
P010A	010A	ABSL PRES SEN/CIRC	—	2	×	B	EC-851
P0111	0111	IAT SENSOR 1 B1	—	2	×	A	EC-854
P0112	0112	IAT SEN/CIRCUIT-B1	—	2	×	B	EC-856
P0113	0113	IAT SEN/CIRCUIT-B1	—	2	×	B	EC-856
P0116	0116	ECT SENSOR	—	2	×	A	EC-858
P0117	0117	ECT SEN/CIRC	—	1	×	B	EC-860
P0118	0118	ECT SEN/CIRC	—	1	×	B	EC-860
P011C	011C	ECT SEN/CIRC	—	2	×	B	EC-862
P0122	0122	TP SEN 2/CIRC-B1	—	1	×	B	EC-864
P0123	0123	TP SEN 2/CIRC-B1	—	1	×	B	EC-864
P0125	0125	ECT SEN/CIRC	—	2	×	B	EC-867
P0127	0127	IAT SENSOR-B1	—	2	×	B	EC-869
P0130	0130	A/F SENSOR1 (B1)	×	2	×	A	EC-871
P0131	0131	A/F SENSOR1 (B1)	—	2	×	B	EC-875
P0132	0132	A/F SENSOR1 (B1)	—	2	×	B	EC-878
P0137	0137	HO2S2 (B1)	×	2	×	A	EC-881
P0138	0138	HO2S2 (B1)	×	2	×	A	EC-887
P0139	0139	HO2S2 (B1)	×	2	×	A	EC-894

DTC[*1]		Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group[*8]	Reference page
CONSULT GST[*2]	ECM[*3]						
P014C	014C	A/F SENSOR1 (B1)	×	2	×	A	EC-900
P014D	014D	A/F SENSOR1 (B1)	×	2	×	A	EC-900
P015A	015A	A/F SENSOR1 (B1)	×	2	×	A	EC-900
P015B	015B	A/F SENSOR1 (B1)	×	2	×	A	EC-900
P0171	0171	FUEL SYS-LEAN-B1	—	2	×	B	EC-905
P0172	0172	FUEL SYS-RICH-B1	—	2	×	B	EC-909
P0181	0181	FTT SENSOR	—	2	×	A and B	EC-913
P0182	0182	FTT SEN/CIRCUIT	—	2	×	B	EC-913
P0183	0183	FTT SEN/CIRCUIT	—	2	×	B	EC-913
P0190	0190	FUEL PRES SEN/CIRC	—	1	×	B	EC-919
P0192	0192	FRP SEN/CIRC	—	2	×	B	EC-919
P0193	0193	FRP SEN/CIRC	—	2	×	B	EC-919
P0196	0196	EOT SENSOR	—	2	×	A and B	EC-922
P0197	0197	EOT SEN/CIRC	—	2	×	B	EC-926
P0198	0198	EOT SEN/CIRC	—	2	×	B	EC-926
P0201	0201	INJECTOR CIRC-CYL1	—	2	×	B	EC-928
P0202	0202	INJECTOR CIRC-CYL2	—	2	×	B	EC-928
P0203	0203	INJECTOR CIRC-CYL3	—	2	×	B	EC-928
P0204	0204	INJECTOR CIRC-CYL4	—	2	×	B	EC-928
P0222	0222	TP SEN 1/CIRC-B1	—	1	×	B	EC-929
P0223	0223	TP SEN 1/CIRC-B1	—	1	×	B	EC-929
P0234	0234	TC SYSTEM-B1	—	1 or 2	×	B	EC-932
P0235	0235	TURBO BOOST SENSOR	—	2	×	B	EC-935
P0237	0237	TC BOOST SEN/CIRC-B1	—	2	×	B	EC-938
P0238	0238	TC BOOST SEN/CIRC-B1	—	2	×	B	EC-938
P0300	0300	MULTI CYL MISFIRE	—	1 or 2	× or —	B	EC-941
P0301	0301	CYL 1 MISFIRE	—	1 or 2	× or —	B	EC-941
P0302	0302	CYL 2 MISFIRE	—	1 or 2	× or —	B	EC-941
P0303	0303	CYL 3 MISFIRE	—	1 or 2	× or —	B	EC-941
P0304	0304	CYL 4 MISFIRE	—	1 or 2	× or —	B	EC-941
P0327	0327	KNOCK SEN/CIRC-B1	—	2	—	—	EC-947
P0328	0328	KNOCK SEN/CIRC-B1	—	2	—	—	EC-947
P0335	0335	CKP SEN/CIRCUIT	—	2	×	B	EC-949
P0340	0340	CMP SEN/CIRC-B1	—	2	×	B	EC-952
P0365	0365	CMP SEN/CIRC-B1	—	2	×	B	EC-955
P0401	0401	EGR A FLOW INSUFFICIENT	×	1 or 2	×	A	EC-959
P0402	0402	EGRC-BPT VALVE	×	2	×	A	EC-959
P0404	0404	EGR A CONTROL	—	2	×	B	EC-961
P0407	0407	EGR SENSOR B	—	2	×	B	EC-963
P0408	0408	EGR SENSOR B	—	2	×	B	EC-963
P0420	0420	TW CATALYST SYS-B1	×	2	×	A	EC-966
P0441	0441	EVAP PURG FLOW/MON	×	2	×	A	EC-971

DTC[*1]		Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group[*8]	Reference page
CONSULT GST[*2]	ECM[*3]						
P0443	0443	PURG VOLUME CONT/V	×	2	×	A	EC-977
P0444	0444	PURG VOLUME CONT/V	—	2	×	B	EC-982
P0445	0445	PURG VOLUME CONT/V	—	2	×	B	EC-982
P0447	0447	VENT CONTROL VALVE	—	2	×	B	EC-985
P0448	0448	VENT CONTROL VALVE	—	2	×	B	EC-989
P044A	044A	EGR SENSOR C	—	2	×	B	EC-993
P044B	044B	EGR SENSOR C	—	2	×	A	EC-996
P044C	044C	EGR SENSOR C	—	2	×	B	EC-999
P044D	044D	EGR SENSOR C	—	2	×	B	EC-999
P044E	044E	EGR SENSOR C	—	2	×	B	EC-993
P0451	0451	EVAP SYS PRES SEN	—	2	×	A	EC-1002
P0452	0452	EVAP SYS PRES SEN	—	2	×	B	EC-1005
P0453	0453	EVAP SYS PRES SEN	—	2	×	A	EC-1008
P0456	0456	EVAP VERY SML LEAK	×	2	×	A	EC-1012
P0460	0460	FUEL LEV SEN SLOSH	—	2	×	A	EC-1018
P0461	0461	FUEL LEVEL SENSOR	—	2	×	B	EC-1019
P0462	0462	FUEL LEVL SEN/CIRC	—	2	×	B	EC-1021
P0463	0463	FUEL LEVL SEN/CIRC	—	2	×	B	EC-1021
P046E	046E	EGR SENSOR B	—	2	×	B	EC-1022
P046F	046F	EGR SENSOR B	—	2	×	B	EC-1025
P0486	0486	EGR SENSOR B	—	2	×	B	EC-1025
P0500	0500	VEHICLE SPEED SEN A[*5]	—	2	×	B	EC-1027 (CVT) EC-1028 (M/T)
P0501	0501	VEHICLE SPEED SEN A	—	2	×	B	EC-1031
P0506	0506	ISC SYSTEM	—	2	×	B	EC-1032
P0507	0507	ISC SYSTEM	—	2	×	B	EC-1034
P050A	050A	COLD START CONTROL	—	2	×	A	EC-1036
P050B	050B	COLD START CONTROL	—	2	×	A	EC-1036
P050E	050E	COLD START CONTROL	—	2	×	A	EC-1036
P0520	0520	EOP SENSOR/SWITCH	—	2	—	—	EC-1038
P0524	0524	ENGINE OIL PRESSURE	—	1	—	—	EC-1041
P052A	052A	CAMSHAFT POSITION TIMING B1	×	2	×	B	EC-1044
P052B	052B	CAMSHAFT POSITION TIMING B1	×	2	×	B	EC-1044
P0603	0603	ECM BACK UP/CIRCUIT[*6]	—	2	× or —	B	EC-1050
P0604	0604	ECM	—	1	×	B	EC-1051
P0605	0605	ECM	—	1 or 2	×	B	EC-1052
P0606	0606	CONTROL MODULE	—	1	× or —	B	EC-1053
P0607	0607	ECM	—	1 or 2	× or —	B	EC-1054
P060A	060A	CONTROL MODULE	—	1	× or —	B	EC-1055
P060B	060B	CONTROL MODULE	—	1	×	B	EC-1056

DTC[*1]		Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group[*8]	Reference page
CONSULT GST[*2]	ECM[*3]						
P0611	0611	FIC MODULE	—	2	×	B	EC-1057
P062B	062B	ECM	—	2	×	B	EC-1058
P062F	062F	CONTROL MODULE	—	1	×	B	EC-1059
P0643	0643	SENSOR POWER/CIRC	—	1	×	B	EC-1060
P06DA	06DA	ENGINE OIL PRESSURE CONTROL	—	2	—	B	EC-1063
P06DB	06DB	ENGINE OIL PRESSURE CONTROL	—	2	—	B	EC-1063
P0850	0850	P-N POS SW/CIRCUIT	—	2	×	B	EC-1065
P100C	100C	V/T OFFSET DATA NOT WRITTEN	—	2	—	B	EC-1069
P1148	1148	CLOSED LOOP-B1	—	1	×	A	EC-1070
P1197	1197	FUEL RUN OUT	—	2	—	—	EC-1071
P119A	119A	FUEL PRESSURE SENSOR	—	2	×	A	EC-1073
P119B	119B	FUEL PRESSURE SENSOR	—	2	×	A	EC-1073
P119C	119C	FUEL PRESSURE SENSOR	—	2	×	B	EC-1077
P1212	1212	TCS/CIRC	—	2	—	—	EC-1080
P1217	1217	ENG OVER TEMP	—	1	×	B	EC-1081
P1225	1225	CTP LEARNING-B1	—	2	—	—	EC-1084
P1226	1226	CTP LEARNING-B1	—	2	—	—	EC-1085
P1423	1423	COLD START CONTROL	—	2	×	B	EC-1086
P1424	1424	COLD START CONTROL	—	2	×	B	EC-1086
P1451	1451	TC/SC PR/S-EVAP PR/S	—	2	×	B	EC-1088
P1550	1550	BAT CURRENT SENSOR	—	2	—	—	EC-1091
P1551	1551	BAT CURRENT SENSOR	—	2	—	—	EC-1094
P1552	1552	BAT CURRENT SENSOR	—	2	—	—	EC-1094
P1553	1553	BAT CURRENT SENSOR	—	2	—	—	EC-1097
P1554	1554	BAT CURRENT SENSOR	—	2	—	—	EC-1100
P1556	1556	BAT TMP SEN/CIRC	—	2	—	—	EC-1103
P1557	1557	BAT TMP SEN/CIRC	—	2	—	—	EC-1103
P1564	1564	ASCD SW	—	1	—	—	EC-1105
P1572	1572	ASCD BRAKE SW	—	1	—	—	EC-1108
P1574	1574	ASCD VHL SPD SEN	—	1	—	—	EC-1113
P158A	158A	G SENSOR	—	1	—	—	EC-1115
P159B	159B	G SENSOR	—	2	×	B	EC-1116
P159C	159C	G SENSOR	—	2	×	B	EC-1120
P159D	159D	G SENSOR	—	2	×	B	EC-1120
P1610	1610	LOCK MODE	—	2	—	—	SEC-50
P1611	1611	ID DISCORD, IMMU-ECM	—	2	—	—	SEC-51
P1612	1612	CHAIN OF ECM-IMMU	—	2	—	—	SEC-52
P1805	1805	BRAKE SW/CIRCUIT	—	2	—	—	EC-1124
P2004	2004	SWIRL CONT/V (B1)	—	2	×	A	EC-1126
P2014	2014	SWIRL CONT SEN/SW	—	2	×	B	EC-1129

DTC[*1]		Items (CONSULT screen terms)	SRT code	Trip	MIL	Permanent DTC group[*8]	Reference page
CONSULT GST[*2]	ECM[*3]						
P2016	2016	IN/MANIFOLD RUNNER POS SEN B1	—	2	×	B	EC-1129
P2017	2017	IN/MANIFOLD RUNNER POS SEN B1	—	2	×	B	EC-1129
P2018	2018	IN/MANIFOLD RUNNER POS SEN B1	—	2	×	B	EC-1129
P2096	2096	POST CATALYST FUEL TRIM SYS B1	—	2	×	A	EC-1132
P2097	2097	POST CATALYST FUEL TRIM SYS B1	—	2	×	A	EC-1132
P2100	2100	ETC MOT PWR-B1	—	1	×	B	EC-1136
P2101	2101	ETC FNCTN/CIRC-B1	—	1	×	B	EC-1138
P2103	2103	ETC MOT PWR	—	1	×	B	EC-1136
P2118	2118	ETC MOT-B1	—	1	×	B	EC-1141
P2119	2119	ETC ACTR-B1	—	1	×	B	EC-1143
P2122	2122	APP SEN 1/CIRC	—	1	×	B	EC-1145
P2123	2123	APP SEN 1/CIRC	—	1	×	B	EC-1145
P2127	2127	APP SEN 2/CIRC	—	1	×	B	EC-1148
P2128	2128	APP SEN 2/CIRC	—	1	×	B	EC-1148
P2135	2135	TP SENSOR-B1	—	1	×	B	EC-1150
P2138	2138	APP SENSOR	—	1	×	B	EC-1153
P2159	2159	VEHICLE SPEED SEN B	—	2	×	B	EC-1031
P2162	2162	VEHICLE SPEED SEN A/B	—	2	×	B	EC-1156
P219A	219A	AIR FUEL RATIO	—	2	×	A	EC-1158
P2263	2263	TC SYSTEM-B1	—	2	×	B	EC-1163
P2562	2562	TC BOOST CONTROL POSITN SEN A	—	2	×	B	EC-1168
P2563	2563	TC BOOST CONTROL POSITN SEN A	—	2	×	A	EC-1171
P2564	2564	TC BOOST CONTROL POSITN SEN A	—	2	×	B	EC-1174
P2565	2565	TC BOOST CONTROL POSITN SEN A	—	2	×	B	EC-1174
P2566	2566	TC BOOST CONTROL POSITN SEN A	—	2	×	B	EC-1168
P2610	2610	ECM/PCM INTERNAL ENG OFF TIMER	—	2	×	A and B	EC-1177
P26A3	26A3	ENGINE COOLANT BYPASS VALVE	—	1 or 2	×	B	EC-1179
P26A5	26A5	ENGINE COOLANT B/V A POSI SEN	—	2	×	A	EC-1181
P26A6	26A6	ENGINE COOLANT B/V A POSI SEN	—	2	×	B	EC-1184
P26A7	26A7	ENGINE COOLANT B/V A POSI SEN	—	2	×	B	EC-1184
P26AB	26AB	ENGINE COOLANT B/V A POSI SEN	—	2	×	A	EC-1187

*1: 1st trip DTC No. is the same as DTC No.

*2: This number is prescribed by SAE J1979/ ISO 15031-5.

*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

*4: The trouble diagnosis for this DTC needs CONSULT.

*5: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.

*6: This self-diagnosis is not for ECM power supply circuit, even though “ECM BACK UP/CIRCUIT” is displayed on CONSULT screen.

*7: When the ECM is in the mode that displays SRT status, MIL may blink. For details, Refer to EC-666, "On Board Diagnosis Function".

*8: Refer to EC-779, "Description".

Test Value and Test Limit

INFOID:0000000012820444

The following is the information specified in Service $06 of SAE J1979/ISO 15031-5.
The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
These data (test value and test limit) are specified by On Board Monitor ID (OBDMID), Test ID (TID), Unit and Scaling ID and can be displayed on the GST screen.
The items of the test value and test limit will be displayed with GST screen which items are provided by the ECM. (e.g., if bank 2 is not applied on this vehicle, only the items of bank 1 are displayed)

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	01H	Air fuel ratio (A/F) sensor 1 (Bank 1)	P0131	83H	0BH	Minimum sensor output voltage for test cycle
			P0131	84H	0BH	Maximum sensor output voltage for test cycle
			P0130	85H	0BH	Minimum sensor output voltage for test cycle
			P0130	86H	0BH	Maximum sensor output voltage for test cycle
			P0133	87H	04H	Response rate: Response ratio (lean to rich)
			P0133	88H	04H	Response rate: Response ratio (rich to lean)
			P2A00 or P2096	89H	84H	The amount of shift in air fuel ratio (too lean)
			P2A00 or P2097	8AH	84H	The amount of shift in air fuel ratio (too rich)
			P0130	8BH	0BH	Difference in sensor output voltage
			P0133	8CH	83H	Response gain at the limited frequency
			P014C	8DH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1
			P014C	8EH	04H	O2 sensor slow response - Rich to lean bank 1 sensor 1
			P014D	8FH	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1
			P014D	90H	84H	O2 sensor slow response - Lean to rich bank 1 sensor 1
			P015A	91H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1
			P015A	92H	01H	O2 sensor delayed response - Rich to lean bank 1 sensor 1
			P015B	93H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1
			P015B	94H	01H	O2 sensor delayed response - Lean to rich bank 1 sensor 1
			P0133	95H	04H	Response rate: Response ratio (lean to rich)
			P0133	96H	84H	Response rate: Response ratio (rich to lean)

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
HO2S	02H	Heated oxygen sensor 2 (Bank 1)	P0138	07H	0CH	Minimum sensor output voltage for test cycle
			P0137	08H	0CH	Maximum sensor output voltage for test cycle
			P0138	80H	0CH	Sensor output voltage
			P0139	81H	0CH	Difference in sensor output voltage
			P0139	82H	11H	Rear O2 sensor delay response diagnosis
	03H	Heated oxygen sensor 3 (Bank 1)	P0143	07H	0CH	Minimum sensor output voltage for test cycle
			P0144	08H	0CH	Maximum sensor output voltage for test cycle
			P0146	80H	0CH	Sensor output voltage
			P0145	81H	0CH	Difference in sensor output voltage
	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P0151	83H	0BH	Minimum sensor output voltage for test cycle
			P0151	84H	0BH	Maximum sensor output voltage for test cycle
			P0150	85H	0BH	Minimum sensor output voltage for test cycle
			P0150	86H	0BH	Maximum sensor output voltage for test cycle
			P0153	87H	04H	Response rate: Response ratio (lean to rich)
			P0153	88H	04H	Response rate: Response ratio (rich to lean)
			P2A03 or P2098	89H	84H	The amount of shift in air fuel ratio (too lean)
			P2A03 or P2099	8AH	84H	The amount of shift in air fuel ratio (too rich)
			P0150	8BH	0BH	Difference in sensor output voltage
			P0153	8CH	83H	Response gain at the limited frequency
			P014E	8DH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1
			P014E	8EH	04H	O2 sensor slow response - Rich to lean bank 2 sensor 1
			P014F	8FH	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1
			P014F	90H	84H	O2 sensor slow response - Lean to rich bank 2 sensor 1
			P015C	91H	01H	O2 sensor delayed response - Rich to lean bank 2 sensor 1
			P015C	92H	01H	O2 sensor delayed response - Rich to lean bank 2 sensor 1
			P015D	93H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display) TID	Unit and Scaling ID	Description
HO2S	05H	Air fuel ratio (A/F) sensor 1 (Bank 2)	P015D	94H	01H	O2 sensor delayed response - Lean to rich bank 2 sensor 1
			P0153	95H	04H	Response rate: Response ratio (lean to rich)
			P0153	96H	84H	Response rate: Response ratio (rich to lean)
	06H	Heated oxygen sensor 2 (Bank 2)	P0158	07H	0CH	Minimum sensor output voltage for test cycle
			P0157	08H	0CH	Maximum sensor output voltage for test cycle
			P0158	80H	0CH	Sensor output voltage
			P0159	81H	0CH	Difference in sensor output voltage
			P0159	82H	11H	Rear O2 sensor delay response diagnosis
	07H	Heated oxygen sensor 3 (Bank2)	P0163	07H	0CH	Minimum sensor output voltage for test cycle
			P0164	08H	0CH	Maximum sensor output voltage for test cycle
			P0166	80H	0CH	Sensor output voltage
			P0165	81H	0CH	Difference in sensor output voltage
CATALYST	21H	Three way catalyst function (Bank1)	P0420	80H	01H	O2 storage index
			P0420	82H	01H	Switching time lag engine exhaust index value
			P2423	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2423	84H	84H	O2 storage index in HC trap catalyst
	22H	Three way catalyst function (Bank2)	P0430	80H	01H	O2 storage index
			P0430	82H	01H	Switching time lag engine exhaust index value
			P2424	83H	0CH	Difference in 3rd O2 sensor output voltage
			P2424	84H	84H	O2 storage index in HC trap catalyst
EGR SYSTEM	31H	EGR function	P0400	80H	96H	Low flow faults: EGR temp change rate (short term)
			P0400	81H	96H	Low flow faults: EGR temp change rate (long term)
			P0400	82H	96H	Low flow faults: Difference between max EGR temp and EGR temp under idling condition
			P0400	83H	96H	Low flow faults: Max EGR temp
			P1402	84H	96H	High Flow Faults: EGR temp increase rate
			P0402	85H	FCH	EGR differential pressure high flow
			P0401	86H	37H	EGR differential pressure low flow
			P2457	87H	96H	EGR temperature

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
VVT SYSTEM	35H	VVT Monitor (Bank1)	P0011	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0014	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0011	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0014	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
			P100A	84H	10H	VEL slow response diagnosis
			P1090	85H	10H	VEL servo system diagnosis
			P0011	86H	9DH	VTC intake intermediate lock function diagnosis (VTC intermediate position alignment check diagnosis)
			Advanced: P052A Retarded: P052B	87H	9DH	VTC intake intermediate lock system diagnosis (VTC intermediate lock position check diagnosis)
	36H	VVT Monitor (Bank2)	P0021	80H	9DH	VTC intake function diagnosis (VTC alignment check diagnosis)
			P0024	81H	9DH	VTC exhaust function diagnosis (VTC alignment check diagnosis)
			P0021	82H	9DH	VTC intake function diagnosis (VTC drive failure diagnosis)
			P0024	83H	9DH	VTC exhaust function diagnosis (VTC drive failure diagnosis)
			P100B	84H	10H	VEL slow response diagnosis
			P1093	85H	10H	VEL servo system diagnosis
			P0021	86H	9DH	VTC intake intermediate lock function diagnosis (VTC intermediate position alignment check diagnosis)
			Advanced: P052C Retarded: P052D	87H	9DH	VTC intake intermediate lock system diagnosis (VTC intermediate lock position check diagnosis)
EVAP SYSTEM	39H	EVAP control system leak (Cap Off)	P0455	80H	0CH	Difference in pressure sensor output voltage before and after pull down
	3BH	EVAP control system leak (Small leak)	P0442	80H	05H	Leak area index (for more than 0.04 inch)
	3CH	EVAP control system leak (Very small leak)	P0456	80H	05H	Leak area index (for more than 0.02 inch)
			P0456	81H	FDH	Maximum internal pressure of EVAP system during monitoring
			P0456	82H	FDH	Internal pressure of EVAP system at the end of monitoring
	3DH	Purge flow system	P0441	83H	0CH	Difference in pressure sensor output voltage before and after vent control valve close

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
O2 SENSOR HEATER	41H	A/F sensor 1 heater (Bank 1)	Low Input: P0031 High Input: P0032	81H	0BH	Converted value of heater electric current to voltage
			P0030	83H	0BH	A/F sensor heater circuit malfunction
	42H	Heated oxygen sensor 2 heater (Bank 1)	Low Input: P0037 High Input: P0038	80H	0CH	Converted value of heater electric current to voltage
			P0141	81H	14H	Rear O2 sensor internal impedance
	43H	Heated oxygen sensor 3 heater (Bank 1)	P0043	80H	0CH	Converted value of heater electric current to voltage
	45H	A/F sensor 1 heater (Bank 2)	Low Input: P0051 High Input: P0052	81H	0BH	Converted value of heater electric current to voltage
			P0036	83H	0BH	A/F sensor heater circuit malfunction
	46H	Heated oxygen sensor 2 heater (Bank 2)	Low Input: P0057 High Input: P0058	80H	0CH	Converted value of heater electric current to voltage
			P0161	81H	14CH	Rear O2 sensor internal impedance
	47H	Heated oxygen sensor 3 heater (Bank 2)	P0063	80H	0CH	Converted value of heater electric current to voltage
SECONDARY AIR	71H	Secondary air system	P0411	80H	01H	Secondary air injection system incorrect flow detected
			Bank1: P0491 Bank2: P0492	81H	01H	Secondary air injection system insufficient flow
			P2445	82H	01H	Secondary air injection system pump stuck off
			P2448	83H	01H	Secondary air injection system high airflow
			Bank1: P2440 Bank2: P2442	84H	01H	Secondary air injection system switching valve stuck open
			P2440	85H	01H	Secondary air injection system switching valve stuck open
			P2444	86H	01H	Secondary air injection system pump stuck on

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
FUEL SYSTEM	81H	Fuel injection system function (Bank 1)	P0171 or P0172	80H	2FH	Long term fuel trim
			P0171 or P0172	81H	24H	The number of lambda control clamped
			P117A / P219A	82H	03H	Cylinder A/F imbalance monitoring
			P219C	83H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #1 cylinder parameter
			P219D	84H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #2 cylinder parameter
			P219E	85H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #3 cylinder parameter
			P219F	86H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #4 cylinder parameter
			P21A0	87H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #5 cylinder parameter
			P21A2	89H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #7 cylinder parameter
	82H	Fuel injection system function (Bank 2)	P0174 or P0175	80H	2FH	Long term fuel trim
			P0174 or P0175	81H	24H	The number of lambda control clamped
			P117B / P219B	82H	03H	Cylinder A/F imbalance monitoring
			P219D	84H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #2 cylinder parameter
			P219F	86H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #4 cylinder parameter
			P21A1	88H	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #6 cylinder parameter
			P21A3	8AH	83H	Air-fuel ratio cylinder imbalance diagnosis CPS (Crankshaft Position Sensor) method #8 cylinder parameter

Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A1H	Multiple cylinder misfires	P0301	80H	24H	Misfiring counter at 1000 revolution of the first cylinder
			P0302	81H	24H	Misfiring counter at 1000 revolution of the second cylinder
			P0303	82H	24H	Misfiring counter at 1000 revolution of the third cylinder
			P0304	83H	24H	Misfiring counter at 1000 revolution of the fourth cylinder
			P0305	84H	24H	Misfiring counter at 1000 revolution of the fifth cylinder
			P0306	85H	24H	Misfiring counter at 1000 revolution of the sixth cylinder
			P0307	86H	24H	Misfiring counter at 1000 revolution of the seventh cylinder
			P0308	87H	24H	Misfiring counter at 1000 revolution of the eighth cylinder
			P0300	88H	24H	Misfiring counter at 1000 revolution of the multiple cylinders
			P0301	89H	24H	Misfiring counter at 200 revolution of the first cylinder
			P0302	8AH	24H	Misfiring counter at 200 revolution of the second cylinder
			P0303	8BH	24H	Misfiring counter at 200 revolution of the third cylinder
			P0304	8CH	24H	Misfiring counter at 200 revolution of the fourth cylinder
			P0305	8DH	24H	Misfiring counter at 200 revolution of the fifth cylinder
			P0306	8EH	24H	Misfiring counter at 200 revolution of the sixth cylinder
			P0307	8FH	24H	Misfiring counter at 200 revolution of the seventh cylinder
			P0308	90H	24H	Misfiring counter at 200 revolution of the eighth cylinder
			P0300	91H	24H	Misfiring counter at 1000 revolution of the single cylinder
			P0300	92H	24H	Misfiring counter at 200 revolution of the single cylinder
			P0300	93H	24H	Misfiring counter at 200 revolution of the multiple cylinders

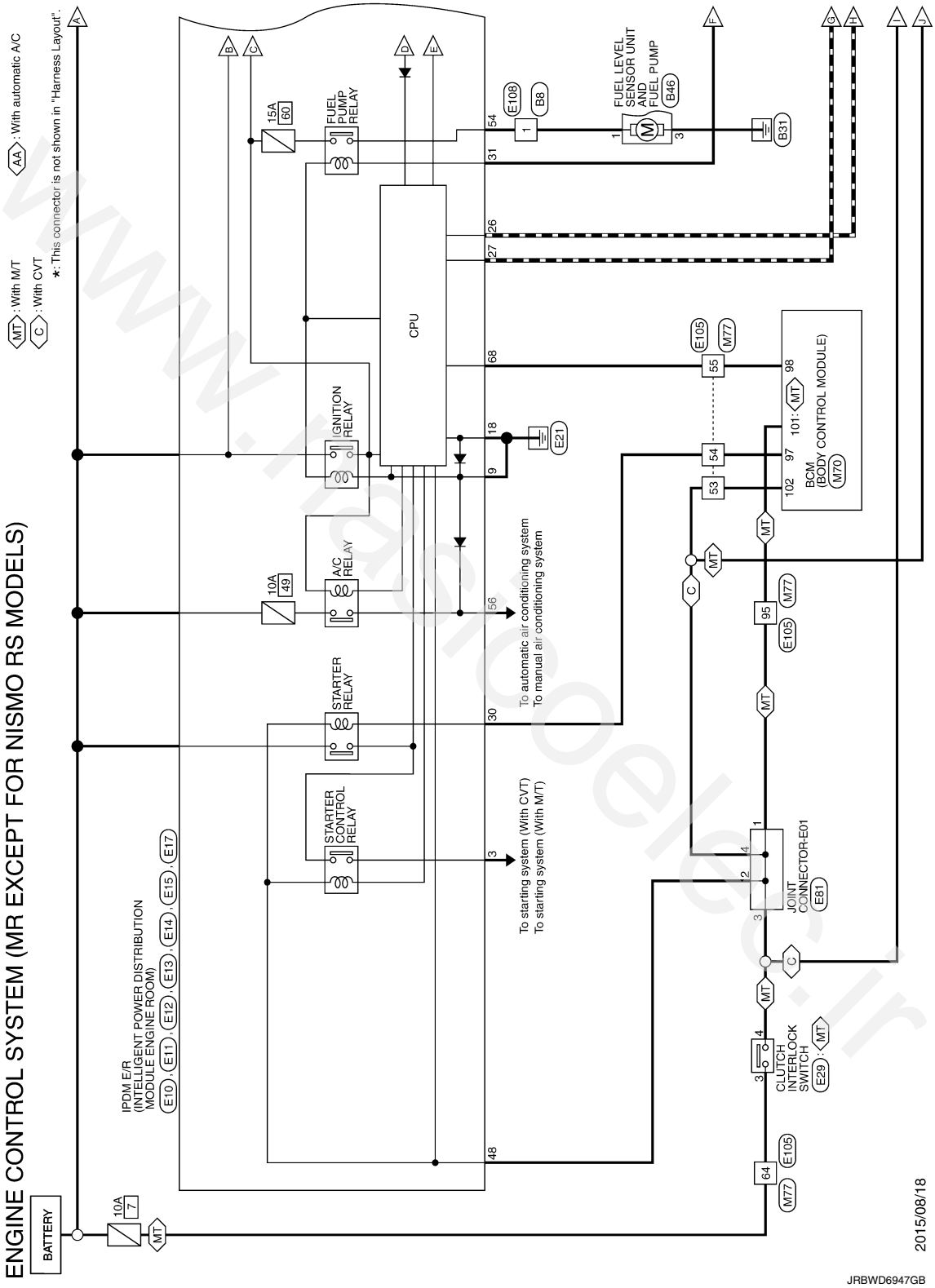
Item	OBD-MID	Self-diagnostic test item	DTC	Test value and Test limit (GST display)		Description
				TID	Unit and Scaling ID	
MISFIRE	A2H	No. 1 cylinder misfire	P0301	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0301	0CH	24H	Misfire counts for last/current driving cycles
	A3H	No. 2 cylinder misfire	P0302	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0302	0CH	24H	Misfire counts for last/current driving cycles
	A4H	No. 3 cylinder misfire	P0303	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0303	0CH	24H	Misfire counts for last/current driving cycles
	A5H	No. 4 cylinder misfire	P0304	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0304	0CH	24H	Misfire counts for last/current driving cycles
	A6H	No. 5 cylinder misfire	P0305	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0305	0CH	24H	Misfire counts for last/current driving cycles
	A7H	No. 6 cylinder misfire	P0306	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0306	0CH	24H	Misfire counts for last/current driving cycles
	A8H	No. 7 cylinder misfire	P0307	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0307	0CH	24H	Misfire counts for last/current driving cycles
	A9H	No. 8 cylinder misfire	P0308	0BH	24H	EWMA (Exponential Weighted Moving Average) misfire counts for last 10 driving cycles
			P0308	0CH	24H	Misfire counts for last/current driving cycles

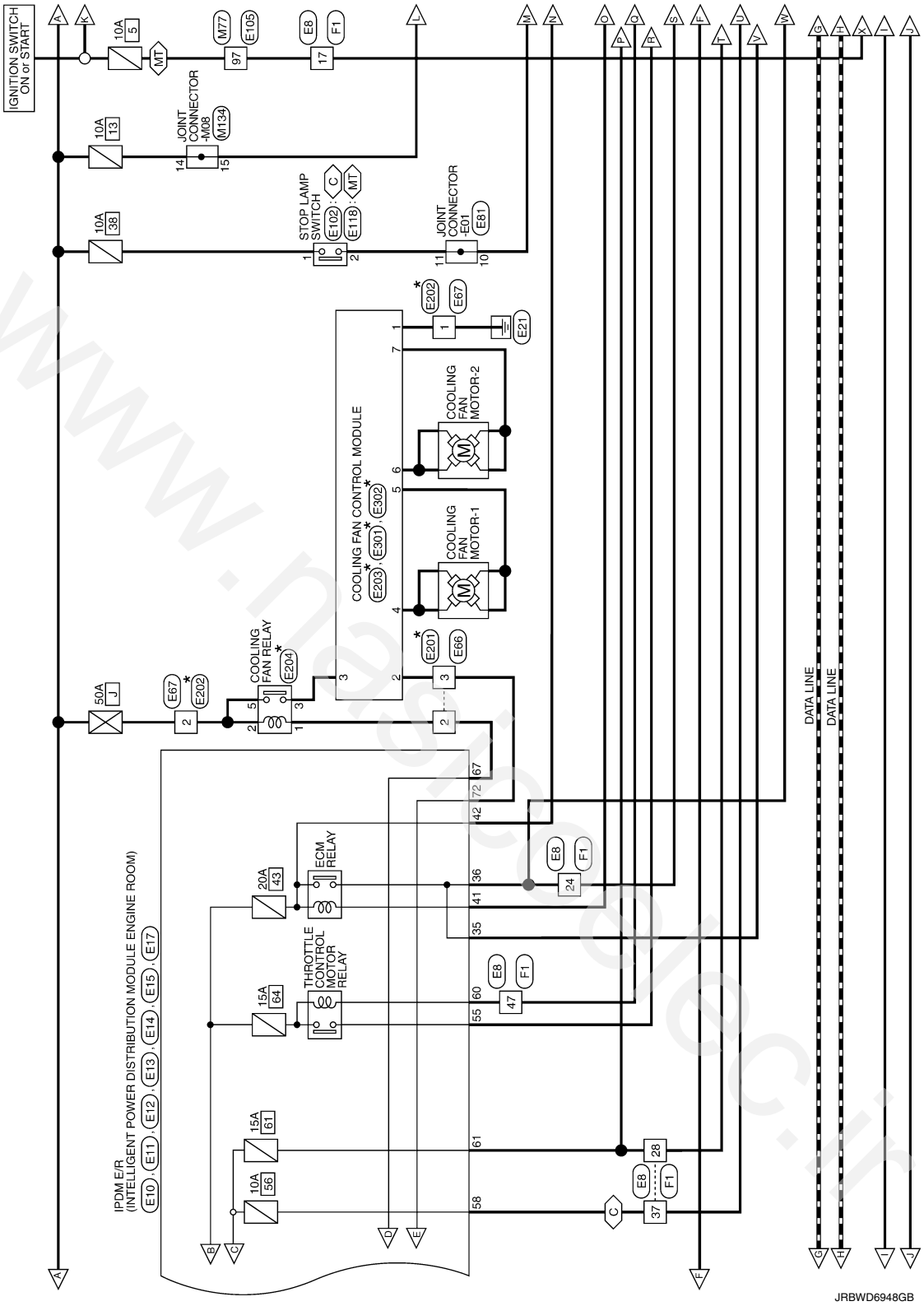
WIRING DIAGRAM

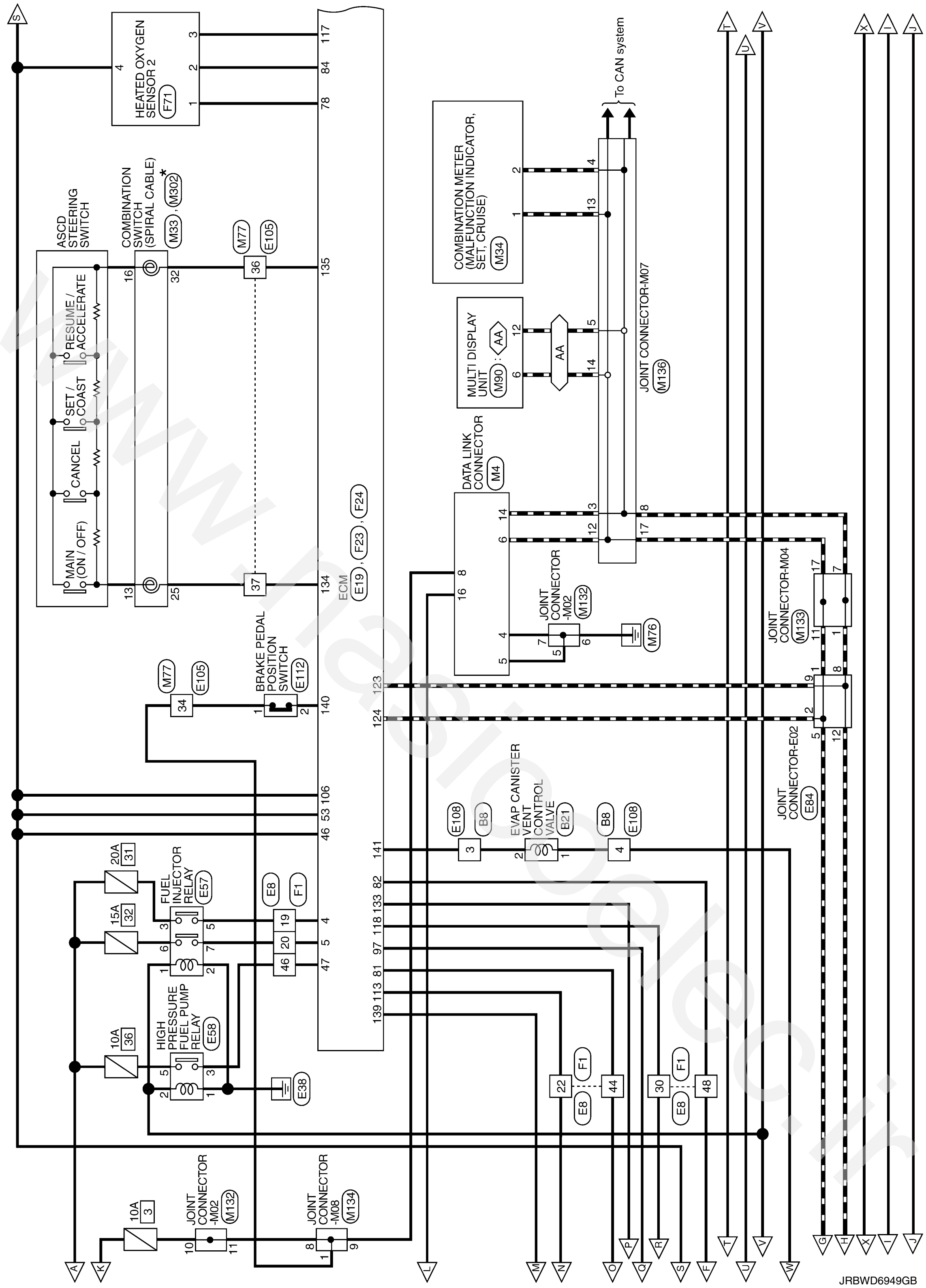
ENGINE CONTROL SYSTEM

Wiring Diagram

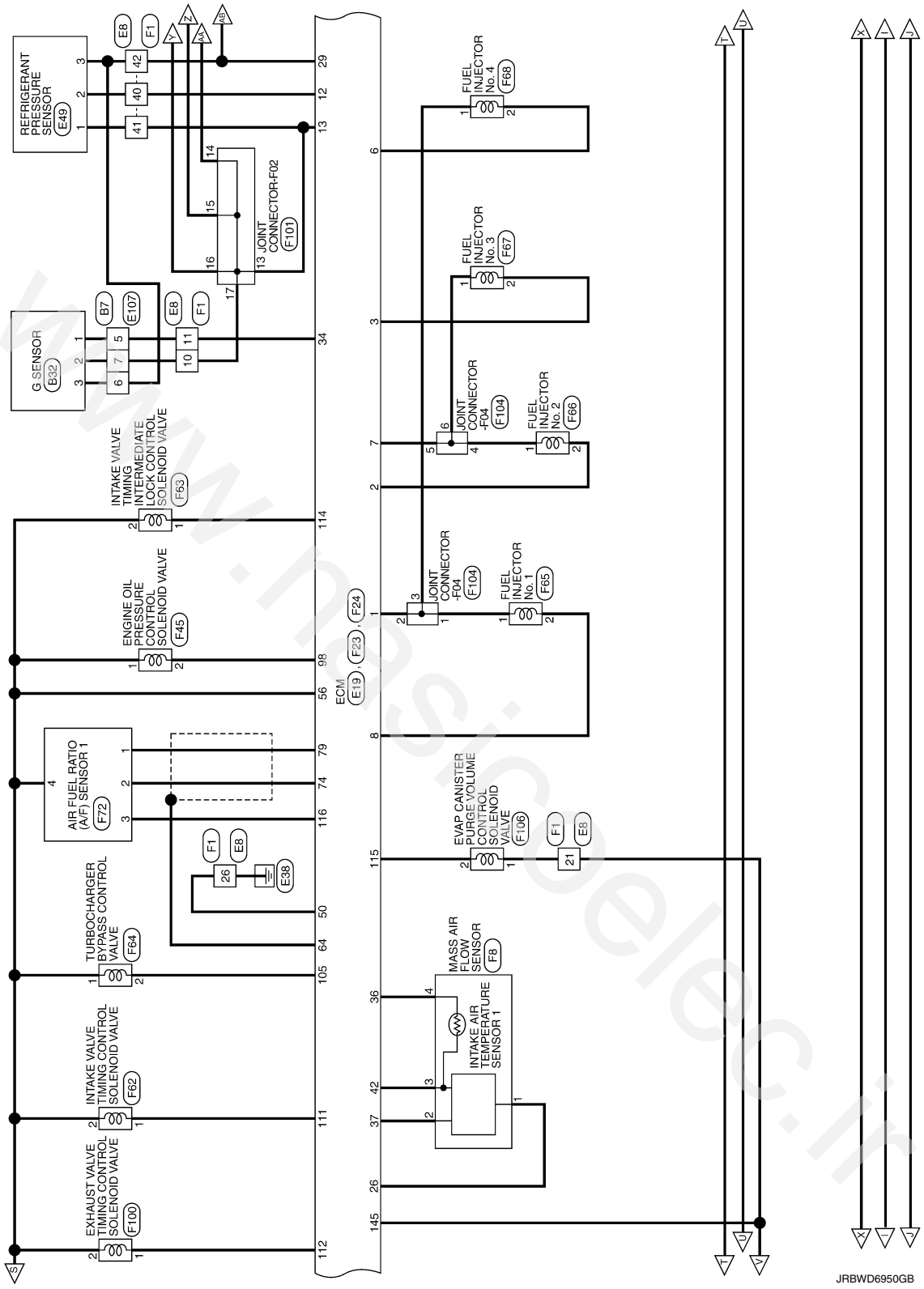
INFOID:0000000012198251

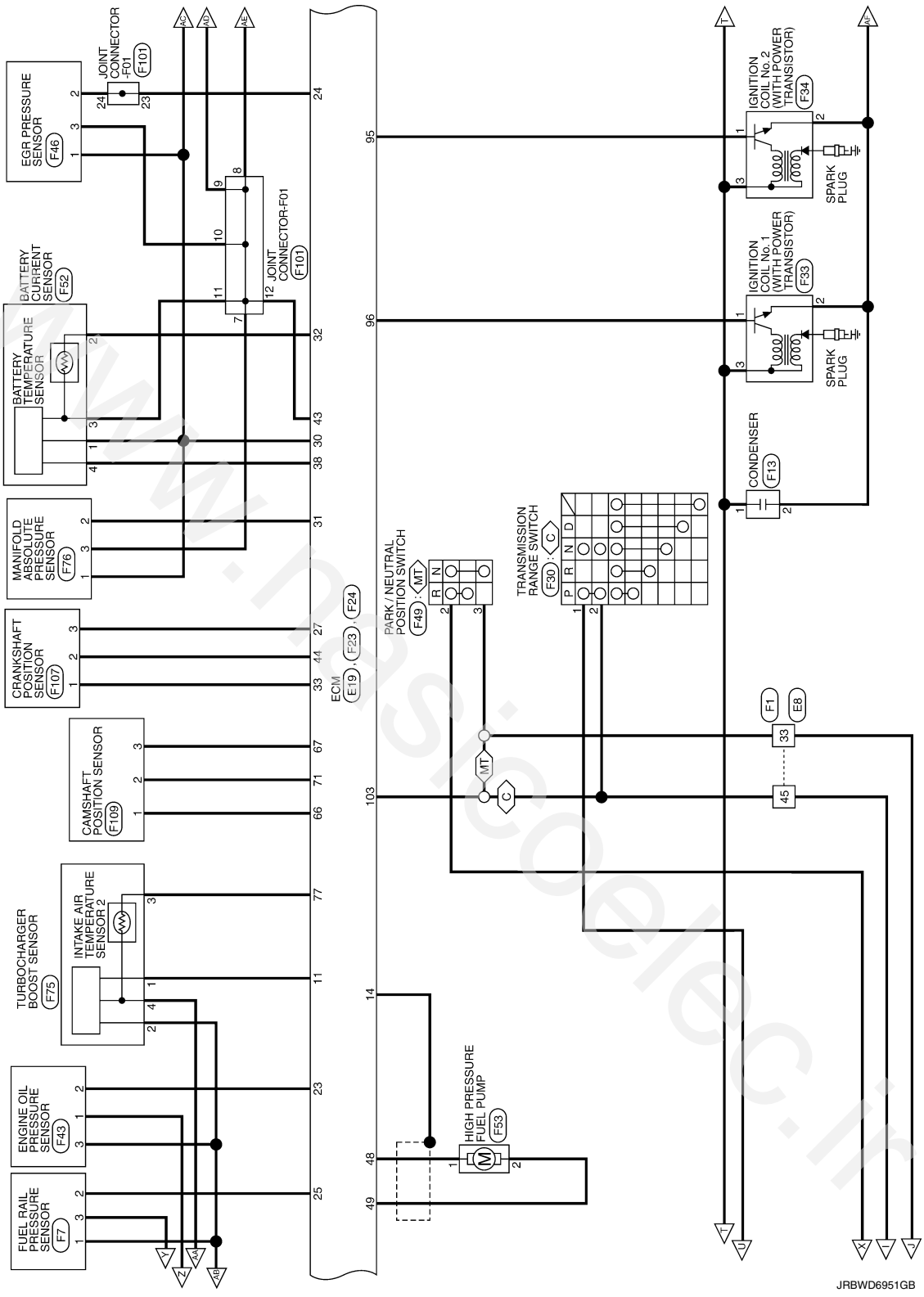


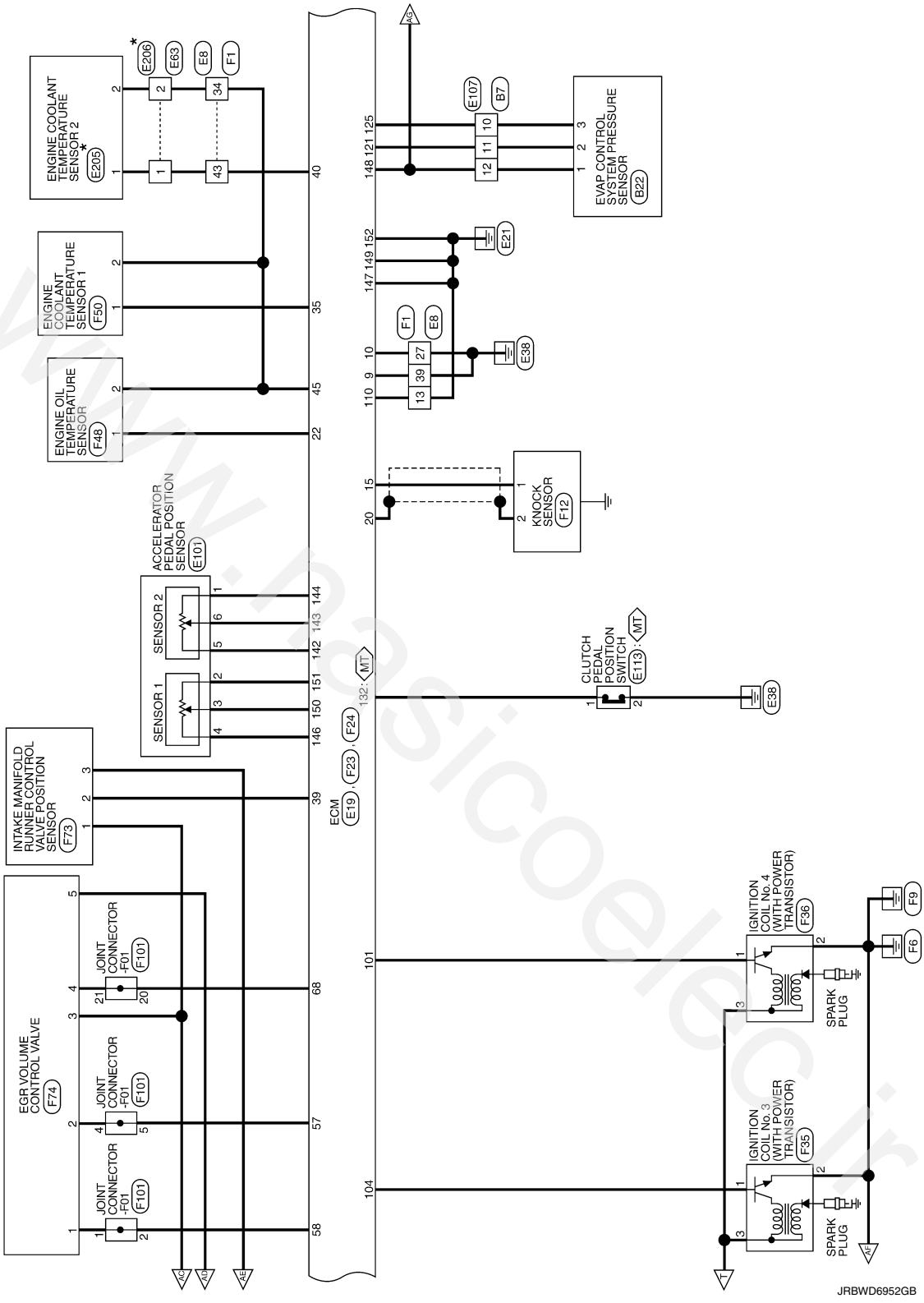


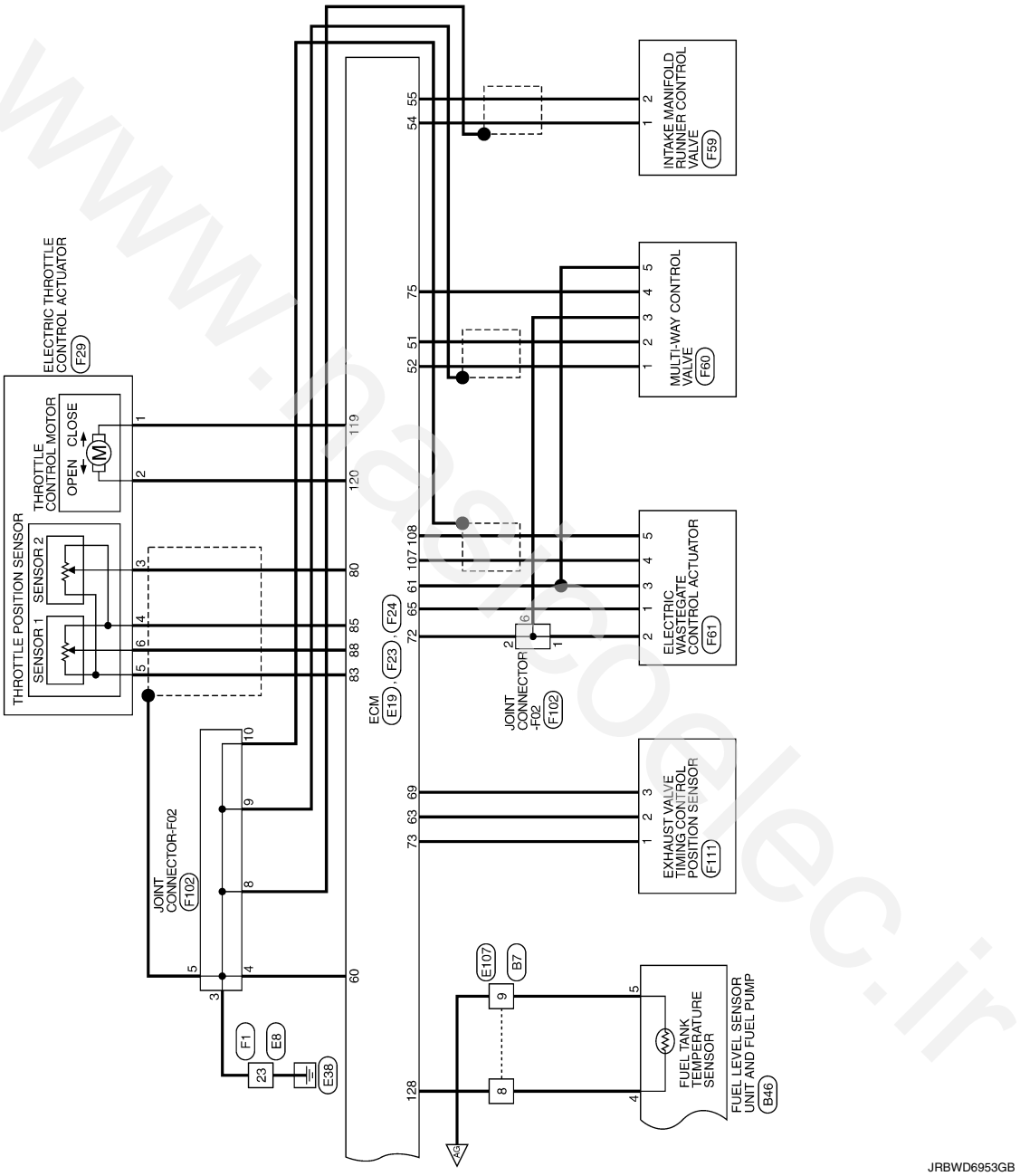


HEATED OXYGEN SENSOR 2
F71
ASCD STEERING SWITCH
COMBINATION SWITCH (SPIRAL CABLE)
M33, M302
RESUME / ACCELERATE
SET / COAST
CANCEL
MAIN (ON / OFF)
M77
E105
ECM
E19, F23, F24
COMBINATION METER (MALFUNCTION INDICATOR, SET, CRUISE)
M34
To CAN system
MULTI DISPLAY UNIT
M90 : AA
AA
JOINT CONNECTOR-M07
M136
DATA LINK CONNECTOR
M4
JOINT CONNECTOR-M02
M132
M76
JOINT CONNECTOR-M04
M133
JOINT CONNECTOR-E02
E84
BRAKE PEDAL POSITION SWITCH
E112
EVAP CANISTER VENT CONTROL VALVE
B21
E108
B8
FUEL INJECTOR RELAY
E57
HIGH PRESSURE FUEL PUMP RELAY
E58
E38
E8
F1
20A 31
15A 32
10A 36
10A 3
JOINT CONNECTOR -M08
M134
JRBWD6949GB









ENGINE CONTROL SYSTEM (MR EXCEPT FOR NISMO RS MODELS)

Connector No.	B7
Connector Name	WIRE TO WIRE
Connector Type	TH24FW-NH

H.S.

12	11	10	9	8	7	6	5	4	3	2	1
24	23	22	21	20	19	18	17	16	15	14	13

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	W	-
3	V	-
5	G	-
6	LG	-
7	R	-
8	P	-
9	L	-
10	G	-
11	LG	-
12	Y	-
13	P	-
14	L	-
15	B	-
16	BR	-
17	L	-
18	P	-
19	B	-
20	G	-
21	W	-
22	R	-
23	SHIELD	-

Connector No.	B8
Connector Name	WIRE TO WIRE
Connector Type	NS04FW-CS

H.S.

4	3	2	1

Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	GR	-
3	L	-
4	R	-

Connector No.	B21
Connector Name	EVAP CANISTER VENT CONTROL VALVE
Connector Type	E02FB-RS

H.S.

1	2

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	L	-

Connector No.	B22
Connector Name	EVAP CONTROL SYSTEM PRESSURE SENSOR
Connector Type	E03-FGY-RS

H.S.

1	2	3

Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	-
2	LG	-
3	G	-

Connector No.	B32
Connector Name	G SENSOR
Connector Type	HS03FB-2V

H.S.

3	2	1

Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	SIGNAL
2	R	GND
3	LG	POWER SUPPLY

Connector No.	B46
Connector Name	FUEL LEVEL SENSOR UNIT AND FUEL PUMP
Connector Type	E05-FGY-RS

H.S.

1	2	3	4	5

Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	BR	-
3	B	-
4	P	-
5	L	-

Connector No.	E8
Connector Name	WIRE TO WIRE
Connector Type	SAA36MB-RS10-SJZ2

H.S.

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
		19	20	21	22	23	24	25
			26	27	28	29	30	
31	32	33	34	35	36	37	38	
39	40	41	42	43	44	45	46	

Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	-
2	L	-
3	O	-
4	LG	- [For NISMO RS]
4	V	- [Except for NISMO RS]
5	O	-
7	BR	-
10	R	-
11	G	- [Except for NISMO RS]
11	O	- [For NISMO RS]
12	G	-
13	B	- [Except for NISMO RS]
13	Y	- [For NISMO RS]
14	L	- [For NISMO RS]

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ENGINE CONTROL SYSTEM (MR EXCEPT FOR NISMO RS MODELS)

14	LG	- [Except for NISMO RS]
15	R	-
16	SB	-
17	GR	-
18	W	-
19	L/B	-
20	L/W	-
21	G	-
22	G	- [For NISMO RS]
22	Y	- [Except for NISMO RS]
23	B	- [Except for NISMO RS]
23	SHIELD	- [For NISMO RS]
24	P	-
25	R	-
26	B	-
27	B	-
28	LG	-
29	SB	-
30	G	- [Except for NISMO RS]
30	P	- [For NISMO RS]
31	G	-
32	Y	-
33	BR	-
34	P	- [Except for NISMO RS]
34	W	- [For NISMO RS]
37	L	- [Without Intelligent Key]
37	LG	- [With Intelligent Key]
38	SB	-
39	B	-
40	P	-
41	V	-
42	L	-
43	BR	- [For NISMO RS]
43	W	- [Except for NISMO RS]
44	BR	- [Except for NISMO RS]
44	G	- [For NISMO RS]
45	BR	-
46	Y	-
47	SB	-
48	LG	- [With Intelligent Key]
48	Y	- [Without Intelligent Key]

Connector No.	E10
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	M06FW-LC

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
3	R	-
4	P	-
5	LG	-
7	Y	-
8	W/R	-

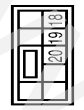
Connector No.	E11
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	M06FB-LC

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
9	B/Y	-
10	L	-
14	R	-

Connector No.	E12
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS08FBR-CS

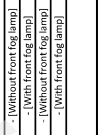
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
18	GR	-
19	R	- [Without front fog lamp]
19	W	- [With front fog lamp]
20	G	- [Without front fog lamp]
20	V	- [With front fog lamp]

Connector No.	E13
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	TH12FW-NH

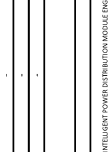
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
23	SB	-
25	BR	-
26	P	-
27	L	-
28	Y	-
30	V	-
31	Y	-
32	R	-
33	G	-
34	L	-

Connector No.	E14
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS12FBR-CS

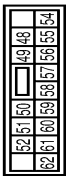
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
35	G	-
36	P	-
37	L	-
39	L	-
41	BR	-
42	Y	-
43	L	-
44	BR	-
45	W	-
46	LG	-

Connector No.	E15
Connector Name	IPDM E/R (INTELLIGENT POWER DISTRIBUTION MODULE ENGINE ROOM)
Connector Type	NS16FW-CS

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
48	BR	-
49	Y	-
50	G	-
51	L	-
52	P	-
54	P	-
55	G	-
56	SB	-
57	O	-
58	LG	-

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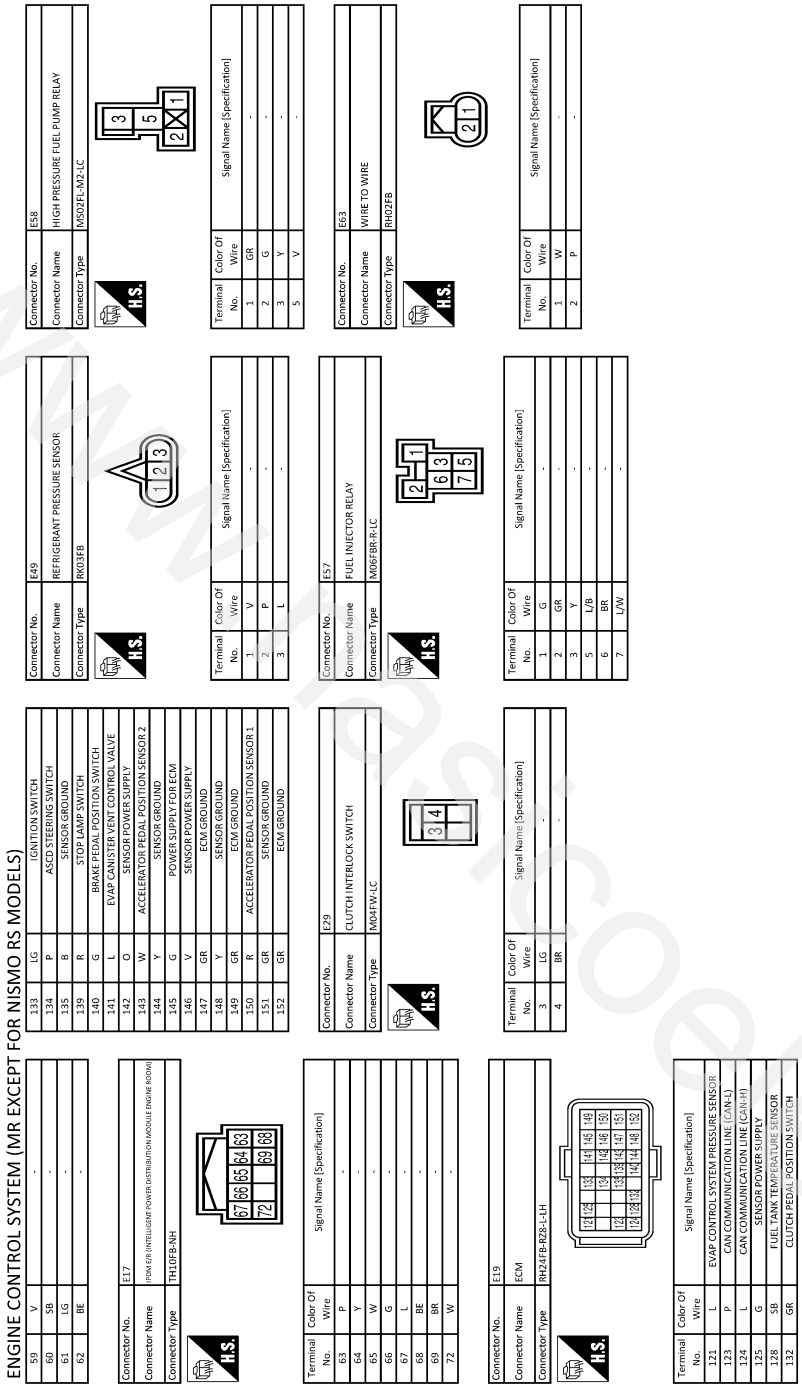

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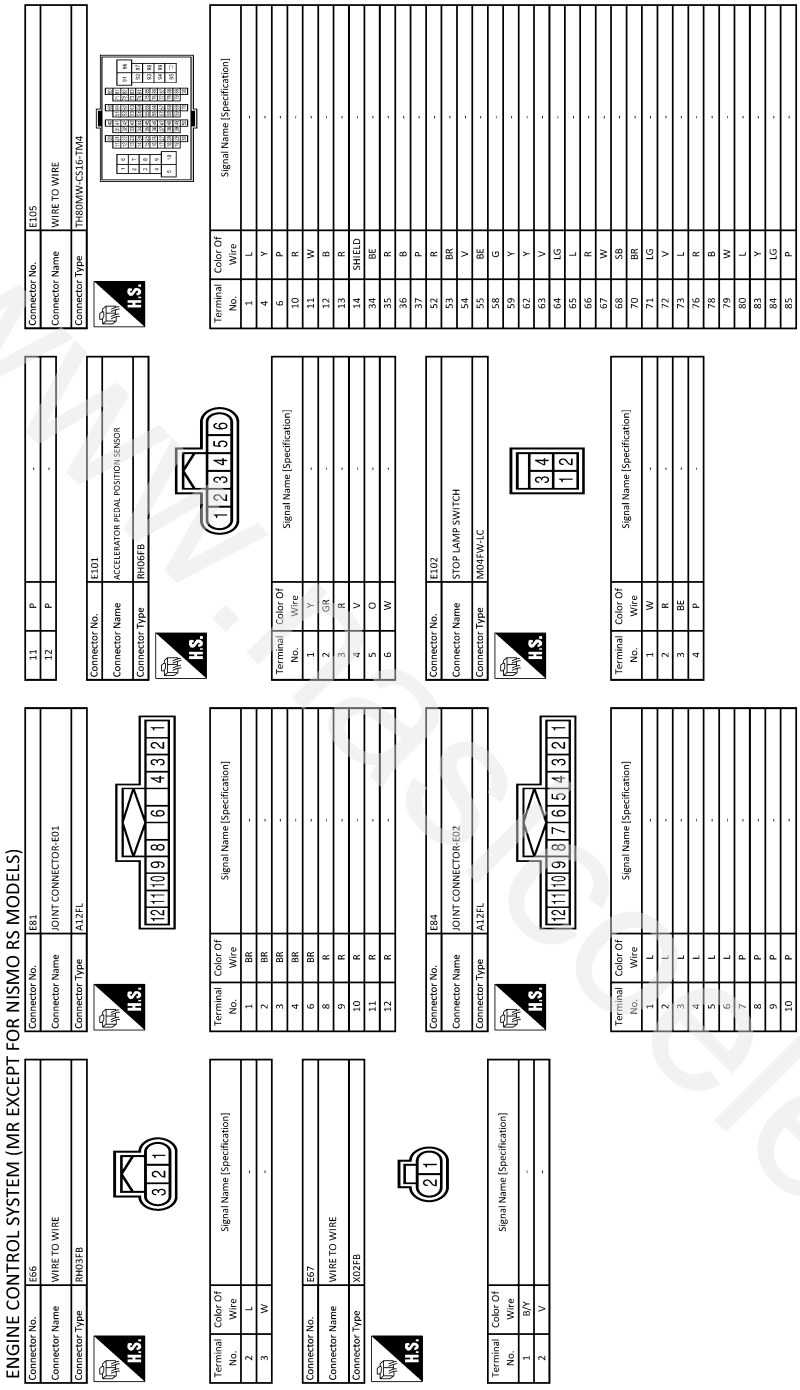

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ENGINE CONTROL SYSTEM (MR EXCEPT FOR NISMO RS MODELS)

86	BE	-
90	SHIELD	-
91	G	-
92	R	-
95	BR	-
96	P	-
97	GR	-
98	W	-
99	V	-
100	O	-

Connector No.	E107
Connector Name	WIRE TO WIRE
Connector Type	TH24MW-NH

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	Y	-
3	V	-
5	G	-
6	L	- [Except for NISMO RS]
6	O	- [For NISMO RS]
7	R	-
8	SB	-
9	R	- [For NISMO RS]
9	Y	- [Except for NISMO RS]
10	G	-
11	L	-
12	Y	-
13	P	-
14	L	-
15	G	-
16	BE	-
17	BR	-
18	Y	-
19	G	-
20	B	-
21	W	-
22	R	-
23	SHIELD	-

Connector No.	E108
Connector Name	WIRE TO WIRE
Connector Type	NS04MW-CS

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	-
2	LG	-
3	BR	- [For NISMO RS]
3	L	- [Except for NISMO RS]
4	P	-

Connector No.	E112
Connector Name	BRAKE PEDAL POSITION SWITCH
Connector Type	M02FBR-LC

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	BE	-
2	G	-

Connector No.	E113
Connector Name	CLUTCH PEDAL POSITION SWITCH
Connector Type	M02FBR-LC

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	-
2	B	-

Connector No.	E118
Connector Name	STOP LAMP SWITCH
Connector Type	M02FB-LC

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	R	-

Connector No.	E201
Connector Name	WIRE TO WIRE
Connector Type	RH03MB

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
2	R/Y	-
3	W/L	-

Connector No.	E202
Connector Name	WIRE TO WIRE
Connector Type	X02MB

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	B/Y	-
2	V	-

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ENGINE CONTROL SYSTEM (MR EXCEPT FOR NISMO RS MODELS)

Connector No.	E203
Connector Name	COOLING FAN CONTROL MODULE
Connector Type	SJZ01FGY-SNZ2

Terminal No.	Color Of Wire	Signal Name [Specification]
1	B/Y	GND
2	W/L	PWM SIG
3	R/W	PWM POWER

Connector No.	E204
Connector Name	COOLING FAN RELAY
Connector Type	24347-9F900

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R/Y	-
2	V	-
3	R/W	-
5	V	-

Connector No.	E205
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR 2
Connector Type	E02FGY-RS

Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	MCV_TW1
2	P	GND

Connector No.	E206
Connector Name	WIRE TO WIRE
Connector Type	RH02MB

Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	P	-

Connector No.	E301
Connector Name	COOLING FAN CONTROL MODULE
Connector Type	6188-0259

Terminal No.	Color Of Wire	Signal Name [Specification]
4	-	-
5	-	-

Connector No.	E302
Connector Name	COOLING FAN CONTROL MODULE
Connector Type	6188-0259

Terminal No.	Color Of Wire	Signal Name [Specification]
6	-	-
7	-	-

Connector No.	F1
Connector Name	WIRE TO WIRE
Connector Type	SAA36FB-RS10-SJZ2

Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	-
2	L	-
3	W	- [Except for NISMO RS]
3	Y	- [For NISMO RS]
4	BG	- [For NISMO RS]
4	GR	- [Except for NISMO RS]
5	LG	-
7	G	-
10	R	- [Except for NISMO RS]
10	Y	- [For NISMO RS]
11	G	- [Except for NISMO RS]
11	Y	- [For NISMO RS]
12	G	-
13	B	- [Except for NISMO RS]
13	BG	- [For NISMO RS]
14	L	- [For NISMO RS]
14	V	- [Except for NISMO RS]
15	BR	-
16	P	-
17	SB	-
18	G	-
19	G	-
20	BR	-
21	G	-
22	BR	- [For NISMO RS]
22	Y	- [Except for NISMO RS]
23	B	-
24	R	-
25	R	-
26	B	-
27	B	-
28	R	-
29	W	-
30	GR	- [Except for NISMO RS]
30	R	- [For NISMO RS]
31	BG	-

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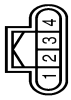
ENGINE CONTROL SYSTEM (MR EXCEPT FOR NISMO RS MODELS)

32	LG	-
33	BR	-
34	G	- [For NISMO RS]
34	P	- [Except for NISMO RS]
37	G	- [Without Intelligent Key]
37	GR	- [With Intelligent Key]
38	R	-
39	GR	-
40	P	-
41	BR	- [For NISMO RS]
41	V	- [Except for NISMO RS]
42	L	- [Except for NISMO RS]
42	W	- [For NISMO RS]
43	L	- [For NISMO RS]
43	W	- [Except for NISMO RS]
44	BR	- [Except for NISMO RS]
44	G	- [For NISMO RS]
45	BR	-
46	R	-
47	Y	-
48	GR	- [With Intelligent Key]
48	Y	- [Without Intelligent Key]

Connector No.	F8
Connector Name	MASS AIR FLOW SENSOR
Connector Type	RH04FB

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	G	-
3	W	-
4	Y	-

Connector No.	F12
Connector Name	KNOCK SENSOR
Connector Type	BS02FGY_B-AHY

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	B	-

Connector No.	F7
Connector Name	FUEL RAIL PRESSURE SENSOR
Connector Type	RH03FB

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	VPWR
2	GR	FPS
3	SB	GND

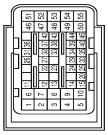
Connector No.	F13
Connector Name	CONDENSER
Connector Type	M02FW-LC

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	B	-

Connector No.	F23
Connector Name	ECM
Connector Type	MA83SFB-MEB20-LH

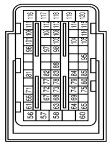
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	FUEL INJECTOR NO.1, 4 (HI)
2	SB	FUEL INJECTOR NO.2 (LO)
3	W	FUEL INJECTOR NO.3 (LO)
4	G	FUEL INJECTOR DRIVER POWER SUPPLY 1
5	BR	FUEL INJECTOR DRIVER POWER SUPPLY 2
6	R	FUEL INJECTOR NO.4 (LO)
7	LG	FUEL INJECTOR NO.2, 3 (HI)
8	BR	FUEL INJECTOR NO.1 (LO)
9	GR	ECM GROUND
10	B	ECM GROUND
11	W	TURBOCHARGER BOOST SENSOR
12	P	REFRIGERANT PRESSURE SENSOR
13	V	SENSOR GROUND
14	SHIELD	SHIELD
15	W	KNOCK SENSOR
20	B	SENSOR GROUND
22	Y	ENGINE OIL TEMPERATURE SENSOR
23	G	ENGINE OIL PRESSURE SENSOR
24	G	EGR PRESSURE SENSOR
25	GR	FUEL RAIL PRESSURE SENSOR
26	R	SENSOR POWER SUPPLY
27	G	SENSOR POWER SUPPLY
29	L	SENSOR POWER SUPPLY
30	Y	SENSOR POWER SUPPLY
31	W	MANIFOLD ABSOLUTE PRESSURE SENSOR
32	BG	BATTERY TEMPERATURE SENSOR
33	R	CRANKSHAFT POSITION SENSOR
34	G	G SENSOR
35	L	ENGINE COOLANT TEMPERATURE SENSOR 1
36	Y	INTAKE AIR TEMPERATURE SENSOR 1
37	G	MASS AIR FLOW SENSOR
38	G	BATTERY CURRENT SENSOR
39	BR	INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR
40	W	ENGINE COOLANT TEMPERATURE SENSOR 2
42	W	SENSOR GROUND
43	BR	SENSOR GROUND
44	W	SENSOR GROUND
45	P	SENSOR GROUND
46	R	MULTI-WAY CONTROL VALVE POWER SUPPLY
47	R	HIGH PRESSURE FUEL PUMP DRIVER POWER SUPPLY
48	BR	HIGH PRESSURE FUEL PUMP (HI)
49	Y	HIGH PRESSURE FUEL PUMP (LO)
50	B	ECM GROUND
51	Y	MULTI-WAY CONTROL VALVE MOTOR (-)
52	G	MULTI-WAY CONTROL VALVE MOTOR (+)
53	R	INTAKE MANIFOLD RUNNER CONTROL VALVE POWER SUPPLY
54	B	INTAKE MANIFOLD RUNNER CONTROL VALVE [OPEN]
55	W	INTAKE MANIFOLD RUNNER CONTROL VALVE [CLOSE]

Connector No.	F24
Connector Name	ECM
Connector Type	MA85FB-MEB10-LH

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
56	R	EGR VOLUME CONTROL VALVE POWER SUPPLY
57	W	EGR VOLUME CONTROL VALVE MOTOR (+)
58	R	EGR VOLUME CONTROL VALVE MOTOR (-)
60	B	ECM GROUND

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ENGINE CONTROL SYSTEM (MR EXCEPT FOR NISMO RS MODELS)

61	W	SENSOR POWER SUPPLY	
63	L	SENSOR GROUND	
64	SHIELD	SHIELD	
65	R	WASTEGATE CONTROL VALVE POSITION SENSOR	
66	G	SENSOR POWER SUPPLY	
67	BR	CAMSHAFT POSITION SENSOR	
68	GR	EGR VOLUME CONTROL VALVE POSITION SENSOR	
69	LG	EXHAUST VALVE TIMING CONTROL POSITION SENSOR	
71	L	SENSOR GROUND	
72	B	SENSOR GROUND	
73	GR	SENSOR POWER SUPPLY	
74	B	A/F SENSOR 1	
75	L	MULTI-WAY CONTROL VALVE POSITION SENSOR	
77	V	INTAKE AIR TEMPERATURE SENSOR 2	
78	R	SENSOR GROUND	
79	W	A/F SENSOR 1	
80	W	THROTTLE POSITION SENSOR 2	
81	BR	ECM RELAY (SELF SHUT-OFF)	
82	Y	FUEL PUMP RELAY	
83	B	SENSOR POWER SUPPLY	
84	W	HEATED OXYGEN SENSOR 2	
85	R	SENSOR GROUND	
88	G	THROTTLE POSITION SENSOR 1	
95	LG	IGNITION SIGNAL NO.2	
96	R	IGNITION SIGNAL NO.1	
97	Y	THROTTLE CONTROL MOTOR RELAY	
98	R	ENGINE OIL PRESSURE CONTROL SOLENOID VALVE	
101	SB	IGNITION SIGNAL NO.4	
103	BR	PNP SIGNAL	
104	P	IGNITION SIGNAL NO.3	
105	BR	TURBOCHARGER BYPASS CONTROL VALVE	
106	R	ELECTRIC WASTEGATE CONTROL ACTUATOR POWER SUPPLY	
107	L/Y	ELECTRIC WASTEGATE CONTROL ACTUATOR MOTOR (+)	
108	P/L	ELECTRIC WASTEGATE CONTROL ACTUATOR MOTOR (-)	
110	B	ECM GROUND	
111	W	INTAKE VALVE TIMING CONTROL SOLENOID VALVE	
112	G	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE	
113	Y	POWER SUPPLY FOR ECM (ENGINE OFF TIMER)	
114	L	VARIABLE INTAKE MANIFOLD RUNNER CONTROL SOLENOID VALVE	
115	L	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE	
116	G	A/F SENSOR 1 HEATER	
117	G	HEATED OXYGEN SENSOR 2 HEATER	
118	GR	THROTTLE CONTROL MOTOR POWER SUPPLY	
119	GR	THROTTLE CONTROL MOTOR (OPEN)	
120	BR	THROTTLE CONTROL MOTOR (CLOSE)	

Connector No.	F29
Connector Name	ELECTRIC THROTTLE CONTROL ACTUATOR
Connector Type	RH06FB

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	- [For NISMO RS]
1	GR	- [Except for NISMO RS]
2	BR	- [Except for NISMO RS]
2	G	- [For NISMO RS]
3	W	-
4	R	- [Except for NISMO RS]
5	B	- [For NISMO RS]
5	BR	- [Except for NISMO RS]
6	G	- [For NISMO RS]
6	GR	- [For NISMO RS]

Connector No.	F30
Connector Name	TRANSMISSION RANGE SWITCH
Connector Type	YDX08FB-HS4

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	-
2	BR	-
3	LG	-
4	SB	-
5	G	-
6	LG	-
7	W	-
8	BR	-

Connector No.	F33
Connector Name	IGNITION COIL No. 1 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	B	-
3	R	-

Connector No.	F34
Connector Name	IGNITION COIL No. 2 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	-
2	B	-
3	R	-

Connector No.	F35
Connector Name	IGNITION COIL No. 3 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	-
2	B	-
3	R	-

Connector No.	F36
Connector Name	IGNITION COIL No. 4 (WITH POWER TRANSISTOR)
Connector Type	E03FGY-RS

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	SB	-
2	B	-
3	R	-

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ENGINE CONTROL SYSTEM (MR EXCEPT FOR NISMO RS MODELS)

Connector No.	F43
Connector Name	ENGINE OIL PRESSURE SENSOR
Connector Type	RH03FB

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	SB	-
2	G	-
3	L	- [Except for NISMO RS]
3	R	- [For NISMO RS]

Connector No.	F45
Connector Name	ENGINE OIL PRESSURE CONTROL SOLENOID VALVE
Connector Type	RH02FLGY

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	VCC
2	R	SIGNAL

Connector No.	F46
Connector Name	EGR PRESSURE SENSOR
Connector Type	HS03FB-2V

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	VCC
2	G	VOUT
3	Y	GND

Connector No.	F48
Connector Name	ENGINE OIL TEMPERATURE SENSOR
Connector Type	E02FGY-RS

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	-
2	P	-

Connector No.	F49
Connector Name	PARK / NEUTRAL POSITION SWITCH
Connector Type	FEA03FG-LC

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	SB	-
3	BR	-

Connector No.	F50
Connector Name	ENGINE COOLANT TEMPERATURE SENSOR 1
Connector Type	E02FGY-RS

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	TW
2	P	GND-TW

Connector No.	F52
Connector Name	BATTERY CURRENT SENSOR
Connector Type	SAZ04FGY

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	-
2	BG	-
3	BR	-
4	G	-

Connector No.	F53
Connector Name	HIGH PRESSURE FUEL PUMP
Connector Type	HS02FLGY-VR

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	BR	-
2	Y	-

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ENGINE CONTROL SYSTEM (MR EXCEPT FOR NISMO RS MODELS)

Connector No.	F59
Connector Name	INTAKE MANIFOLD RUNNER CONTROL VALVE
Connector Type	RH02FB

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	TCV_VALVE_OPEN
2	W	TCV_VALVE_CLOSE

Connector No.	F60
Connector Name	MULTI-WAY CONTROL VALVE
Connector Type	E05FGY-RS

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	MOTOR(+)
2	Y	MOTOR(-)
3	B	GND
4	L	OUTPUT
5	W	VCC

Connector No.	F61
Connector Name	ELECTRIC WASTEGATE CONTROL ACTUATOR
Connector Type	SG206FGY-S

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	OUTPUT
2	B	GND
3	W	VCC
4	L/Y	MOTOR(+)
5	P/L	MOTOR(-)

Connector No.	F62
Connector Name	INTAKE VALVE TIMING CONTROL SOLENOID VALVE
Connector Type	E02FBR-RS-GY

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	R	-

Connector No.	F63
Connector Name	INTAKE VALVE TIMING INTERMEDIATE LOCK CONTROL SOLENOID VALVE
Connector Type	E02FBR-RS-GY

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	CVTC(ECM)
2	R	POWER

Connector No.	F64
Connector Name	TURBOCHARGER BYPASS CONTROL VALVE
Connector Type	RH02FBR

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	VCC
2	BR	SIGNAL

Connector No.	F65
Connector Name	FUEL INJECTOR No. 1
Connector Type	HS02FGY

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	- [For NISMO RS]
1	GR	- [Except for NISMO RS]
2	BR	- [Except for NISMO RS]
2	R	- [For NISMO RS]

Connector No.	F66
Connector Name	FUEL INJECTOR No. 2
Connector Type	HS02FGY

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	- [Except for NISMO RS]
1	Y	- [For NISMO RS]
2	BR	- [For NISMO RS]
2	SB	- [Except for NISMO RS]

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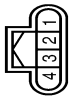
ENGINE CONTROL SYSTEM (MR EXCEPT FOR NISMO RS MODELS)

Connector No.	F67
Connector Name	FUEL INJECTOR No. 3
Connector Type	HS02FGY

Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	- [For NISMO RS]
1	R	- [Except for NISMO RS]
2	W	-

Connector No.	F71
Connector Name	HEATED OXYGEN SENSOR 2
Connector Type	RH04FDGY-P

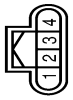


Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	W	-
3	G	-
4	R	-

Connector No.	F73
Connector Name	INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR
Connector Type	RH03FB

Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	VCC
2	BR	OUTPUT
3	B	GND

Connector No.	F75
Connector Name	TURBOCHARGER BOOST SENSOR
Connector Type	RH04FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	- [For NISMO RS]
1	W	- [Except for NISMO RS]
2	L	- [Except for NISMO RS]
2	W	- [For NISMO RS]
3	SB	- [For NISMO RS]
3	V	- [Except for NISMO RS]
4	SB	- [Except for NISMO RS]
4	V	- [For NISMO RS]

Connector No.	F68
Connector Name	FUEL INJECTOR No. 4
Connector Type	HS02FGY

Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	R	-

Connector No.	F72
Connector Name	AIR FUEL RATIO (A/F) SENSOR 1
Connector Type	RH04FB-P

Terminal No.	Color Of Wire	Signal Name [Specification]
1	W	-
2	B	-
3	G	-
4	R	-

Connector No.	F74
Connector Name	EGR VOLUME CONTROL VALVE
Connector Type	HS05FB

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	MOTOR(-)
2	W	MOTOR(+)
3	Y	VCC
4	GR	EGR
5	P	GND

Connector No.	F76
Connector Name	MANIFOLD ABSOLUTE PRESSURE SENSOR
Connector Type	RH03FB

Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	VCC
2	W	OUTPUT
3	B	GND

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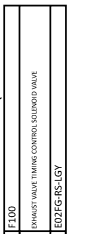
ENGINE CONTROL SYSTEM (MR EXCEPT FOR NISMO RS MODELS)

Connector No.	F100
Connector Name	EXHAUST VALVE TIMING CONTROL SOLENOID VALVE
Connector Type	E02FG-RS-LGY

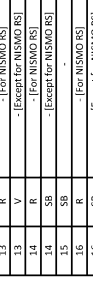
Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	-
2	R	-

Connector No.	F101
Connector Name	JOINT CONNECTOR-F01
Connector Type	SAA24FB-J



Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	-
1	R	- [Except for NISMO RS]
2	B	- [For NISMO RS]
2	R	- [Except for NISMO RS]
3	B	-
4	B	- [For NISMO RS]
4	W	- [Except for NISMO RS]
5	B	- [For NISMO RS]
5	W	- [Except for NISMO RS]
6	B	-
7	B	-
8	B	-
9	B	- [For NISMO RS]
9	P	- [Except for NISMO RS]
10	B	- [For NISMO RS]
10	Y	- [Except for NISMO RS]
11	B	- [For NISMO RS]
11	BR	- [Except for NISMO RS]
12	BR	-
13	R	- [For NISMO RS]
13	V	- [Except for NISMO RS]
14	R	- [For NISMO RS]
14	SB	- [Except for NISMO RS]
15	SB	-
16	R	- [For NISMO RS]
16	SB	- [Except for NISMO RS]
17	R	-
18	BR	-
19	BR	-
20	GR	-
21	BG	- [For NISMO RS]
21	GR	- [Except for NISMO RS]
22	W	-
23	G	- [Except for NISMO RS]
23	W	- [For NISMO RS]
24	G	- [Except for NISMO RS]
24	P	- [For NISMO RS]

Connector No.	F102
Connector Name	JOINT CONNECTOR-F02
Connector Type	RH10FB



Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	-
2	B	-
3	B	-
4	B	-
5	SHIELD	-
6	B	-
8	SHIELD	-
9	SHIELD	-
10	SHIELD	-

Connector No.	F104
Connector Name	JOINT CONNECTOR-F04
Connector Type	RH06FB

Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	-
2	GR	-
3	G	-
4	LG	-
5	LG	-
6	R	-

Connector No.	F106
Connector Name	EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
Connector Type	E02FEL-RS-LGY

Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	- [Except for NISMO RS]
1	L	- [For NISMO RS]
2	G	- [For NISMO RS]
2	L	- [Except for NISMO RS]

Connector No.	F107
Connector Name	CRANKSHAFT POSITION SENSOR
Connector Type	RH03FB

Terminal No.	Color Of Wire	Signal Name [Specification]
1	R	-
2	W	-
3	G	-

Connector No.	F109
Connector Name	CAMSHAFT POSITION SENSOR
Connector Type	RH03FB

Terminal No.	Color Of Wire	Signal Name [Specification]
1	G	- [Except for NISMO RS]
1	GR	- [For NISMO RS]
2	L	-
3	BR	-

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ENGINE CONTROL SYSTEM (MR EXCEPT FOR NISMO RS MODELS)

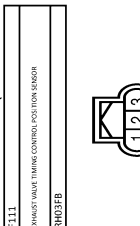
Connector No.	F111
Connector Name	EXHAUST VALVE TIMING CONTROL POSITION SENSOR
Connector Type	RH03FB

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
1	GR	-
2	L	-
3	LG	-

Connector No.	M4
Connector Name	DATA LINK CONNECTOR
Connector Type	BD16FW

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
4	B	-
5	B	-
6	L	-
7	W	-
8	LG	-
14	P	-
16	Y	-

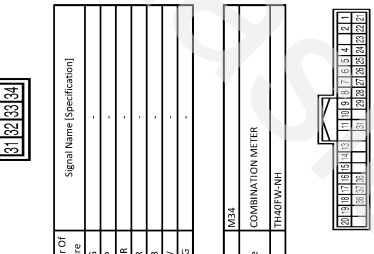
Connector No.	M33
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Type	TK08FGY-1V

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
24	G	-
25	P	-
26	GR	-
31	R	-
32	B	-
33	V	-
34	LG	-

Connector No.	M34
Connector Name	COMBINATION METER
Connector Type	TH40FW-NH

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	CAN-H
2	P	CAN-L
4	Y	VEHICLE SPEED SIGNAL (8-PULSE)
5	G	PADDLE SHIFTER UP SWITCH SIGNAL
6	BR	FUEL LEVEL SENSOR SIGNAL
7	R	AIR BAG SIGNAL
8	P	-
9	W	SEAT BELT BUCKLE SWITCH SIGNAL (DRIVER SIDE)
10	SB	PARKING BRAKE SWITCH SIGNAL
11	G	BRAKE FLUID LEVEL SWITCH SIGNAL
13	GR	ILLUMINATION CONTROL SIGNAL
14	R	MANUAL MODE SHIFT UP SIGNAL
15	L	ACC POWER SUPPLY
16	W	MANUAL MODE SHIFT DOWN SIGNAL
17	G	WASHER LEVEL SWITCH SIGNAL
18	R	SECURITY SIGNAL
19	GR	AMBIENT SENSOR SIGNAL
20	R	AMBIENT SENSOR GROUND
21	B	GROUND
22	B	GROUND
23	B	GROUND
24	L	FUEL LEVEL SENSOR GROUND
25	B	VDC GROUND
26	V	PADDLE SHIFTER DOWN SWITCH SIGNAL
27	LG	BATTERY POWER SUPPLY
28	GR	IGNITION SIGNAL
29	V	PASSENGER SEAT BELT WARNING SIGNAL
31	P	A/C AUTO AMP. CONNECTION RECOGNITION SIGNAL
36	Y	MANUAL MODE SIGNAL
37	G	NON-MANUAL MODE SIGNAL
38	P	ALTERNATOR SIGNAL

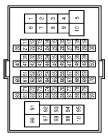
Connector No.	M70
Connector Name	BCM (BODY CONTROL MODULE)
Connector Type	TH40FW-NH

H.S.

Terminal No.	Color Of Wire	Signal Name [Specification]
72	SB	A/C IND OUTPUT
75	LG	DR DOOR REQ SW
76	LG	PUSH SW
78	P	DRIVER DOOR ANT+
79	V	DRIVER DOOR ANT-
80	BR	PASS DOOR ANT+
81	G	PASS DOOR ANT-
82	W	REAR BMPR ANT+
83	B	REAR BMPR ANT-
84	BR	ROOM ANT 1+
85	GR	ROOM ANT 1-
86	V	ROOM ANT2 +
87	LG	ROOM ANT2 -
90	W	PUSH-BTN IGN SW ILL PWR
91	V	ACC / ON IND
92	R	PUSH-BTN IGN SW ILL GND
93	GR	I-KEY WARN BUZZER
96	BR	ACC RELAY CONT
97	SB	STARTER RELAY CONT
98	P	IGN RELAY (1PDM E/R) CONT
99	R	IGN RELAY (F/B) CONT
100	P	PASS DOOR REQ SW
101	Y	CLUTCH INTERLOCK SW (FOR M/T MODELS)
101	Y	IGN SPLY NO.2 (EXCEPT FOR M/T MODELS)
102	L	NEUTRAL SW (FOR M/T MODELS)
102	L	P/N POSITION (EXCEPT FOR M/T MODELS)
103	G	FR DEFROST SW
104	SB	CVT SHIFT SELECT PWR SPLY
105	V	STOP LAMP SW 2
106	Y	BLWR RELAY CONT

Connector No.	M77
Connector Name	WIRE TO WIRE
Connector Type	TH80FW-CS16-TM4

H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	L	-
4	V	-
6	P	-
10	R	-
11	R	-
12	LG	-
13	V	-
34	SHIELD	-
34	LG	-
35	SB	-
36	B	-
37	P	-
52	R	-
53	L	-
54	SB	-
55	P	-
58	LG	-
59	G	-
62	Y	-
63	W	-

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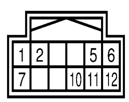
ENGINE CONTROL SYSTEM (MR EXCEPT FOR NISMO RS MODELS)

64	G	-
65	GR	-
66	Y	-
67	V	-
68	R	-
70	V	-
71	R	-
72	GR	-
73	G	-
76	W	-
78	LG	-
79	V	-
80	LG	-
83	P	-
84	G	-
85	BR	-
86	LG	-
90	SHIELD	-
91	Y	-
92	BR	-
95	Y	-
96	L	-
97	GR	-
98	G	-
99	R	-
100	LG	-

Connector No.	M90
Connector Name	MULTI DISPLAY UNIT
Connector Type	TH12FW-NH

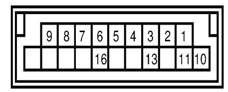
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	Y	BATTERY POWER SUPPLY
2	V	ILLUMINATION SIGNAL
5	GR	ILLUMINATION CONTROL SIGNAL
6	L	CAN-H
7	LG	IGNITION SIGNAL
10	B	GROUND
11	B	GROUND
12	P	CAN-L

Connector No.	M132
Connector Name	JOINT CONNECTOR-M02
Connector Type	NH20FL-DC

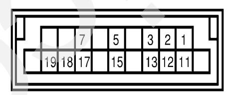
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	B	-
2	B	-
3	B	-
4	B	-
5	B	-
6	B	-
7	B	-
8	B	-
9	B	-
10	LG	-
11	LG	-
13	LG	-
16	LG	-

Connector No.	M133
Connector Name	JOINT CONNECTOR-M04
Connector Type	NH20FL-DC

H.S.

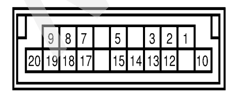


Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	-
2	P	-
3	P	-
5	P	-
7	P	-
11	L	-
12	L	-

13	L	-
15	L	-
17	L	-
18	W	-
19	W	-

Connector No.	M134
Connector Name	JOINT CONNECTOR-M08
Connector Type	NH20FL-DC

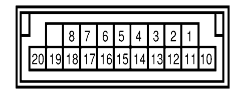
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	LG	-
2	LG	-
3	LG	-
5	LG	-
7	LG	-
8	LG	-
9	LG	-
10	Y	-
12	Y	-
13	Y	-
14	Y	-
15	Y	-
17	LG	-
18	R	-
19	R	-
20	R	-

Connector No.	M136
Connector Name	JOINT CONNECTOR-M07
Connector Type	NH20FL-DC

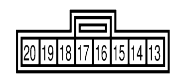
H.S.



Terminal No.	Color Of Wire	Signal Name [Specification]
1	P	-
2	P	-
3	P	-
4	P	-
5	P	-
6	P	-
7	P	-
8	P	-
10	L	-
11	L	-
12	L	-
13	L	-
14	L	-
15	L	-
16	L	-
17	L	-
18	GR	-
19	GR	-
20	GR	-

Connector No.	M302
Connector Name	COMBINATION SWITCH (SPIRAL CABLE)
Connector Type	TK08FGY

H.S.



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ENGINE CONTROL SYSTEM (MR EXCEPT FOR NISMO RS MODELS)

Terminal No.	Color Of Wire	Signal Name [Specification]
13	R	-
14	W	-
15	L	-
16	B	-
17	BR	-
18	G	-
19	P	-
20	Y	-

JRBWD6968GB

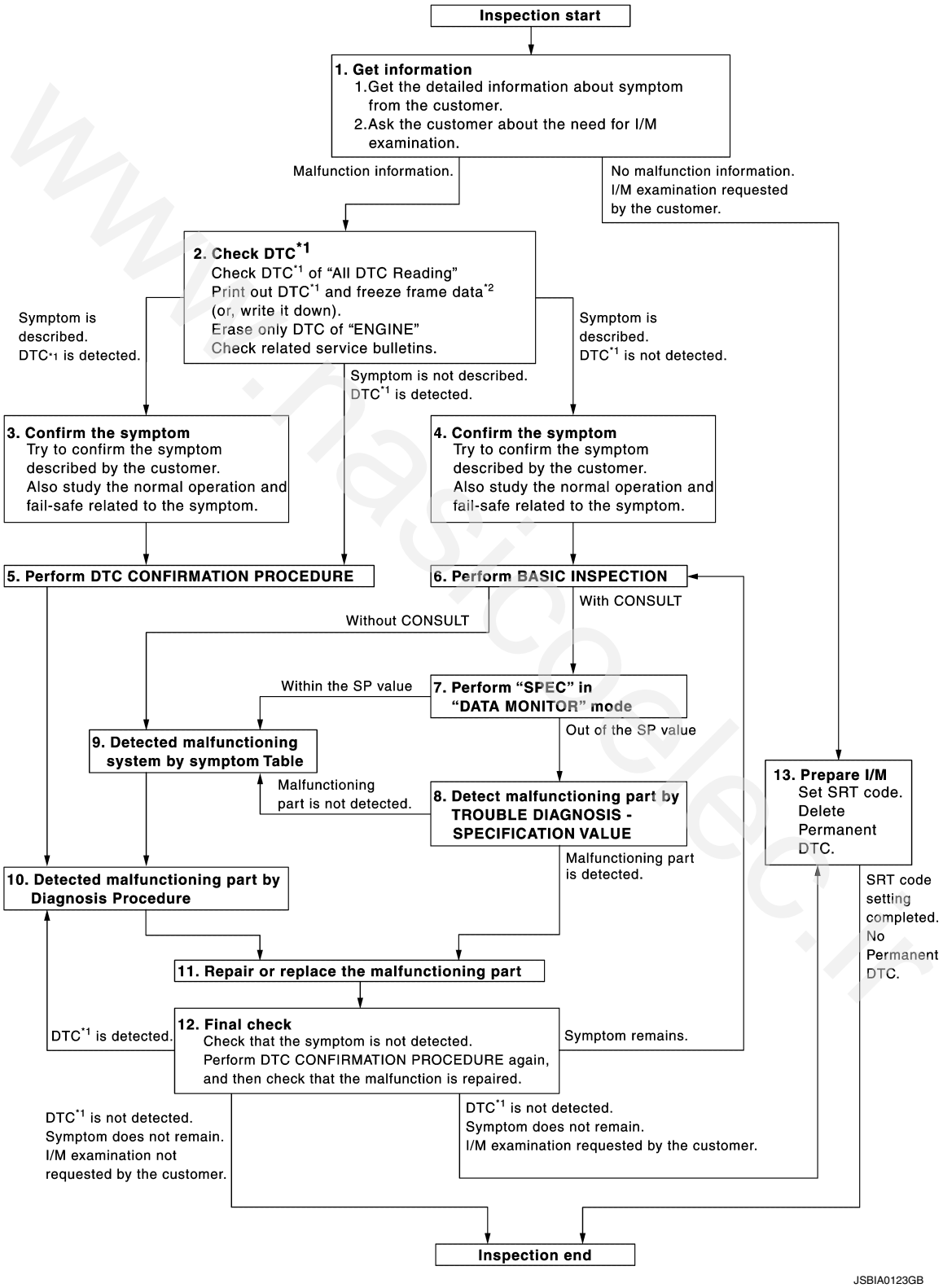
BASIC INSPECTION

DIAGNOSIS AND REPAIR WORKFLOW

Work Flow

INFOID:0000000012198252

OVERALL SEQUENCE



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*1: Include 1st trip DTC.
*2: Include 1st trip freeze frame data.

DETAILED FLOW

1.GET INFORMATION FOR SYMPTOM

1. 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-746, "Diagnostic Work Sheet".)
2. Ask if the customer requests I/M examination.

Malfunction information, obtained>>GO TO 2.
No malfunction information, but a request for I/M examination>>GO TO 13.

2.CHECK DTC

1. Check DTC.
2. Perform the following procedure if DTC is displayed.

- Record DTC and freeze frame data. (Print them out using CONSULT or GST.)
- Erase DTC.

With CONSULT: “How to Erase DTC and 1st Trip DTC” in EC-667, "CONSULT Function".

- Study the relationship between the cause detected by DTC and the symptom described by the customer. (Symptom Table is useful. Refer to EC-1242, "Symptom Table".)

3. Check related service bulletins for information.

Is any symptom described and is any DTC detected?

Symptom is described, DTC is detected>>GO TO 3.
Symptom is described, DTC is not detected>>GO TO 4.
Symptom is not described, DTC is detected>>GO TO 5.

3.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).
Also study the normal operation and fail safe related to the symptom. Refer to EC-1249, "Description" and EC-699, "Fail Safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4.CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
Also study the normal operation and fail safe related to the symptom. Refer to EC-1249, "Description" and EC-699, "Fail Safe".
Diagnosis Work Sheet is useful to verify the incident.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC CONFIRMATION PROCEDURE for the displayed DTC, and then make sure that DTC is detected again.
If two or more DTCs are detected, refer to EC-704, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

NOTE:

- Freeze frame data is useful if the DTC is not detected.
- Perform Component Function Check if DTC CONFIRMATION PROCEDURE is not included on Service Manual. This simplified check procedure is an effective alternative though DTC cannot be detected during this check.
  If the result of Component Function Check is NG, it is the same as the detection of DTC by DTC CONFIRMATION PROCEDURE.

Is DTC detected?

YES >> GO TO 10.
NO >> Check according to EC-706, "DTC Index".

6.PERFORM BASIC INSPECTION

Perform EC-765, "Work Procedure".

Do you have CONSULT?

YES >> GO TO 7.
NO >> GO TO 9.

7.PERFORM SPEC IN DATA MONITOR MODE

With CONSULT
Make sure that “MASS AIR FLOW SENSOR (Hz)”, “B/FUEL SCHDL” and “A/F ALPHA-B1” are within the SP value using CONSULT in “SPEC” of “DATA MONITOR” mode. Refer to EC-785, "Component Function Check".

Is the measurement value within the SP value?

YES >> GO TO 9.
NO >> GO TO 8.

8.DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-786, "Diagnosis Procedure".

Is malfunctioning part detected?

YES >> GO TO 11.
NO >> GO TO 9.

9.DETECT MALFUNCTIONING SYSTEM BY SYMPTOM TABLE

Detect malfunctioning system according to EC-1242, "Symptom Table" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 10.

10.DETECT MALFUNCTIONING PART BY DIAGNOSIS PROCEDURE

Inspect according to Diagnosis Procedure of the system.

NOTE:

The Diagnosis Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnosis Procedure. For details, refer to Circuit Inspection in GI-48, "Circuit Inspection".

Is malfunctioning part detected?

YES >> GO TO 11.
NO >> Monitor input data from related sensors or check the voltage of related ECM terminals using CONSULT. Refer to EC-679, "Reference Value".

11.REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnosis Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it. Refer to the following.
   With CONSULT: “How to Erase DTC and 1st Trip DTC” in EC-667, "CONSULT Function".

>> GO TO 12.

12.FINAL CHECK

When DTC was detected in step 2, perform DTC CONFIRMATION PROCEDURE or Component Function Check again, and then make sure that the malfunction have been repaired securely.
When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

Is DTC detected and does symptom remain?

YES-1 >> DTC is detected: GO TO 10.
YES-2 >> Symptom remains: GO TO 6.

NO-1 >> No request for I/M examination from the customer: Before returning the vehicle to the customer, always erase unnecessary DTC in ECM and TCM (With CONSULT: Refer to “How to Erase DTC and 1st Trip DTC” in EC-667, "CONSULT Function", If the completion of SRT is needed, drive vehicle under the specific driving pattern. Refer to EC-774, "SRT Set Driving Pattern".

NO-2 >> I/M examination, requested from the customer: GO TO 13.

13.PREPARE FOR I/M EXAMINATION

1. Set SRT codes. Refer to EC-773, "Description".
2. Erase permanent DTCs. Refer to EC-779, "Description".

>> INSPECTION END

Diagnostic Work Sheet

INFOID:0000000012198253

DESCRIPTION

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.

In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.

Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

SEF907L

WORKSHEET SAMPLE

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Fuel and fuel filler cap		☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions		☐ Not affected	
	Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions		☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions		☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp		☐ Turned on ☐ Not turned on	

MTBL0017

SERVICE AFTER REPLACING OR REMOVING ENGINE PARTS

Description

INFOID:0000000012198254

SPECIAL REPAIR REQUIREMENT

×: Applicable

Part name	Service performed		Required service	Reference
	Replacement	Removal*		
ECM	×		Additional service when replacing ECM	EC-749
		×	Accelerator pedal released position learning	EC-753
			Throttle valve closed position learning	EC-754
Accelerator Pedal	×	×	Accelerator pedal released position learning	EC-753
G sensor	×	×	G sensor calibration	EC-763
Turbocharger assembly	×	×	Wastegate valve closed positon learning	EC-755
			Idle air volume learning	EC-758
Electric throttle	×	×	Throttle valve closed position learning	EC-754
			Idle air volume learning	EC-758
	×		Air fuel ratio initial learning	EC-760
Mass air flow sensor	×		Air fuel ratio initial learning	EC-760
Fuel injector	×			
Battery	×		Cumulative battery discharge current clear	EC-764
Camshaft	×		Valve timing offset data clear	EC-756
			Valve timing offset data writing	EC-757
Timing chain	×		Valve timing offset data clear	EC-756
			Valve timing offset data writing	EC-757
Engine assembly	×		Idle air volume learning	EC-758
			Air fuel ratio initial learning	EC-760
			Valve timing offset data clear	EC-756
			Valve timing offset data writing	EC-757
			Wastegate valve closed positon learning	EC-755
			Throttle valve closed position learning	EC-754

*: Harness connector disconnection included.

ADDITIONAL SERVICE WHEN REPLACING ECM

Description

INFOID:0000000012198255

When replacing ECM, the following procedure must be performed. (For details, refer to EC-749, "Work Procedure".)

PROGRAMMING OPERATION

NOTE:

After replacing with a blank ECM, programming is required to write ECM information. Be sure to follow the procedure to perform the programming.

Work Procedure

INFOID:0000000012198256

1.SAVE ECM DATA

With CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Turn ignition switch ON.
4. Select “SAVING DATA FOR REPLC CPU” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.
5. Follow the instruction of CONSULT display.

NOTE:

Necessary data in ECM is copied and saved to CONSULT.

>> GO TO 2.

2.CHECK ECM PART NUMBER

Check ECM part number to see whether it is blank ECM or not.

NOTE:

- Part number of blank ECM is 23703 - ×××××.
- Check the part number when ordering ECM or with the one included in the label on the container box.

Is the ECM a blank ECM?

YES >> GO TO 3.
NO >> GO TO 5.

3.SAVE ECM PART NUMBER

Read out the part number from the old ECM and save the number, following the programming instructions. Refer to “CONSULT Operation Manual”.

NOTE:

- The ECM part number is saved in CONSULT.
- Even when ECM part number is not saved in CONSULT, go to 4.

>> GO TO 4.

4.PERFORM ECM PROGRAMMING

After replacing ECM, perform the ECM programming. Refer to “CONSULT Operation Manual”.

NOTE:

- Refer to EC-1256, "Removal and Installation" for replacement of ECM.
- During programming, maintain the following conditions:
- Ignition switch: ON
- Electric load: OFF
- Brake pedal: Not depressed
- Battery voltage: 12 – 13.5 V (Be sure to check the value of battery voltage by selecting “BATTERY VOLT” in “Data monitor” of CONSULT.)

>> GO TO 6.

5.REPLACE ECM

Replace ECM. Refer to EC-1256, "Removal and Installation".

>> GO TO 6.

6.WRITE ECM DATA

With CONSULT
1. Select “WRITING DATA FOR REPLC CPU” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.
2. Follow the instruction of CONSULT display.

NOTE:
The data saved by “SAVE DATA FOR CPU REPLC” is written to ECM.

>> GO TO 7.

7.PERFORM VIN REGISTRATION

Refer to EC-752, "Description".

>> GO TO 8.

8.PERFORM INITIALIZATION OF NATS SYSTEM AND REGISTRATION OF ALL NATS IGNITION KEY IDS

Refer to SEC-47, "ECM : Description".

>> GO TO 9.

9.PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

Refer to EC-753, "Description".

>> GO TO 10.

10.PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Refer to EC-754, "Description".

>> GO TO 11.

11.PERFORM WASTEGATE VALVE CLOSED POSITION LEARNING

Perform wastegate valve closed position learning. Refer to EC-755, "Description".

>> GO TO 12.

12.PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-758, "Description".

>> GO TO 13.

13.PERFORM AIR FUEL RATIO INITIAL LEARNING

Perform air fuel ratio initial learning. Refer to EC-760, "Description".

>> GO TO 14.

14.PERFORM G SENSOR CALIBRATION

Refer to EC-763, "Description".

>> GO TO 15.

15.PERFORM VALVE TIMING OFFSET DATA CLEAR

Perform valve timing offset data clear. Refer to EC-756, "Description".

>> GO TO 16.

16. PERFORM VALVE TIMING OFFSET DATA WRITING

Perform valve timing offset data writing. Refer to EC-757, "Description".

>> END

VIN REGISTRATION

Description

INFOID:0000000012198257

VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced.
NOTE:
Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).
Refer to EC-752, "Work Procedure".

Work Procedure

INFOID:0000000012198258

1.CHECK VIN

Check the VIN of the vehicle and note it. Refer to GI-36, "Information About Identification or Model Code".

>> GO TO 2.

2.PERFORM VIN REGISTRATION

With CONSULT
1. Turn ignition switch ON and engine stopped.
2. Select “VIN REGISTRATION” in “WORK SUPPORT” mode of “ENGINE”.
3. Follow the instruction of CONSULT display.

>> END

ACCELERATOR PEDAL RELEASED POSITION LEARNING

Description

INFOID:0000000012198259

Accelerator Pedal Released Position Learning is a function of ECM to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected. Refer to EC-753, "Work Procedure".

Work Procedure

INFOID:0000000012198260

1.START

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 2 seconds.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and wait at least 2 seconds.
5. Turn ignition switch OFF and wait at least 10 seconds.

>> END

THROTTLE VALVE CLOSED POSITION LEARNING

Description

INFOID:0000000012198261

Throttle Valve Closed Position Learning is a function of ECM to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time the harness connector of the electric throttle control actuator or ECM is disconnected or electric throttle control actuator inside is cleaned. Refer to EC-754, "Work Procedure".

Work Procedure

INFOID:0000000012198262

1.START

With CONSULT

1. Turn ignition switch ON.
2. Select “CLSD THL POS LEARN” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.
3. Follow the instructions on the CONSULT display.
4. Turn ignition switch OFF and wait at least 10 seconds.
   Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

Without CONSULT

1. Start the engine.
   NOTE:
   Engine coolant temperature is 25°C (77°F) or less before engine starts.
2. Warm up the engine.
   NOTE:
   Raise engine coolant temperature until it reaches 65°C (149°F) or more.
3. Turn ignition switch OFF and wait at least 10 seconds.
   Check that throttle valve moves during the above 10 seconds by confirming the operating sound.

>> END

WASTEGATE VALVE CLOSED POSITION LEARNING

Description

INFOID:0000000012198263

Wastegate valve closed position learning is a function of ECM to learn the fully closed position of the wastegate valve by monitoring the wastegate valve position sensor output signal. It must be performed under any of the following conditions:

- Turbocharger assembly is replaced or removed.
- ECM is replaced.
- Engine assembly is replaced.

Refer to EC-755, "Work Procedure".

Work Procedure

INFOID:0000000012198264

1.START

1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select “ENGINE” >> “WORK SUPPORT” >> “WASTEGATE ACTUATOR POSI LEARN CLEAR”.
3. Touch “Start”.

>> END

VALVE TIMING OFFSET DATA CLEAR

Description

INFOID:0000000012198265

Valve timing offset data clear is an operation to erase engine valve timing offset data stored in ECM. This operation must be performed after the following parts are replaced:

- Camshaft
- Timing chain
- Engine assembly
- ECM

Refer to EC-756, "Work Procedure".

Work Procedure

INFOID:0000000012198266

CAUTION:

After replacing the following parts, remove 2D code label affixed to throttle valve.

- **Camshaft**
- **Timing chain**
- **Engine assembly**

1.ERASE VALVE TIMING OFFSET DATA

With CONSULT

1. Turn ignition switch ON.
2. Select “VALVE TIMING OFFSET DATA CLEAR” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.
3. Touch “START” and erase valve timing offset data.

>> INSPECTION END

VALVE TIMING OFFSET DATA WRITING

Description

INFOID:0000000012198267

Valve timing offset data writing is an operation to allow ECM to learn engine valve timing offset data. This operation must be performed after the following parts are replaced:

- ECM
- Engine assembly

Refer to EC-757, "Work Procedure".

Work Procedure

INFOID:0000000012198268

CAUTION:

- **Perform the valve timing offset data clear operation beforehand. Refer to EC-756, "Description".**
- **If 2D code cannot be read, perform only the valve timing offset data clear operation.**

1. WRITE VALVE TIMING OFFSET DATA

With CONSULT

1. Turn ignition switch ON.
2. Select “VALVE TIMING OFFSET DATA WRITING ” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.
3. Observe the instructions displayed on the CONSULT screen to write 2D code affixed to the throttle valve.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON.
6. Check that DTC P100C is not displayed.

>> INSPECTION END

IDLE AIR VOLUME LEARNING

Description

INFOID:0000000012198269

Idle Air Volume Learning is a function of ECM to learn the idle air volume that keeps each engine idle speed within the specific range. It must be performed under any of the following conditions:
- ECM is replaced.
- Engine assembly is replaced.
- Electric throttle control actuator is replaced or removed.
- Turbocharger assembly is replaced or removed.
- Idle speed or ignition timing is out of specification.

Refer to EC-758, "Work Procedure".

Work Procedure

INFOID:0000000012198270

1.PRECONDITIONING

Make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.
- Battery voltage: More than 12.5 V (At idle)
- Engine coolant temperature: 70 - 100°C (158 - 212°F)
- Selector lever: P or N (CVT), Neutral (M/T)
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
  On vehicles equipped with daytime running light systems, set lighting switch to the 1st position to light only small lamps.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up

- CVT models
- With CONSULT: Drive vehicle until “ATF TENP SEN” in “DATA MONITOR” mode of “CVT” system indicates less than 0.9 V.
- Without CONSULT: Drive vehicle for 10 minutes.

- M/T models
- Drive vehicle for 10 minutes.

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 3.

2.IDLE AIR VOLUME LEARNING

With CONSULT
1. Perform Accelerator Pedal Released Position Learning. Refer to EC-753, "Description".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-754, "Description".
3. Start engine and warm it up to normal operating temperature.
4. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode of “ENGINE”.
5. Touch “START” and wait 20 seconds.

Is “CMPLT” displayed on CONSULT screen?

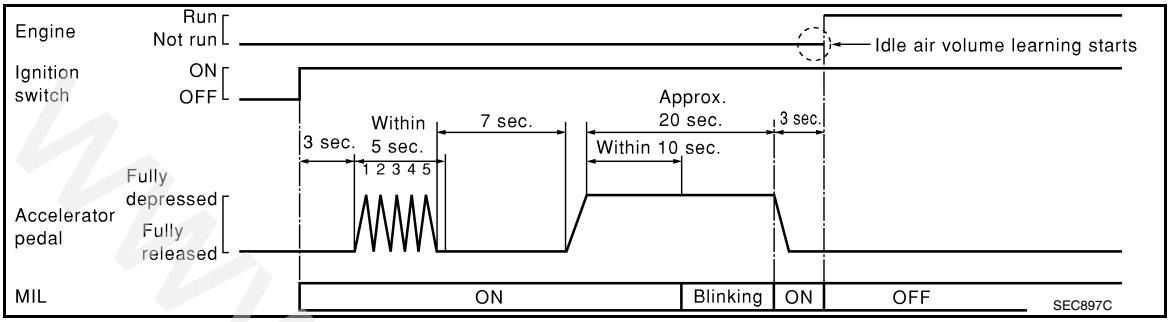
YES >> GO TO 4.
NO >> GO TO 5.

3.IDLE AIR VOLUME LEARNING

Without CONSULT
NOTE:
- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**

1. Perform Accelerator Pedal Released Position Learning. Refer to EC-753, "Description".
2. Perform Throttle Valve Closed Position Learning. Refer to EC-754, "Description".
3. Start engine and warm it up to normal operating temperature.
4. Turn ignition switch OFF and wait at least 10 seconds.

5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
6. Repeat the following procedure quickly five times within 5 seconds.
- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.
7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops blinking and turned ON.
8. Fully release the accelerator pedal within 3 seconds after the MIL turned ON.
9. Start engine and let it idle.
10. Wait 20 seconds.



>> GO TO 4

4. CHECK IDLE SPEED AND IGNITION TIMING

Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications. For specification, refer to EC-1258, "Idle Speed" and EC-1258, "Ignition Timing".

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following
- Check that throttle valve is fully closed.
- Check PCV valve operation.
- Check that downstream of throttle valve is free from air leakage.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace malfunctioning part.

6. DETECT MALFUNCTIONING PART

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.
It is useful to perform “TROUBLE DIAGNOSIS - SPECIFICATION VALUE”. Refer to EC-785, "Description".
If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:
- Engine stalls.
- Erroneous idle.

>> INSPECTION END

AIR FUEL RATIO INITIAL LEARNING

Description

INFOID:0000000012198271

Air fuel ratio initial learning of ECM to learn the air fuel ratio that keeps each engine idle speed within the specific range. It must be performed under any of the following conditions:

- When ECM is replaced*
- When engine assembly is replaced*
- When electric throttle control actuator is replaced*
- When mass air flow sensor is replaced
- When fuel injector is replaced

Refer to EC-760, "Work Procedure".

CAUTION:

***: Must be performed “IDLE AIR VOLUME LEARNING” when electric throttle control actuator or ECM is replaced. Refer to EC-758, "Description".**

Work Procedure

INFOID:0000000012198272

1.PRECONDITIONING

Make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery temperature: More than 5°C (41°F)
- Engine coolant temperature: More than 70°C (158°F)
- Shift lever: P or N
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
- Vehicle speed: Stopped
- Transmission: Warmed-up
- Drive vehicle for 10 minutes.

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 3.

2.AIR FUEL RATIO INITIAL LEARNING

With CONSULT

1. Perform “ACCELERATOR PEDAL RELEASED POSITION LEARNING”. Refer to EC-753, "Description".
2. Perform “THROTTLE VALVE CLOSED POSITION LEARNING”. Refer to EC-754, "Description".
3. Start engine and warm it up to normal operating temperature.
4. Select “A/F INITIAL LEARNING” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.
5. Touch “START” and wait 20 seconds.

“CMPLT” displayed on CONSULT screen?

YES >> INSPECTION END
NO >> GO TO 4.

3.AIR FUEL RATIO INITIAL LEARNING

Without CONSULT

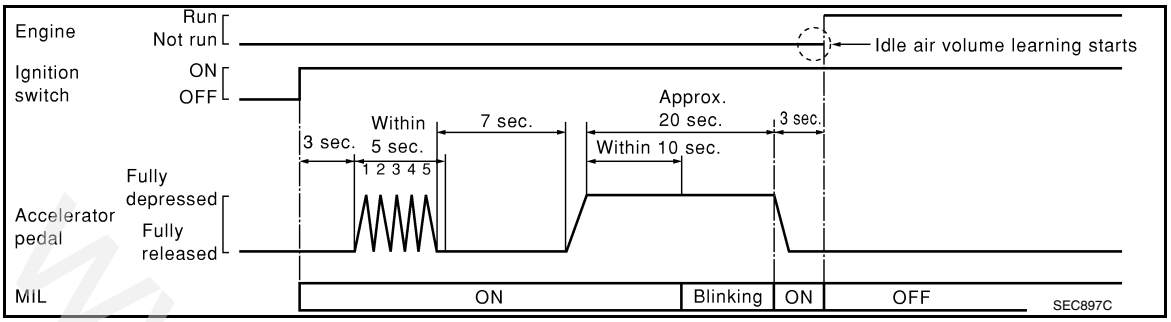
NOTE:

- It is better to count the time accurately with a clock.
- It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.

1. Perform “ACCELERATOR PEDAL RELEASED POSITION LEARNING”. Refer to EC-753, "Description".
2. Perform “THROTTLE VALVE CLOSED POSITION LEARNING”. Refer to EC-754, "Description".
3. Start engine and warm it up to normal operating temperature.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
6. Repeat the following procedure quickly five times within 5 seconds.

- Fully depress the accelerator pedal.
- Fully release the accelerator pedal.

7. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops blinking and turned ON.
8. Fully release the accelerator pedal within 3 seconds after the MIL turned ON.
9. Start engine and let it idle.
10. Wait 20 seconds.



>> INSPECTION END

4. DETECT MALFUNCTIONING PART

Engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.
It is useful to perform “TROUBLE DIAGNOSIS - SPECIFICATION VALUE”. Refer to EC-785, "Description".
If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform “AIR FUEL RATIO INITIAL LEARNING” all over again:
- Engine stalls
- Erroneous idle

>> INSPECTION END

MIXTURE RATIO SELF-LEARNING VALUE CLEAR

Description

INFOID:0000000012198273

This describes how to erase the mixture ratio self-learning value. For the actual procedure, follow the instructions in “Diagnosis Procedure”. Refer to EC-762, "Work Procedure".

Work Procedure

INFOID:0000000012198274

1.START

With CONSULT
1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.
3. Clear mixture ratio self-learning value by touching “CLEAR”.

With GST
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select Service $03 with GST. Make sure DTC P0102 is detected.
7. Select Service $04 with GST to erase the DTC P0102.

>> END

G SENSOR CALIBRATION

Description

INFOID:0000000012198275

ECM stores calibration data (inherent characteristic value) of G sensor to provide accurate control. Therefore, it is required to perform calibration of G sensor after the following work is performed.

- Removal/installation or replacement of G sensor
- Replacement of ECM

Refer to EC-763, "Work Procedure".

Work Procedure

INFOID:0000000012198276

1.PREPARATION BEFORE CALIBRATION PROCEDURE

1. Park the vehicle on a level surface.
2. Adjust air pressure of all tires to the specified pressure. WT-47, "Tire Air Pressure".

>> GO TO 2.

2.PERFORM CALIBRATION

With CONSULT

1. Turn ignition switch ON.
   CAUTION:
   Never start engine.
2. Select “Work Support” mode in “ENGINE.
3. Select “G SENSOR CALIBRATION”.
4. Touch “Start”.
   CAUTION:
   Never swing the vehicle during “G sensor calibration”.

Is “COMPLETED” displayed?

YES >> END
NO >> Perform steps 1 and 2 again.

CUMULATIVE BATTERY DISCHARGE CURRENT CLEAR

Description

INFOID:0000000012198277

Cumulative Battery Discharge Current Clear is a function of ECM to erase the cumulative battery discharge current. It must be performed when battery is replaced. Refer to EC-764, "Work Procedure".

Work Procedure

INFOID:0000000012198278

1.ERASE CUMULATIVE BATTERY DISCHARGE CURRENT

With CONSULT
1. Turn ignition switch ON.
2. Select “CML B/DCHRG CRNT CLEAR” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.
3. Touch “CLEAR” and erase cumulative battery discharge current.

>> INSPECTION END

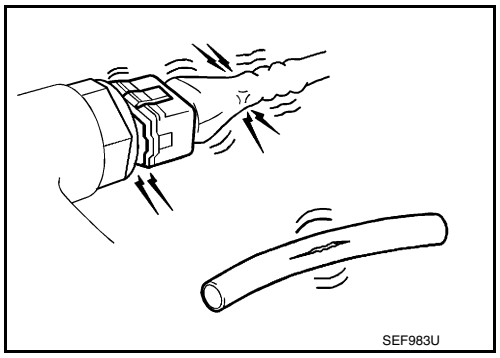
BASIC INSPECTION

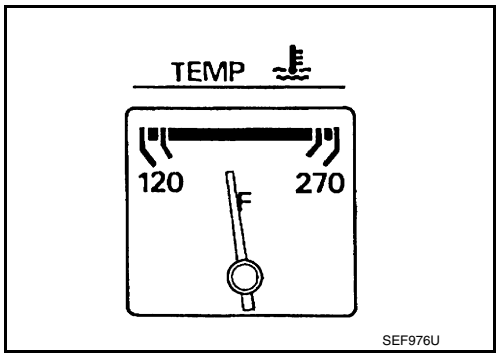
Work Procedure

INFOID:0000000012198279

1.INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket
3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
   Ensure engine stays below 1,000 rpm.


SEF983U

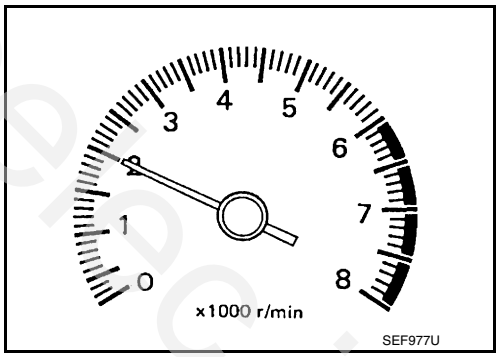


SEF976U

5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT or GST.

Is any DTC detected?

YES >> GO TO 2.
NO >> GO TO 3.



SEF977U

2.REPAIR OR REPLACE

Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3.

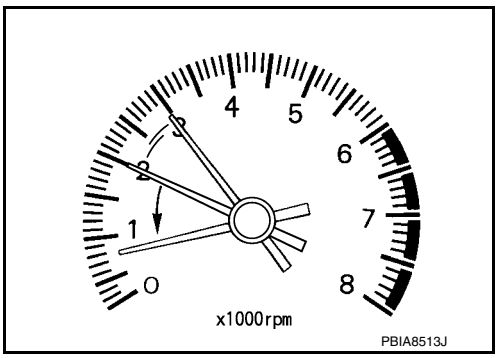
3.CHECK TARGET IDLE SPEED

1. Run engine at about 2,000 rpm for about 2 minutes under no load.

2. Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
3. Check idle speed.
   For procedure, refer to EC-1250, "Inspection".
   For specification, refer to EC-1258, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 4.



4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-753, "Description".

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-754, "Description".

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-758, "Description".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 7.
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
   For procedure, refer to EC-1250, "Inspection".
   For specification, refer to EC-1258, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the Following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-952, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-949, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace. Then GO TO 4

9. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-47, "ECM : Description".

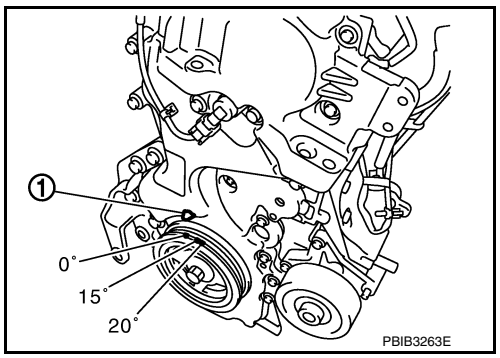
>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.

2. Check ignition timing with a timing light.
For procedure, refer to EC-1251, "Inspection"
For specification, refer to EC-1258, "Ignition Timing".

1 : Timing indicator



Is the inspection result normal?

YES >> INSPECTION END.
NO >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-753, "Description".

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-754, "Description".

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-758, "Description".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 14.
NO >> Follow the instruction of Idle Air Volume Learning. Then GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.
For procedure, refer to EC-1250, "Inspection".
For specification, refer to EC-1258, "Idle Speed".

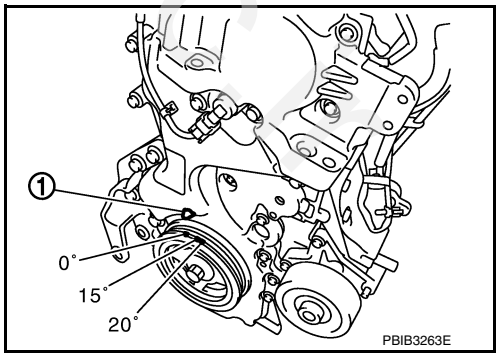
Is the inspection result normal?

YES >> GO TO 15.
NO >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.
For procedure, refer to EC-1251, "Inspection".
For specification, refer to EC-1258, "Ignition Timing".

1 : Timing indicator



Is the inspection result normal?

YES >> INSPECTION END.
NO >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-248, "Exploded View".

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair the timing chain installation. Then GO TO 4.

17. DETECT MALFUNCTIONING PART

Check the following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-952, "DTC Logic".
- Check crankshaft position sensor (POS) and circuit. Refer to EC-949, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair or replace. Then GO TO 4

18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to SEC-47, "ECM : Description".

>> GO TO 4.

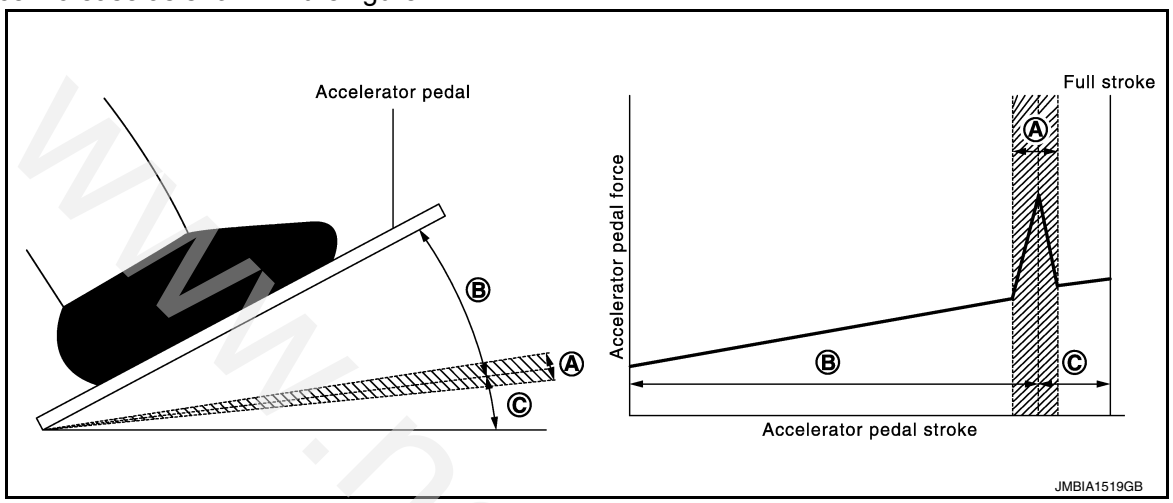
ACCELERATOR PEDAL

Work Procedure

INFOID:0000000012198280

1.PERFORM ACCELERATOR PEDAL FORCE-I

1. Turn ignition switch OFF.
2. Depress the accelerator pedal and check if there is a specific point (A) in the pedal stroke where the pedal force increase as shown in the figure.



Is the inspection result normal?

YES-1 >> With CONSULT:GO TO 2.
YES-2 >> Without CONSULT:GO TO 3.
NO >> Perform Accelerator Pedal Released Position Learning. Refer to EC-753, "Description".

2.PERFORM ACCELERATOR PEDAL FORCE-II

With CONSULT

1. Turn ignition switch ON.
2. Select “KICKDOWN POS” in “DATA MONITOR” mode using CONSULT.
3. Check “KICKDOWN POS” indication under the following condition.

Monitor item	Condition	Indication
KICKDOWN POS	Depressing range of the accelerator pedal: Within (B) as indicated in the figure	OFF
	Depressing range of the accelerator pedal: Within (C) as indicated in the figure	ON

Is the inspection result normal?

YES >> INSPECTION END
NO >> Perform Accelerator Pedal Released Position Learning. Refer to EC-753, "Description".

3.PERFORM ACCELERATOR PEDAL FORCE-III

Without CONSULT

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground under the following conditions.

ECM			Condition	Voltage (Approx.)
Connector	+	–		
	Terminal			
E19	150 (APP sensor 1)	151	Depressing range of the accelerator pedal: Within (C) as indicated in the figure	3.9 - 4.7 V
	143 (APP sensor 2)	144		1.95 - 2.4 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Perform Accelerator Pedal Released Position Learning. Refer to EC-753, "Description".

FUEL PRESSURE

Work Procedure

INFOID:0000000012198281

FUEL PRESSURE RELEASE

1.FUEL PRESSURE RELEASE

With CONSULT
1. Turn ignition switch ON.
2. Perform “FUEL PRESSURE RELEASE” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.

Without CONSULT
1. Remove fuel pump fuse located in IPDM E/R.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.

>> END

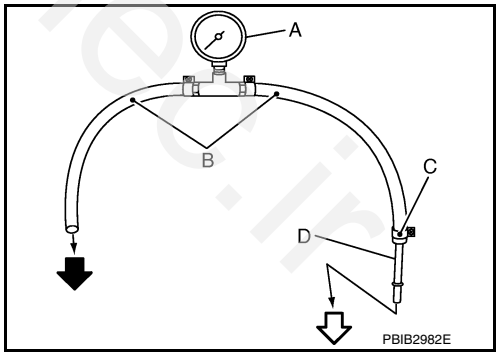
FUEL PRESSURE CHECK

CAUTION:
- **Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.**
- **The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.**
- **Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains sealability with O-rings inside.**
- **Do not perform fuel pressure check with electrical systems operating (i.e. lights, rear defogger, A/C, etc.) Fuel pressure gauge may indicate false readings due to varying engine load and changes in manifold vacuum.**

NOTE:
Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because F15 models do not have fuel return system.

1.FUEL PRESSURE CHECK

1. Release fuel pressure to zero.
2. Prepare fuel hose for fuel pressure check (B) and fuel tube adapter [SST: KV10120000] (D), then connect fuel pressure gauge (A).



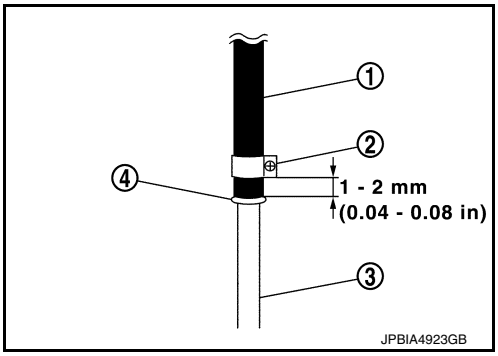
⇦ : To quick connector
⬅ : To high pressure fuel pump
C : Clamp

CAUTION:
- **Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).**
- **To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.**
- **Do not use the fuel hose for checking fuel pressure with damage or cracks on it.**
- **Use Pressure Gauge to check fuel pressure.**

3. Remove fuel hose.

CAUTION:
Do not twist or kink fuel hose because it is plastic hose.

4. Connect fuel hose for fuel pressure check (1) to high pressure fuel pump (3) with clamp (2) as shown in the figure.

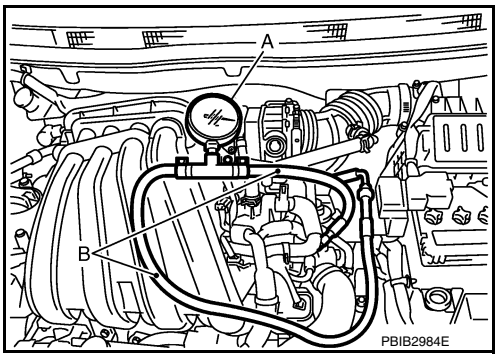


CAUTION:
- **Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.**
- **Apply proper amount of gasoline between top of the high pressure fuel pump (3) and spool (4).**
- **Insert fuel hose for fuel pressure check until it touches the spool on high pressure fuel pump.**
- **Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).**
- **When reconnecting fuel line, always use new clamps.**
- **Use a torque driver to tighten clamps.**

Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

- **Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).**
- **Make sure that clamp screw does not contact adjacent parts.**
- **After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm high pressure fuel pump does not come off.**

5. Connect fuel tube adapter to quick connector.



A :Fuel pressure gauge

B :Fuel hose for fuel pressure check

6. Turn ignition switch ON and check for fuel leakage.
7. Start engine and check for fuel leakage.
8. Read the indication of fuel pressure gauge.

CAUTION:
- **Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.**
- **During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.**

At idling : Approximately 500 kPa (5.0 bar, 5.1 kg/cm^2, 73 psi)

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK FUEL HOSES

Check the following.
- Fuel hoses for clogging
- Fuel filter for clogging
- Low pressure fuel pump
- Fuel pressure regulator for clogging

Is the inspection result normal?

YES >> Replace fuel pressure regulator.
NO >> Repair or replace error-detected parts.

HOW TO SET SRT CODE

Description

INFOID:0000000012198282

OUTLINE

In order to set all SRTs, the self-diagnoses as in the “SRT ITEM” table must have been performed at least once. Each diagnosis may require actual driving for a long period of time under various conditions.

SRT ITEM

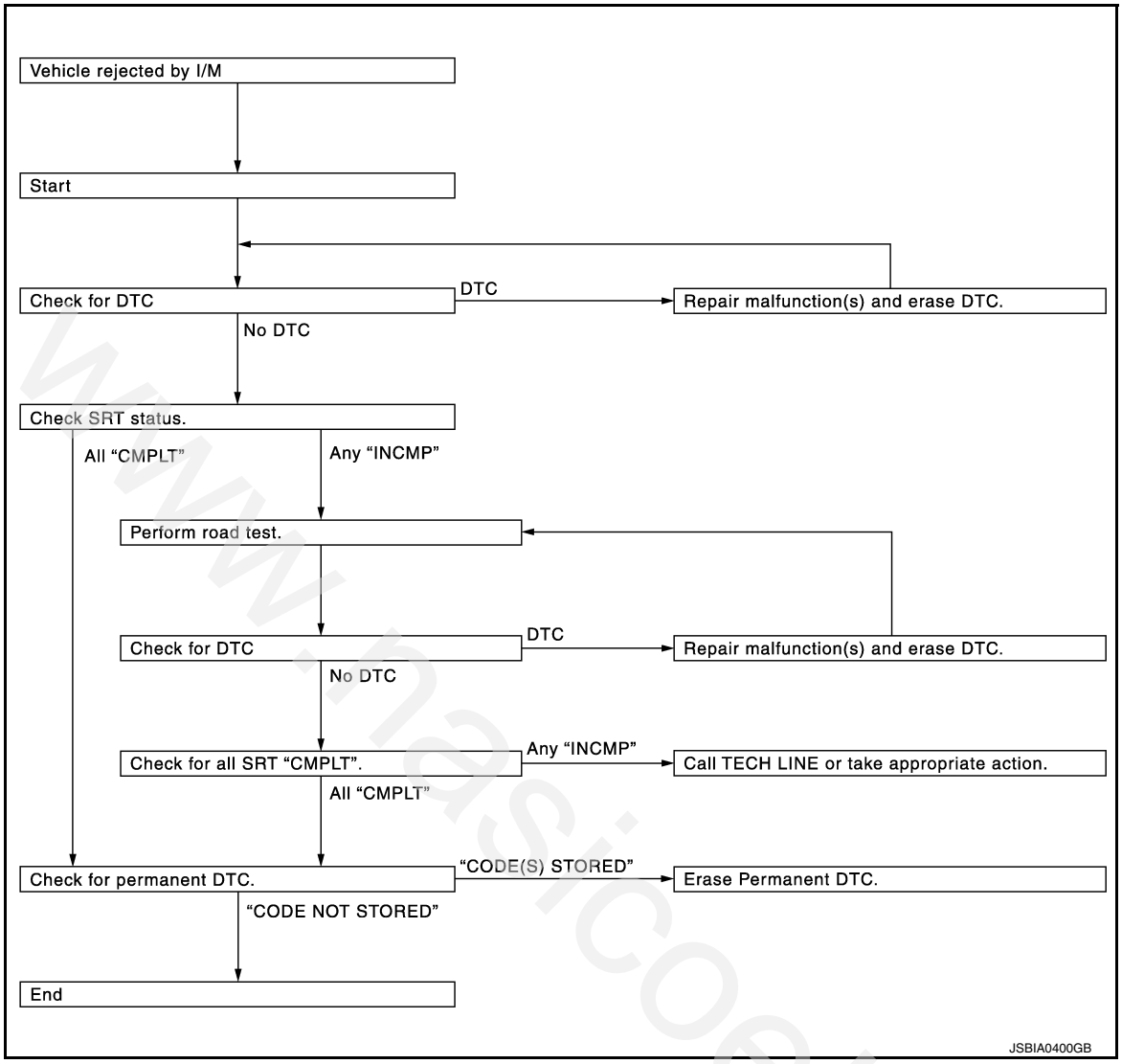
The table below shows required self-diagnostic items to set the SRT to “CMPLT”.

SRT item*1 (CONSULT indication)	Performance Priority*2	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.
CATALYST	1	Three way catalyst function	P0420
EVAP SYSTEM	1	EVAP control system purge flow monitoring	P0441
	1	EVAP control system	P0443, P0456
HO2S	1	Air fuel ratio (A/F) sensor 1	P0130, P014C, P014D, P015A, P015B
	1	Heated oxygen sensor 2	P0137
	1	Heated oxygen sensor 2	P0138
	1	Heated oxygen sensor 2	P0139
EGR/VVT SYSTEM	2	Intake valve timing control function	P0011

*1: Though displayed on the CONSULT screen, “HO2S HTR” is not SRT item.
*2: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT.

SRT SERVICE PROCEDURE

If a vehicle has failed the state emissions inspection due to one or more SRT items indicating “INCMP”, review the flowchart diagnostic sequence, referring to the following flowchart.

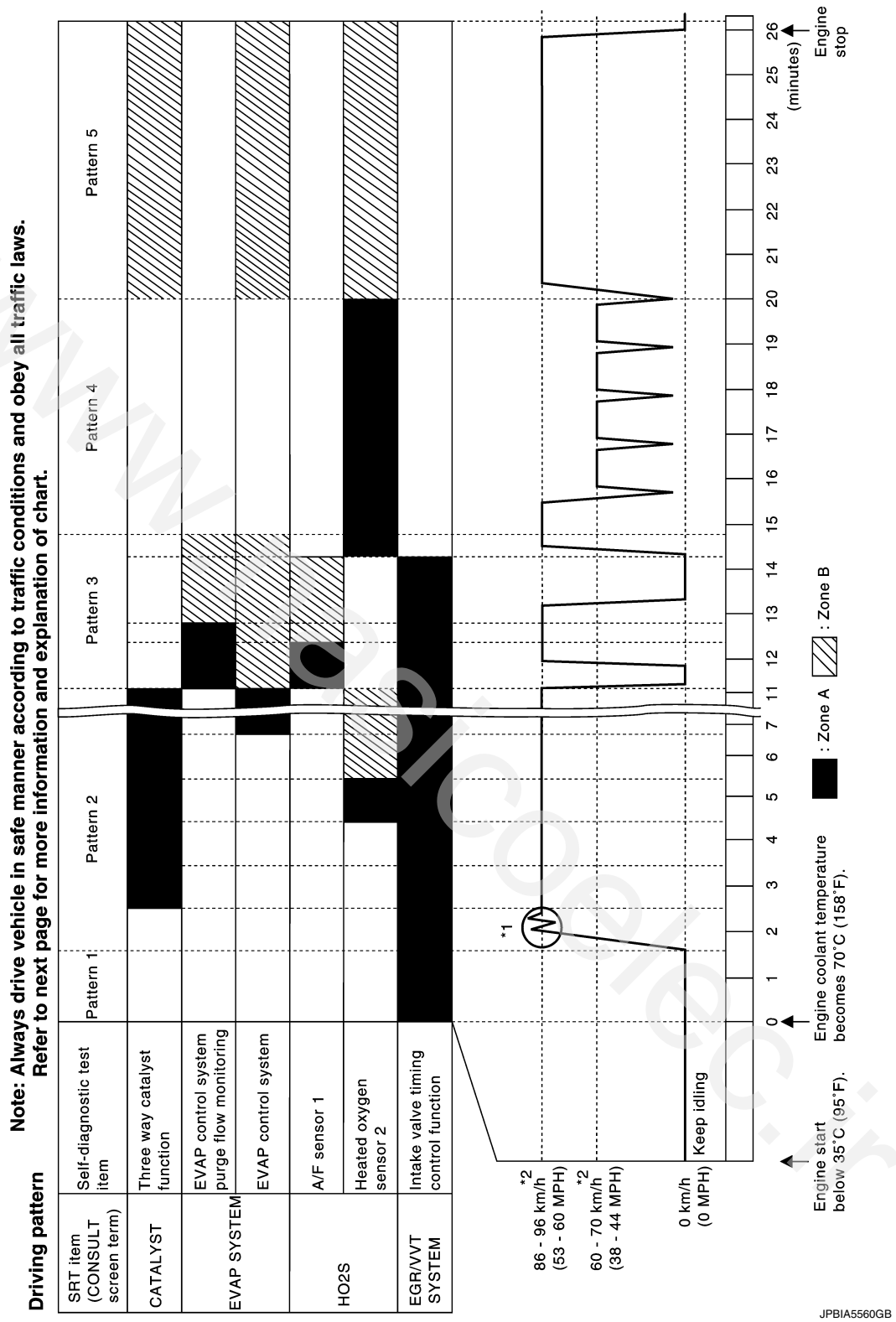


SRT Set Driving Pattern

INFOID:0000000012198283

CAUTION:

Always drive the vehicle in safe manner according to traffic conditions and obey all traffic laws.



*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.

*2: Checking the vehicle speed with GST is advised.

- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
- “Zone A” is the fastest time where required for the diagnosis under normal conditions*. If the diagnosis is not completed within “Zone A”, the diagnosis can still be performed within “Zone B”.

*: Normal conditions
- Sea level
- Flat road
- Ambient air temperature: 20 – 30°C (68 – 86°F)

NOTE:
Diagnosis is performed as quickly as possible under normal conditions. However, under other conditions, diagnosis may also be performed. [For example: ambient air temperature other than 20 – 30°C (68 – 86°F)]

Work Procedure

INFOID:0000000012198284

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-706, "DTC Index".
NO >> GO TO 2.

2.CHECK SRT STATUS

With CONSULT
Select “SRT STATUS” in “DTC & SRT CONFIRMATION” mode of “ENGINE” using CONSULT.
WithouT CONSULT
Perform “SRT status” mode with EC-666, "On Board Diagnosis Function".
With GST
Select Service $01 with GST.

Is SRT code(s) set?

YES >> GO TO 11.
NO-1 >> With CONSULT: GO TO 3.
NO-2 >> Without CONSULT: GO TO 4.

3.DTC CONFIRMATION PROCEDURE

1. Select “SRT WORK SUPPORT” in “DTC & SRT CONFIRMATION” mode of “ENGINE” using CONSULT.
2. For SRT(s) that is not set, perform the corresponding “DTC CONFIRMATION PROCEDURE” according to the “Performance Priority” in the “SRT ITEM” table. Refer to EC-773, "Description".
3. Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-706, "DTC Index".
NO >> GO TO 10.

4.PERFORM ROAD TEST

- Check the “Performance Priority” in the “SRT ITEM” table. Refer to EC-773, "Description".
- Perform the most efficient SRT set driving pattern to set the SRT properly. Refer to EC-774, "SRT Set Driving Pattern".
  In order to set all SRTs, the SRT set driving pattern must be performed at least once.

>> GO TO 5.

5.PATTERN 1

1. Check the vehicle condition;
- Engine coolant temperature is −10 to 35°C (14 to 95°F).
- Fuel tank temperature is more than 0°C (32°F).
2. Start the engine.
3. Keep engine idling until the engine coolant temperature is greater than 70°C (158°F)

NOTE:
ECM terminal voltage is follows;
- Engine coolant temperature
- −10 to 35°C (14 to 95°F): 3.0 - 4.3 V
- 70°(158°F): Less than 1.4 V

>> GO TO 6.

6.PATTERN 2

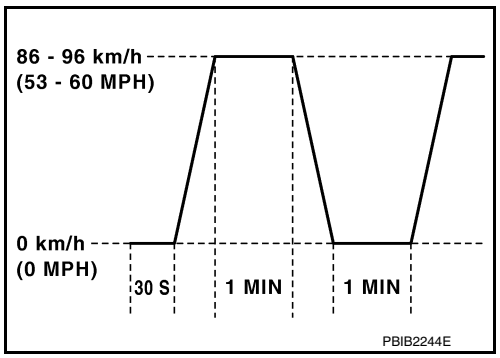
1. Drive the vehicle. And depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds.
2. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again

NOTE:
- Checking the vehicle speed with GST is advised.
- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

>> GO TO 7.

7.PATTERN 3

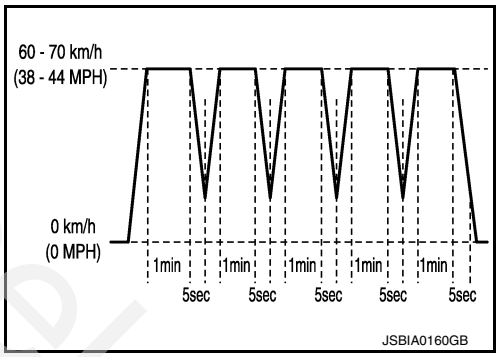
- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during deceleration of vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).



>> GO TO 8.

8.PATTERN 4

- Operate vehicle following the driving pattern shown in the figure.
- Drive the vehicle in a proper gear at 60 km/h (38 MPH) and maintain the speed.
- Release the accelerator pedal fully at least 5 seconds.
- Repeat the above two steps at least 5 times.



>> GO TO 9.

9.PATTERN 5

- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted again.

>> GO TO 10.

10.CHECK SRT STATUS

With CONSULT
Select “SRT STATUS” in “DTC & SRT CONFIRMATION” mode of “ENGINE” using CONSULT.
WITHOUT CONSULT
Perform “SRT status” mode with EC-666, "On Board Diagnosis Function".
With GST
Select Service $01 with GST.

Is SRT(s) set?

YES >> GO TO 11.
NO >> Call TECH LINE or take appropriate action.

11.CHECK PERMANENT DTC

NOTE:
Permanent DTC cannot be checked with a tool other than CONSULT or GST.

With CONSULT
Select “SRT STATUS” in “DTC & SRT CONFIRMATION” mode with CONSULT.
With GST
Select Service $0A with GST.

Is permanent DTC(s) detected?

YES >> Proceed to EC-785, "Description".
NO >> END

HOW TO ERASE PERMANENT DTC

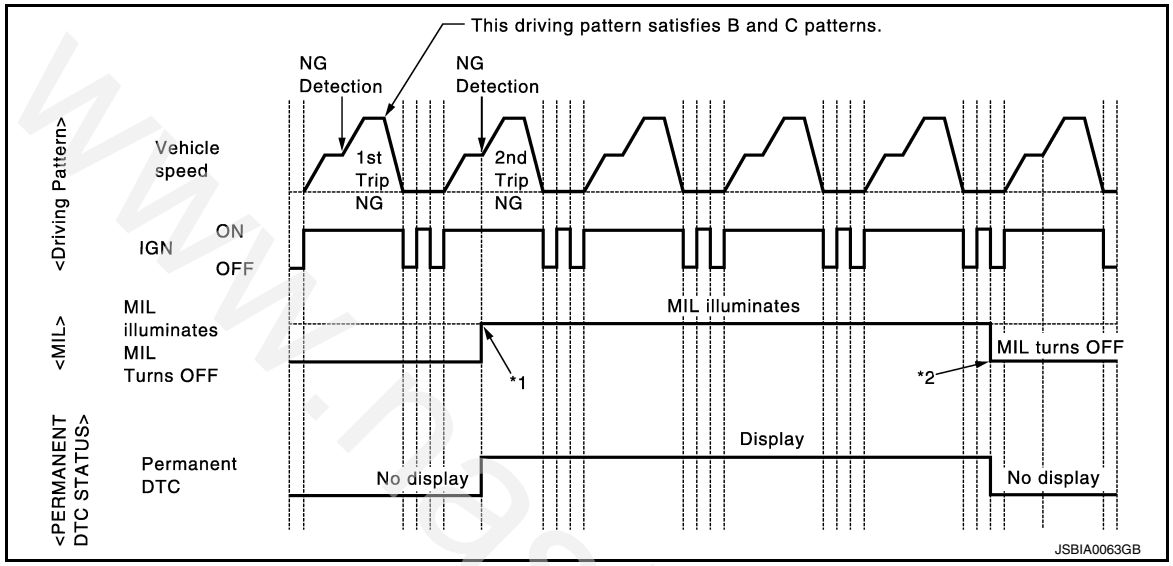
Description

INFOID:0000000012198285

OUTLINE

When a DTC is stored in ECM

When a DTC is stored in ECM and MIL is ON, a permanent DTC is erased with MIL shutoff if the same malfunction is not detected after performing the driving pattern for MIL shutoff three times in a raw.



*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.

*2: MIL will turn off after vehicle is driven 3 times (driving pattern B) without any malfunctions.

When a DTC is not stored in ECM

The erasing method depends on a permanent DTC stored in ECM. Refer to the following table.

NOTE:

If the applicable permanent DTC includes multiple groups, perform the procedure of Group B first. If the permanent DTC is not erased, perform the procedure of Group A.

×: Applicable —: Not applicable

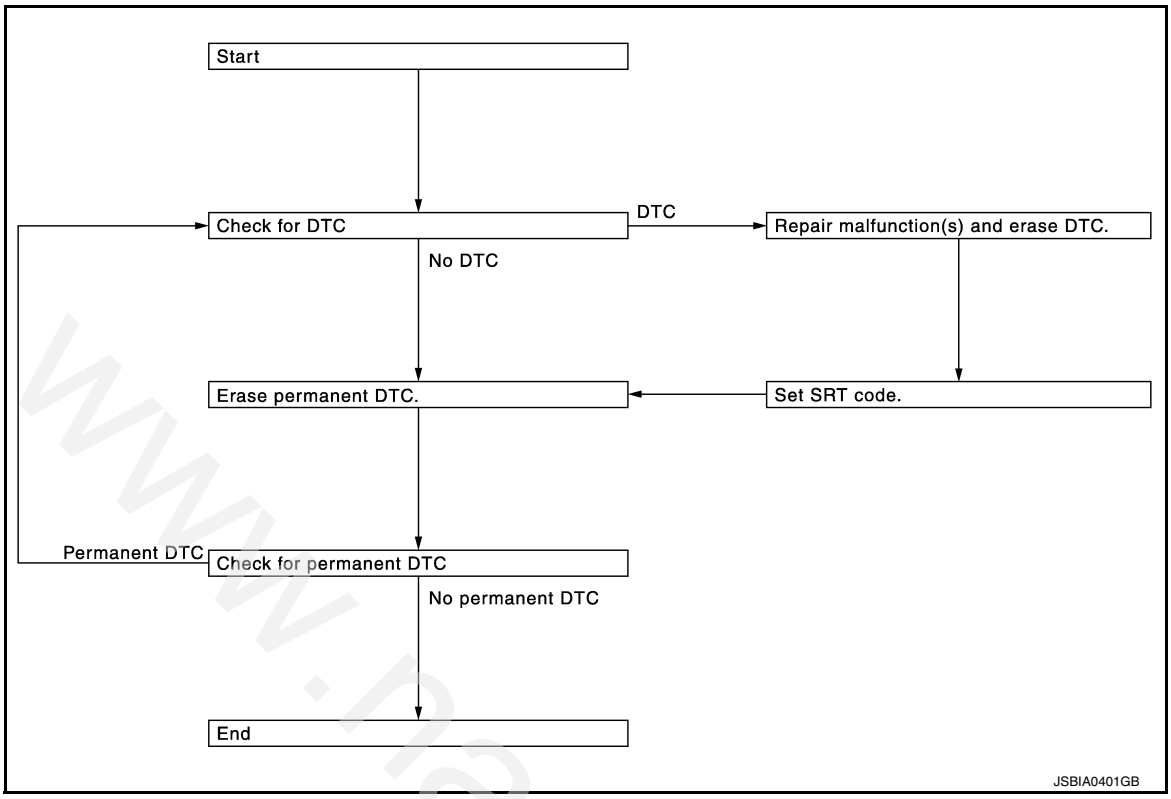
Group*	Perform "DTC CONFIRMATION PROCEDURE" for applicable DTCs.	Driving pattern		Reference
		B	D	
A	×	—	—	EC-780
B	—	×	×	EC-782

*: For group, refer to EC-706, "DTC Index".

PERMANENT DTC ITEM

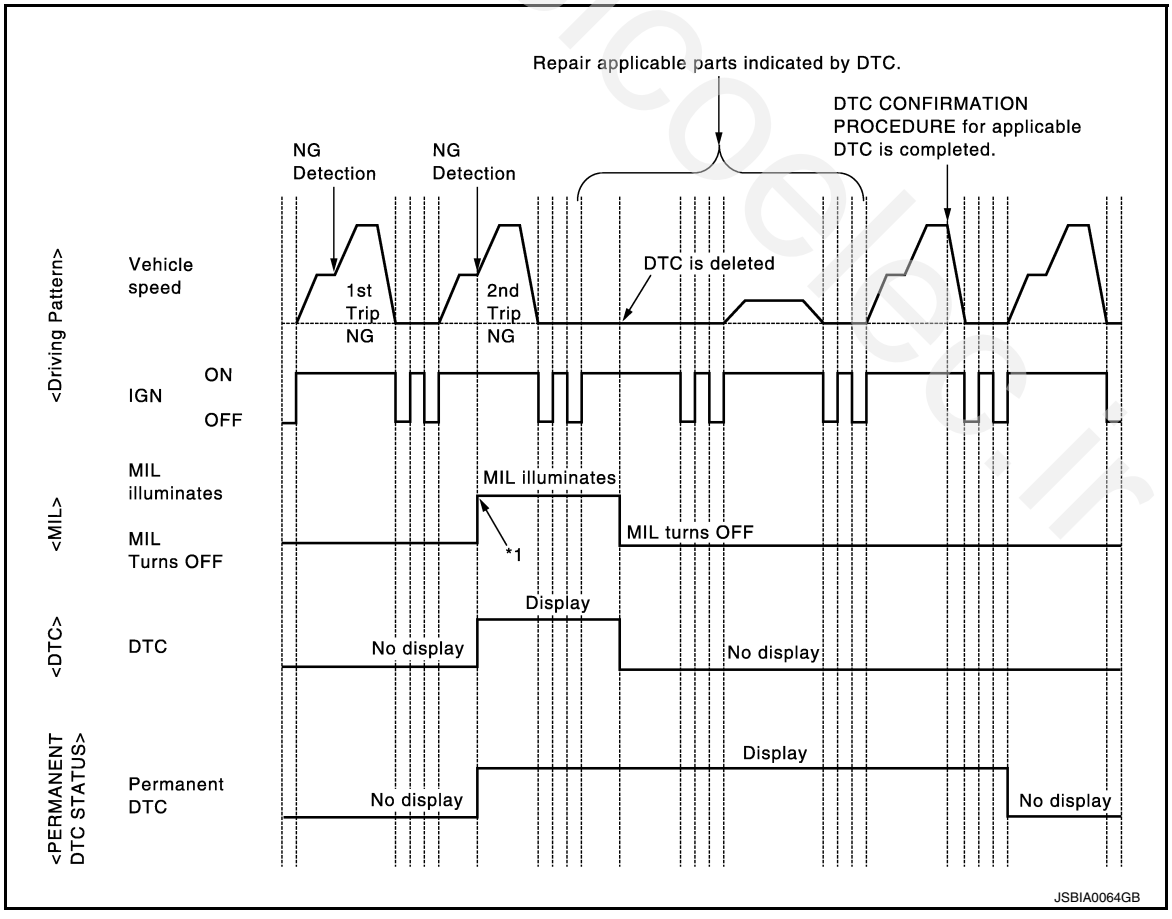
For permanent DTC items, MIL turns ON. Refer to EC-706, "DTC Index".

PERMANENT DTC SERVICE PROCEDURE



Work Procedure (Group A)

INFOID:0000000012198286



*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-666, "On Board Diagnosis Function", EC-667, "CONSULT Function".

NO >> GO TO 2.

2.CHECK PERMANENT DTC

With CONSULT

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “PERMANENT DTC STATUS” mode with CONSULT.

With GST

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select Service $0A with GST.

Is any permanent DTC detected?

YES >> GO TO 3.

NO >> END

3.PERFORM DTC CONFIRMATION PROCEDURE

Perform “DTC CONFIRMATION PROCEDURE” for DTCs which are the same as permanent DTCs stored in ECM. Refer to EC-706, "DTC Index".

>> GO TO 4.

4.CHECK PERMANENT DTC

With CONSULT

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “PERMANENT DTC STATUS” mode with CONSULT.

With GST

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select Service $0A with GST.

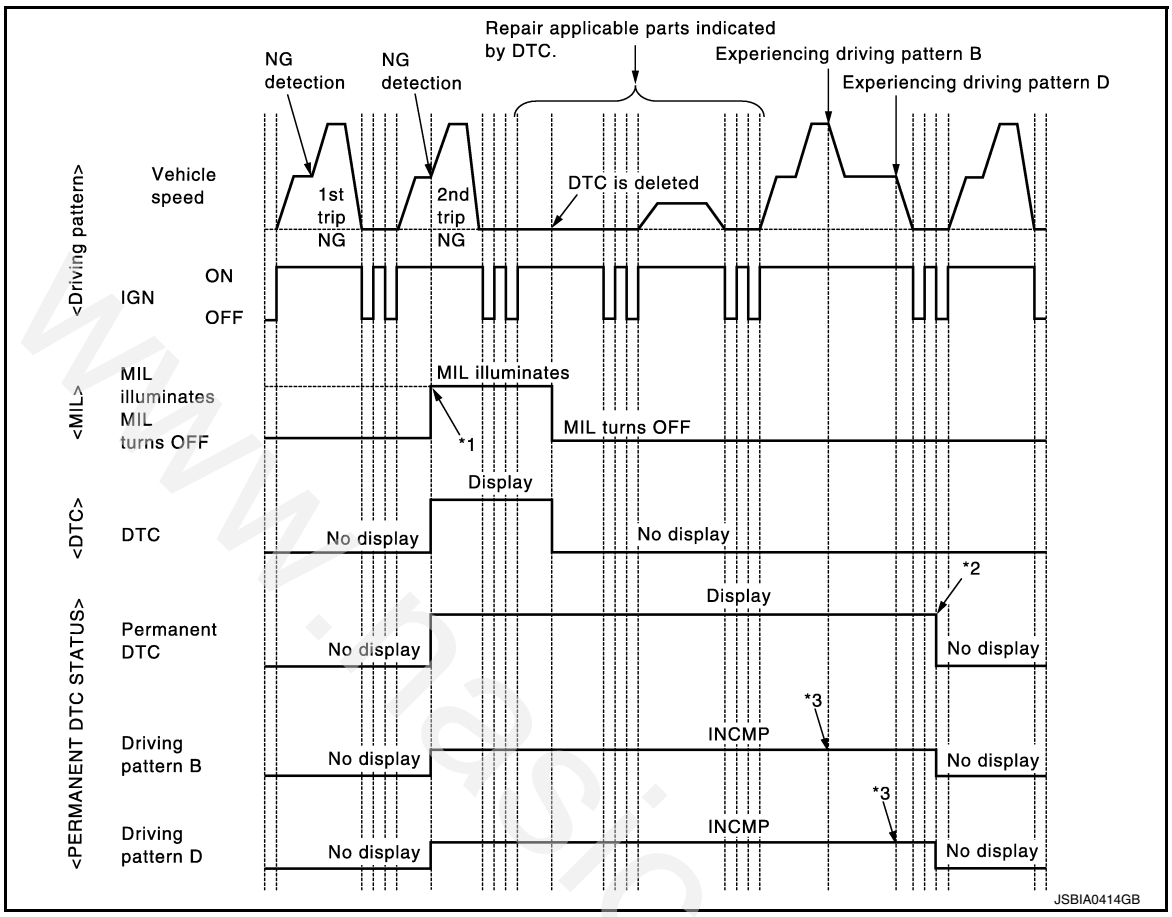
Is any permanent DTC detected?

YES >> GO TO 1.

NO >> END

Work Procedure (Group B)

INFOID:0000000012198287



*1: When the same malfunction is detected in two consecutive trips, MIL will illuminate.

*2: After experiencing driving pattern B and D, permanent DTC is erased.

*3: Indication does not change unless the ignition switch is turned from ON to OFF twice even after experiencing driving pattern B or D.

NOTE:
Drive the vehicle according to only driving patterns indicating “INCMP” in driving patterns B and D on the “PERMANENT DTC STATUS” screen.

1.CHECK DTC

Check DTC.

Is any DTC detected?

YES >> Repair malfunction(s) and erase DTC. Refer to EC-666, "On Board Diagnosis Function", EC-667, "CONSULT Function".

NO >> GO TO 2.

2.CHECK PERMANENT DTC

With CONSULT

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “PERMANENT DTC STATUS” mode with CONSULT.

With GST

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

4. Turn ignition switch ON.
5. Select Service $0A with GST.

Is any permanent DTC detected?

YES >> GO TO 3.
NO >> END

3. DRIVE DRIVING PATTERN B

CAUTION:
- **Always drive at a safe speed.**
- **Never erase self-diagnosis results.**
- **If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B and D is reset.**

With CONSULT
1. Start engine and warm it up to normal operating temperature.
2. Use “PERMANENT DTC WORK SUPPORT” mode with CONSULT to drive the vehicle according to driving pattern B. Refer to EC-667, "CONSULT Function", EC-663, "DIAGNOSIS DESCRIPTION : Driving Pattern".

With GST
1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle according to driving pattern B. Refer to EC-663, "DIAGNOSIS DESCRIPTION : Driving Pattern".

>> GO TO 4.

4. CHECK PERMANENT DTC

With CONSULT
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “PERMANENT DTC STATUS” mode with CONSULT.

With GST
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select Service $0A with GST.

Is any permanent DTC detected?

YES >> GO TO 5.
NO >> END

5. DRIVE DRIVING PATTERN D

CAUTION:
- **Always drive at a safe speed.**
- **Never erase self-diagnosis results.**
- **If self-diagnosis results are erased during the trip of driving pattern B or D, the counter of driving pattern B and D is reset.**

Drive the vehicle according to driving pattern D. Refer to EC-663, "DIAGNOSIS DESCRIPTION : Driving Pattern".

>> GO TO 6.

6. CHECK PERMANENT DTC

With CONSULT
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.

5. Select “PERMANENT DTC STATUS” mode with CONSULT.

With GST

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select Service $0A with GST.

Is any permanent DTC detected?

YES >> GO TO 1.
NO >> END

DTC/CIRCUIT DIAGNOSIS

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Description

INFOID:0000000012198288

The specification (SP) value indicates the tolerance of the value that is displayed in “SPEC” of “DATA MONITOR” mode of CONSULT during normal operation of the Engine Control System. When the value in “SPEC” of “DATA MONITOR” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “SPEC” of “DATA MONITOR” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.
The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.
The SP value will be displayed for the following three items:
- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MASS AIR FLOW SENSOR (Hz) (The signal frequency of the mass air flow sensor)

Component Function Check

INFOID:0000000012198289

1.START

Make sure that all of the following conditions are satisfied.
- Vehicle driven distance: More than 5,000 km (3,107 miles)
- Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm^2, 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up
  - CVT models: After the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (CVT fluid temperature sensor signal) indicates more than 60°C (140°F).
  - M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied
  - Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.
- Engine speed: Idle

>> GO TO 2.

2.PERFORM “SPEC” OF “DATA MONITOR” MODE

With CONSULT
NOTE:
Perform “SPEC” in “DATA MONITOR” mode in maximum scale display.
1. Perform EC-765, "Work Procedure".
2. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MASS AIR FLOW SENSOR (Hz)” in “SPEC” of “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Make sure that monitor items are within the SP value.

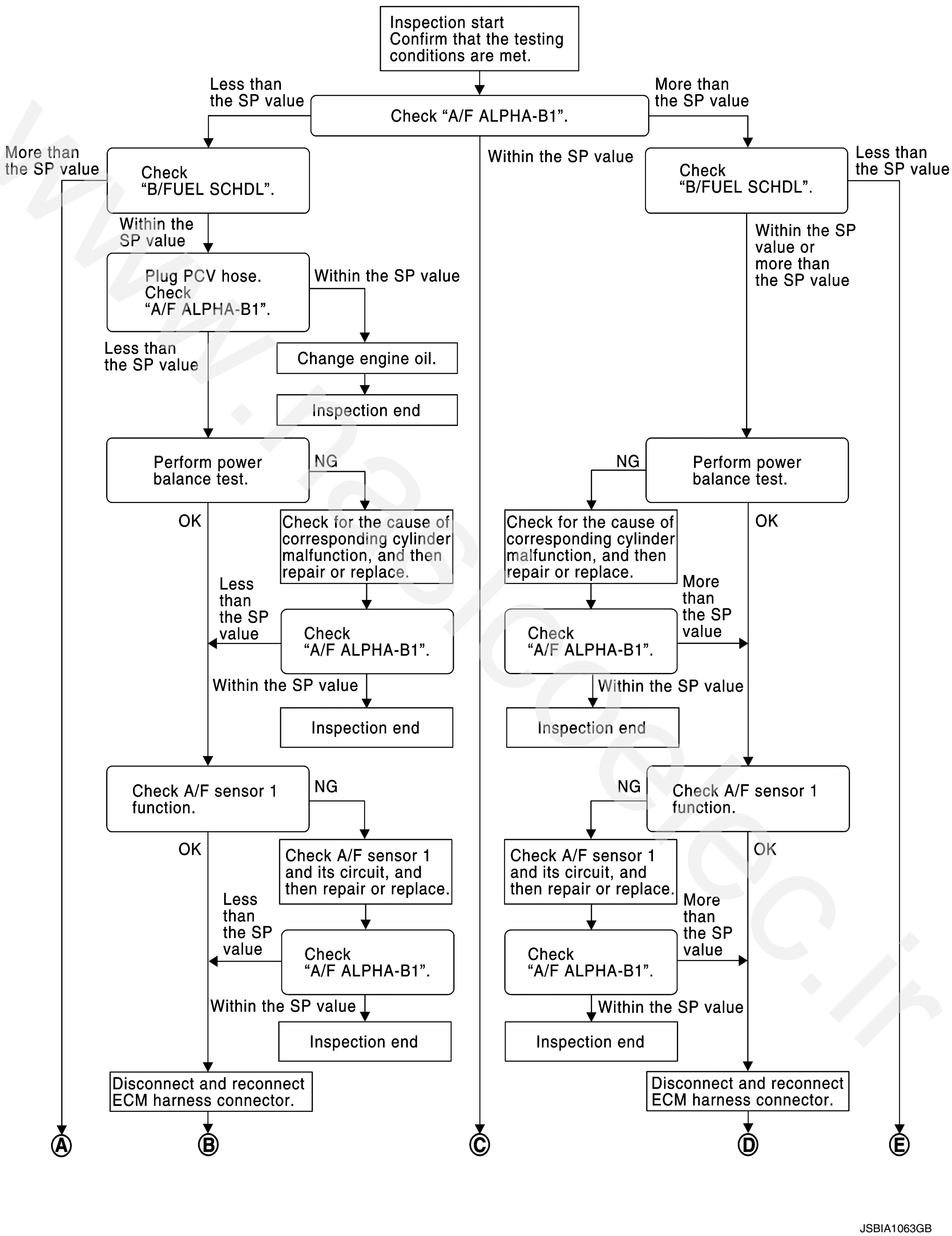
Is the inspection result normal?

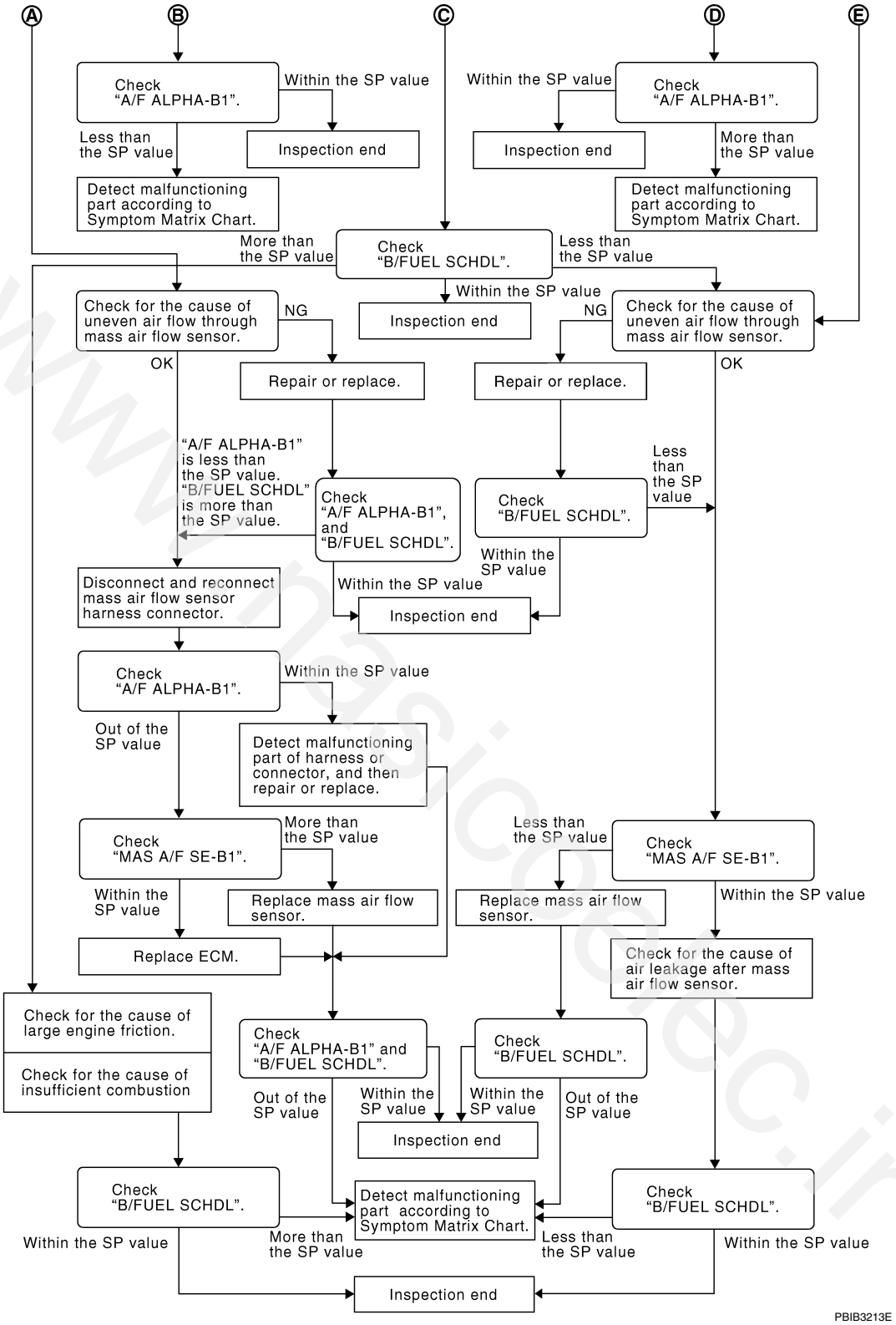
YES >> END
NO >> Proceed to EC-786, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198290

OVERALL SEQUENCE





DETAILED PROCEDURE

1. CHECK "A/F ALPHA-B1"

With CONSULT

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-785, "Component Function Check".
3. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

NOTE:
Check “A/F ALPHA-B1” for approximately 1 minute because it may fluctuate. It is NG if the indication is out of the SP value even a little.

Is the measurement value within the SP value?

YES >> GO TO 14.
NO-1 >> Less than the SP value: GO TO 2.
NO-2 >> More than the SP value: GO TO 3.

2.CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 4.
NO >> More than the SP value: GO TO 16.

3.CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 6.
NO-1 >> More than the SP value: GO TO 6.
NO-2 >> Less than the SP value: GO TO 22.

4.CHECK “A/F ALPHA-B1”

1. Stop the engine.
2. Disconnect PCV hose, and then plug it.
3. Start engine.
4. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 5.
NO >> GO TO 6.

5.CHANGE ENGINE OIL

1. Stop the engine.
2. Change engine oil.

NOTE:
This symptom may occur when a large amount of gasoline is mixed with engine oil because of driving conditions (such as when engine oil temperature does not rise enough since a journey distance is too short during winter). The symptom will not be detected after changing engine oil or changing driving condition.

>> **INSPECTION END**

6.PERFORM POWER BALANCE TEST

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.
2. Make sure that the each cylinder produces a momentary engine speed drop.

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 7.

7.DETECT MALFUNCTIONING PART

Check the following.
1. Ignition coil and its circuit (Refer to EC-1229, "Component Function Check".)
2. Fuel injector and its circuit (Refer to EC-1204, "Component Function Check".)
3. Intake air leakage
4. Low compression pressure (Refer to EM-182, "Inspection".)

Is the inspection result normal?

YES >> Replace fuel injector and then GO TO 8.
NO >> Repair or replace malfunctioning part and then GO TO 8.

8. CHECK "A/F ALPHA-B1"

1. Start engine.
2. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 9.

9. CHECK A/F SENSOR 1 FUNCTION

Perform all DTC CONFIRMATION PROCEDURE related with A/F sensor 1.
- For DTC P0130, refer to EC-871, "DTC Logic".
- For DTC P0131, refer to EC-875, "DTC Logic".
- For DTC P0132, refer to EC-878, "DTC Logic".
- For DTC P2096 or P2097, refer to EC-1132, "DTC Logic".

Is any DTC detected?

YES >> GO TO 10.
NO >> GO TO 12.

10. CHECK A/F SENSOR 1 CIRCUIT

Perform DIAGNOSTIC PROCEDURE according to corresponding DTC.

>> GO TO 11.

11. CHECK "A/F ALPHA-B1"

1. Start engine.
2. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> GO TO 12.

12. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect ECM harness connector.
3. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 13.

13. CHECK "A/F ALPHA-B1"

1. Start engine.
2. Select "A/F ALPHA-B1" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-1242, "Symptom Table".

14. CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "SPEC" of "DATA MONITOR" mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO-1 >> More than the SP value: GO TO 15.
NO-2 >> Less than the SP value: GO TO 22.

15. DETECT MALFUNCTIONING PART

1. Check for the cause of large engine friction. Refer to the following.
- Engine oil level is too high
- Engine oil viscosity
- Belt tension of power steering, alternator, A/C compressor, etc. is excessive
- Noise from engine
- Noise from transmission, etc.
2. Check for the cause of insufficient combustion. Refer to the following.
- Valve clearance malfunction
- Intake valve timing control function malfunction
- Camshaft sprocket installation malfunction, etc.

>> Repair or replace malfunctioning part, and then GO TO 27.

16. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

Is the inspection result normal?

YES >> GO TO 21.
NO >> Repair or replace malfunctioning part, and then GO TO 17.

17. CHECK “A/F ALPHA-B1”, AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1” and “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that each indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> “B/FUEL SCHDL” is more, “A/F ALPHA-B1” is less than the SP value: GO TO 18.

18. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect mass air flow sensor harness connector.
3. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 19.

19. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-843, "DTC Logic". Then GO TO 26.
NO >> GO TO 20.

20. CHECK “MASS AIR FLOW SENSOR (HZ)”

Select “MASS AIR FLOW SENSOR (Hz)” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 21.
NO >> More than the SP value: Replace mass air flow sensor, and then GO TO 26.

21. REPLACE ECM

1. Replace ECM.
2. Perform EC-749, "Description".

>> GO TO 26.

22. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

Is the inspection result normal?

YES >> GO TO 24.
NO >> Repair or replace malfunctioning part, and then GO TO 23.

23. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Less than the SP value: GO TO 24.

24. CHECK “MASS AIR FLOW SENSOR (HZ)”

Select “MASS AIR FLOW SENSOR (Hz)” in “SPEC” of “DATA MONITOR” mode, and make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> GO TO 25.
NO >> Less than the SP value: Replace mass air flow sensor, and then GO TO 27.

25. CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.
- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts
- Malfunctioning seal of intake air system, etc.

>> GO TO 27.

26. CHECK “A/F ALPHA-B1” AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1” and “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and make sure that each indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-1242, "Symptom Table".

27. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “SPEC” of “DATA MONITOR” mode, and then make sure that the indication is within the SP value.

Is the measurement value within the SP value?

YES >> INSPECTION END
NO >> Detect malfunctioning part according to EC-1242, "Symptom Table".

POWER SUPPLY AND GROUND CIRCUIT

Diagnosis Procedure

INFOID:0000000012198291

1.CHECK FUSE

Check that the following fuse is not blowing.

Location	Fuse No.	Capacity
IPDM E/R	#43	20 A
	#61	15 A

Is the fuse blown (open)?

YES >> If the replaced fuse is blown again. Check IPDM E/R power supply.
NO >> GO TO 2.

2.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection E21 and E38. Refer to GI-48, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace ground connection.

3.CHECK ECM GROUND CIRCUIT

1. Disconnect ECM harness connectors.
2. Check the continuity between ECM harness connector and ground.

+		–	Continuity
ECM			
Connector	Terminal		
F23	9	Ground	Existed
	10		
	50		
F24	60		
	110		
E19	147		
	149		
	152		

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK ECM POWER SUPPLY (MAIN)-I

1. Reconnect ECM harness connector.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector terminals.

ECM			Voltage
Connector	+	–	
	Terminal		
E19	145	152	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.

NO >> GO TO 6.

5. CHECK ECM POWER SUPPLY (MAIN)-II

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Check the voltage between ECM harness connector terminals as per the following.

ECM			Condition	Voltage (Approx.)
Connector	+	–		
	Terminal			
E19	145	152	After turning ignition switch OFF, battery voltage will exist for a few seconds	Drop to 0 V

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 7.

6. CHECK ECM POWER SUPPLY (MAIN) CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		–		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E19	145	E14	35	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for IPDM E/R power supply circuit.
NO >> Repair or replace error-detected parts.

7. CHECK ECM RELAY CONTROL SIGNAL

Check the voltage between ECM harness connector terminals as per the following.

ECM				Condition	Voltage (Approx.)
Connector	+	Connector	–		
	Terminal		Terminal		
F24	81	E19	152	Ignition switch ON	0 V
				Turn ignition switch OFF and wait at least 10 seconds.	Battery voltage

Is the inspection result normal?

YES >> Check Intermittent Incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 8.

8. CHECK ECM RELAY CONTROL SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		–		
ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F24	81	E14	41	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Replace IPDM E/R. Refer to PCS-37, "Removal and Installation".
NO >> Repair or replace error-detected parts.

9. CHECK IGNITION SWITCH SIGNAL

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals.

ECM			Condition	Voltage (Approx.)
Connector	+	–		
	Terminal			
E19	133	152	Ignition switch OFF	0 V
			Ignition switch ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 11.
NO >> GO TO 10.

10. CHECK IGNITION SWITCH SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		–		
ECM		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
E19	133	E15	61	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

11. CHECK ECM POWER SUPPLY (BACK-UP)

Check the voltage between ECM harness connector terminals.

+		–		
ECM		ECM		Voltage
Connector	Terminal	Connector	Terminal	
F24	113	E19	152	Battery voltage

Is the inspection result normal?

YES >> Check Intermittent Incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 12.

12. CHECK ECM POWER SUPPLY (BACK-UP) CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

3. Disconnect IPDM E/R harness connector.
4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		–		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F24	113	E14	42	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

U0101 CAN COMM CIRCUIT

Description

INFOID:0000000012198292

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:0000000012198293

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U0101	LOST COMM (TCM) (Lost communication with TCM)	When ECM is not transmitting or receiving CAN communication signal of OBD (emission-related diagnosis) with TCM for 2 seconds or more.	CAN communication line between TCM and ECM

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-796, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198294

Perform the trouble diagnosis for CAN communication system. Refer to LAN-17, "Trouble Diagnosis Flow Chart".

U0122 VEHICLE DYNAMICS CONTROL MODULE

Description

INFOID:0000000012198295

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:0000000012198296

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U0122	VDC MDL (Lost communication with vehicle dynamics control module)	When ECM is not transmitting or receiving CAN communication signal of OBD (emission related diagnosis) with ABS actuator and electric unit (control unit) for 2 seconds or more.	CAN communication line between ECM and ABS actuator and electric unit (control unit) (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-797, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198297

Perform the trouble diagnosis for CAN communication system. Refer to LAN-17, "Trouble Diagnosis Flow Chart".

U1000 CAN COMM CIRCUIT

Description

INFOID:0000000012198298

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:0000000012198299

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
U1000	CAN COMM CIRCUIT (CAN communication line)	When ECM is not transmitting or receiving CAN communication signal of OBD (emission related diagnosis) for 2 seconds or more.	Harness or connectors (CAN communication line is open or shorted)

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 3 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-798, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198300

Perform the trouble diagnosis for CAN communication system. Refer to LAN-17, "Trouble Diagnosis Flow Chart".

P0011 IVT CONTROL

DTC Logic

INFOID:0000000012198301

DTC DETECTION LOGIC

NOTE:
If DTC P0011 is displayed with DTC P0075, first perform the trouble diagnosis for EC-1060, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0011	INT/V TIM CONT-B1 (Intake valve timing control performance)	There is a gap between angle of target and phase-control angle degree.	• Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Intake valve control solenoid valve • Accumulation of debris to the signal pick-up portion of the camshaft • Timing chain installation • Foreign matter caught in the oil groove for intake valve timing control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10 V and 16 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT
1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Start engine and warm it up to normal operating temperature.
3. Maintain the following conditions for at least 6 consecutive seconds. Hold the accelerator pedal as steady as possible.

ENG SPEED	1,200 - 2,000 rpm
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	P or N position (CVT) Neutral position (M/T)

4. Stop vehicle with engine running and let engine idle for 10 seconds.
5. Check 1st trip DTC.

With GST
Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-800, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT
1. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,200 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	D position (CVT) 1st or 2nd position (M/T)
Driving location	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:
Always drive at a safe speed.

2. Check 1st trip DTC.

With GST
Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

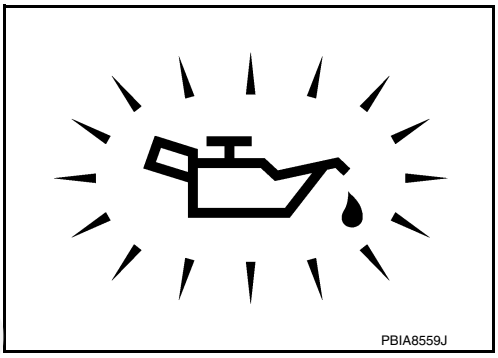
YES >> Proceed to EC-800, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198302

1.CHECK OIL PRESSURE WARNING LAMP

1. Start engine.
2. Check oil pressure warning lamp and confirm it is not illuminated.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Is oil pressure warning lamp illuminated?

YES >> Check the engine oil level. Refer to LU-28, "Inspection".
NO >> GO TO 2.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Check the intake valve timing control solenoid valve. Refer to EC-801, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace intake valve timing control solenoid valve. Refer to EM-248, "Exploded View".

3.CHECK CRANKSHAFT POSITION SENSOR (POS)

Check the crankshaft position sensor (POS). Refer to EC-951, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace crankshaft position sensor (POS). Refer to EM-282, "Exploded View".

4.CHECK CAMSHAFT POSITION SENSOR (PHASE)

Check the camshaft position sensor (PHASE). Refer to EC-954, "Component Inspection".

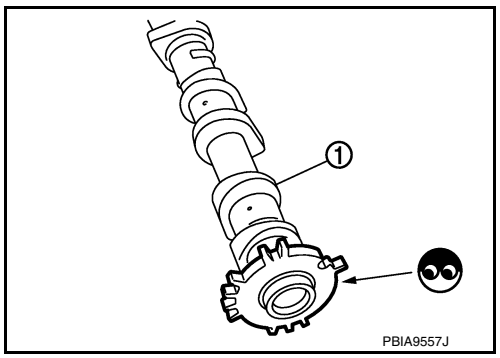
Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace camshaft position sensor (PHASE). Refer to EM-260, "Exploded View".

5.CHECK CAMSHAFT (INT)

Check the following.

- Accumulation of debris to the signal plate of camshaft (1) rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> GO TO 6.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-261, "Removal and Installation".

6.CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

YES >> Check timing chain installation. Refer to EM-249, "Removal and Installation".
NO >> GO TO 7.

7.CHECK LUBRICATION CIRCUIT

Refer to LU-28, "Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Clean lubrication line.

Component Inspection

INFOID:0000000012198303

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Check resistance between intake valve timing control solenoid valve terminals as per the following.

Intake valve timing control solenoid valve		Resistance
+	–	
Terminal		
1	2	6.7 - 7.7 Ω [at 20°C (68°F)]
1	Ground	∞ Ω (Continuity should not exist)
2		

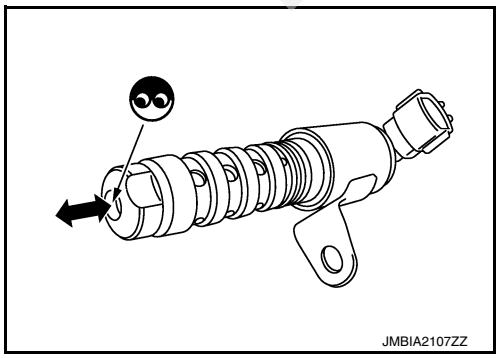
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace intake valve timing control solenoid valve. Refer to EM-248, "Exploded View".

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve. Refer to EM-248, "Exploded View".
2. Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.
NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace intake valve timing control solenoid valve. Refer to EM-248, "Exploded View".

P0014 EVT CONTROL

DTC Logic

INFOID:0000000012198304

DTC DETECTION LOGIC

NOTE:

- **If DTC P0014 is displayed with DTC P0078, first perform trouble diagnosis for DTC P0078. Refer to EC-816, "DTC Logic".**

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0014	EXH/V TIM CONT-B1 (Exhaust valve timing control performance)	There is a gap between angle of target and phase-control angle degree.	• Crankshaft position sensor (POS) • Camshaft position sensor (PHASE) • Exhaust valve timing control position sensor • Exhaust valve control solenoid valve • Accumulation of debris to the signal pick-up portion of the camshaft • Timing chain installation • Foreign matter caught in the oil groove for exhaust valve timing control

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10 V and 16 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Start engine and warm it up to the normal operating temperature.
3. Maintain the following conditions for at least 6 consecutive seconds. Hold the accelerator pedal as steady as possible.

ENG SPEED	1,200 - 2,000 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	P or N position (CVT) Neutral position (M/T)

4. Let engine idle for 10 seconds.
5. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-803, "Diagnosis Procedure"

NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

With CONSULT

1. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,200 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	More than 60°C (140°F)
Selector lever	D position (CVT) 1st or 2nd position (M/T)
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

CAUTION:
Always drive at a safe speed.

2. Check 1st trip DTC.

With GST
Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-803, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

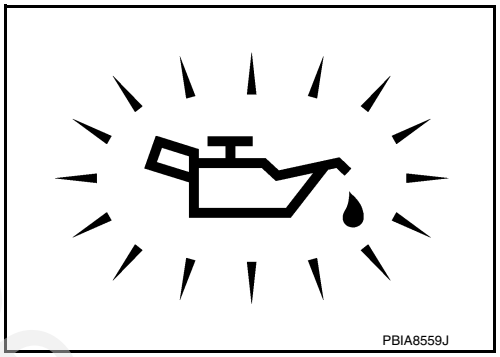
INFOID:0000000012198305

1.CHECK OIL PRESSURE WARNING LAMP

1. Start engine.
2. Check oil pressure warning lamp and confirm it is not illuminated.

Is oil pressure warning lamp illuminated?

YES >> Check the engine oil level. Refer to LU-28, "Inspection".
NO >> GO TO 2.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2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE

Check the exhaust valve timing control solenoid valve. Refer to EC-801, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-248, "Exploded View".

3.CHECK CRANKSHAFT POSITION SENSOR (POS)

Check the crankshaft position sensor (POS). Refer to EC-951, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace crankshaft position sensor (POS). Refer to EM-282, "Exploded View".

4.CHECK EXHAUST VALVE TIMING CONTROL POSITION SENSOR

Check the exhaust valve timing control position sensor. Refer to EC-954, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace exhaust valve timing control position sensor. Refer to EM-260, "Exploded View".

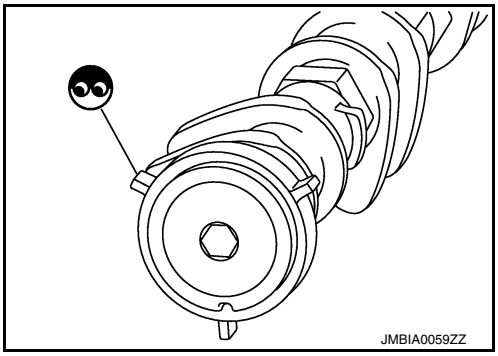
5.CHECK CAMSHAFT (EXH)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

Is the inspection result normal?

YES >> GO TO 6.
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-261, "Removal and Installation".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6.CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

Are there any service records that may cause timing chain misaligned?

YES >> Check timing chain installation. Refer to EM-249, "Removal and Installation".
NO >> GO TO 7.

7.CHECK LUBRICATION CIRCUIT

Refer to LU-28, "Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Clean lubrication line.

Component Inspection

INFOID:0000000012198306

1.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.
2. Disconnect exhaust valve timing control solenoid valve harness connector.
3. Check resistance between exhaust valve timing control solenoid valve terminals as per the following.

Exhaust valve timing control solenoid valve		Resistance
+	–	
Terminal		
1	2	7.0 - 7.7 Ω [at 20°C (68°F)]
1	Ground	∞ Ω (Continuity should not exist)
2		

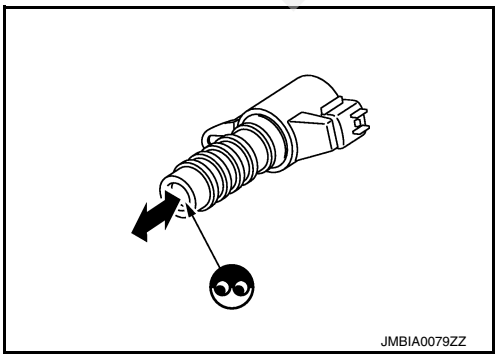
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-248, "Exploded View".

2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove exhaust valve timing control solenoid valve. Refer to EM-248, "Exploded View".
2. Provide 12 V DC between exhaust valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.

CAUTION:
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in exhaust valve timing control solenoid valve.
NOTE:
Always replace O-ring when exhaust valve timing control solenoid valve is removed.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Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-248, "Exploded View".

P0030, P0031, P0032 A/F SENSOR HEATER

DTC Logic

INFOID:0000000012198307

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0030	A/F SEN 1 HTR (B1) (Air fuel ratio (A/F) sensor 1 heater control circuit)	Deterioration in A/F sensor 1 heater performance. (Voltage signal transmitted from A/F sensor 1 heater to ECM is higher/lower than voltage in the normal range.)	• Harness or connectors (A/F sensor 1 heater circuit is open or shorted.) • A/F sensor 1 heater
P0031	A/F SEN 1 HTR (B1) (Air fuel ratio (A/F) sensor 1 heater control circuit low)	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the A/F sensor 1 heater.)	
P0032	A/F SEN 1 HTR (B1) (Air fuel ratio (A/F) sensor 1 heater control circuit high)	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the A/F sensor 1 heater.)	• Harness or connectors (A/F sensor 1 heater circuit is shorted.) • A/F sensor 1 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than between 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-805, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198308

1.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

+		–	Voltage
A/F sensor 1			
Connector	Terminal		
F72	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK A/F SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

+		–		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F72	3	F24	116	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

3.CHECK A/F SENSOR 1 HEATER

Check the A/F sensor 1 heater. Refer to EC-806, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 4.

4.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-242, "Exploded View".

CAUTION:

- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new A/F sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J-43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

Component Inspection

INFOID:0000000012198309

1.CHECK AIR FUEL RATIO (A/F) SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Check resistance between A/F sensor 1 terminals as per the following.

+	–	Resistance
A/F sensor 1		
Terminal		
3	4	1.8 - 2.44 Ω [at 20°C (68°F)]
	1	∞ Ω (Continuity should not exist)
	2	
4	1	
	2	

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. Refer to EM-242, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

P0037, P0038 HO2S2 HEATER

DTC Logic

INFOID:0000000012198310

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0037	HO2 HTR (B1) (Heated oxygen sensor 2 heater control circuit low)	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	• Harness or connectors (Heated oxygen sensor 2 heater circuit is open or shorted.) • Heated oxygen sensor 2 heater
P0038	HO2 HTR (B1) (Heated oxygen sensor 2 heater control circuit high)	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	• Harness or connectors (Heated oxygen sensor 2 heater circuit is shorted.) • Heated oxygen sensor 2 heater

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-808, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198311

1.CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between HO2S2 harness connector and ground.

+		−	Voltage
HO2S2			
Connector	Terminal		
F71	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK HO2S2 HEATER OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S2 harness connector and ECM harness connector.

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F71	3	F24	117	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK HEATED OXYGEN SENSOR 2 HEATER

Check the heated oxygen sensor 2 heater. Refer to EC-809, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 4.

4.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

Component Inspection

INFOID:0000000012198312

1.CHECK HEATED OXYGEN SENSOR 2 HEATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
3. Check resistance between HO2S2 terminals as per the following.

+	–	Resistance
Heated oxygen sensor 2		
Terminal		
4	3	3.3 - 4.4 Ω [at 25°C (77°F)]
1	2	∞ Ω (Continuity should not exist)
	3	
	4	
2	1	
	3	
	4	

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

P0046 WASTEGATE CONTROL MOTOR

DTC Logic

INFOID:0000000012198313

DTC DETECTION LOGIC

NOTE:
If DTC P0046 is displayed with DTC P2562, and/or P2566 first perform the trouble diagnosis for DTC P2562, and/or P2566. Refer to EC-1168, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0046	TC/SC BOOST CONTROL A (Turbocharger/supercharger boost control A circuit range/ performance)	When the following conditions are detected due to a malfunction in electric wastegate actuator motor: • Motor drive duty is 100% or more for 5 consecutive seconds • The difference between target stroke and actual stroke is 3mm or more for 5 consecutive seconds	• Harness or connectors (Electric wastegate control motor circuit is open or shorted.) • Electric wastegate control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:
Before performing the following procedure, confirm that battery voltage is between more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Start the engine and warm it up to nomal operating temperature.
3. Check 1st trip DTC. (If actuator motor is stuck on the valve closing side, 1st trip DTC is detected during the above procedure. If 1st trip DTC is not detected, actuator motor may be stuck on the valve opening side. In this case, follow the instruction below.)
4. Drive the vehicle and accelerate from 20km/h (13 MPH) to 80km/h (50 MPH) within 10 seconds.
   CAUTION:
   Always drive at safe speed.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-811, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198314

1.CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric wastegate control actuator harness connector and ECM harness connector.
3. Check the continuity between electric wastegate control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric wastegate control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F61	4	F24	107	Existed
	5		108	

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

Check the electric wastegate control actuator. Refer to EC-812, "Component Inspection (Electric Wastegate Control Actuator)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace electric wastegate control actuator.

Component Inspection (Electric Wastegate Control Actuator)

INFOID:0000000012198315

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

With CONSULT

1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “WASTEGATE ACTUATOR”.
3. Operate “Up” or “Down”, set “W/G ACTUATOR POSITION B1” to 0.002 m, and make a quick short note of value “V1” of “W/G ACTUATOR POSI SEN B1”.
4. Operate “Up” or “Down”, set “W/G ACTUATOR POSITION B1” to 0.006 m, and make a quick short note of value “V2” of “W/G ACTUATOR POSI SEN B1”.

Do the values of “V1” and “V2” change (visually, ACTUATOR SHAFT operates) and “V2” minus “V1” becomes equal to or more than 1.3V?

YES >> INSPECTION END
NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator only). Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

3.CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

Without CONSULT

1. Turn ignition switch OFF.
2. Disconnect Wastegate control actuator harness connector.
3. While checking the POSITION SENSOR OUT voltage with an oscilloscope, apply a voltage of 12 V to the positive or negative terminal.

Does ACTUATOR SHAFT visually operate and POSITION SENSOR OUT voltage change?

YES >> INSPECTION END
NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator only). Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

P0075 IVT CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000012198316

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name ((Trouble diagnosis content))	DTC detecting condition	Possible cause
P0075	INT/V TIM V/CIR-B1 (Intake valve timing control solenoid valve circuit)	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	• Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) • Intake valve timing control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-813, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198317

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake valve timing (IVT) control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake valve timing control solenoid valve harness connector and ground.

+		–	Voltage
IVT control solenoid valve			
Connector	Terminal		
F62	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IVT control solenoid valve harness connector and IPDM E/R harness connector.

+		+		Continuity
IVT control solenoid valve		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F62	2	E14	36	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between IVT control solenoid valve harness connector and ECM harness connector.

+		+		Continuity
IVT control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F62	1	F24	111	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Check the intake valve timing control solenoid valve. Refer to EC-814, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace intake valve timing control solenoid valve.

Component Inspection

INFOID:0000000012198318

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Check resistance between intake valve timing control solenoid valve terminals as per the following.

Intake valve timing control solenoid valve		Resistance
+	–	
Terminal		
1	2	6.7 - 7.7 Ω [at 20°C (68°F)]
1	Ground	∞ Ω (Continuity should not exist)
2		

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace intake valve timing control solenoid valve. Refer to EM-248, "Exploded View".

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve. Refer to EM-248, "Exploded View".

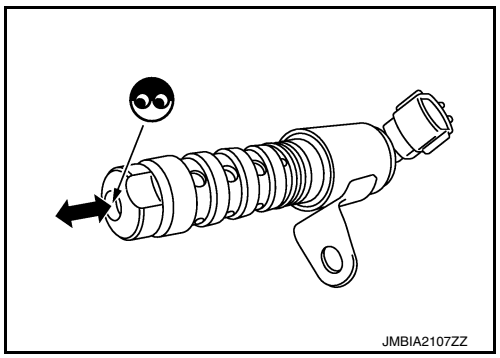
2. Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:

Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.

NOTE:

Always replace O-ring when intake valve timing control solenoid valve is removed.



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace intake valve timing control solenoid valve. Refer to EM-248, "Exploded View".

P0078 EVT CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000012198319

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0078	EX V/T ACT/CIRC-B1 (Exhaust valve timing control solenoid valve circuit)	An improper voltage is sent to the ECM through exhaust valve timing control solenoid valve.	• Harness or connectors (Exhaust valve timing control solenoid valve circuit is open or shorted.) • Exhaust valve timing control solenoid valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-816, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198320

1.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect exhaust valve timing (EVT) control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between exhaust valve timing control solenoid valve harness connector and ground.

+		–	Voltage
EVT control solenoid valve			
Connector	Terminal		
F100	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between EVT control solenoid valve harness connector and IPDM E/R harness connector.

+		+		
EVT control solenoid valve		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F100	2	E14	36	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVT control solenoid valve harness connector and ECM harness connector.

+		+		
EVT control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F100	1	F24	112	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE

Check the exhaust valve timing control solenoid valve. Refer to EC-814, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace exhaust valve timing control solenoid valve.

Component Inspection

INFOID:0000000012198321

1.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.
2. Disconnect exhaust valve timing control solenoid valve harness connector.
3. Check resistance between exhaust valve timing control solenoid valve terminals as per the following.

Exhaust valve timing control solenoid valve		Resistance
+	–	
Terminal		
1	2	7.0 - 7.7 Ω [at 20°C (68°F)]
1	Ground	∞ Ω (Continuity should not exist)
2		

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-248, "Exploded View".

2.CHECK EXHAUST VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove exhaust valve timing control solenoid valve. Refer to EM-248, "Exploded View".

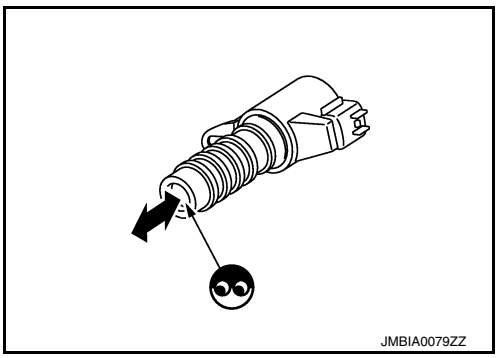
2. Provide 12 V DC between exhaust valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.

CAUTION:

Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in exhaust valve timing control solenoid valve.

NOTE:

Always replace O-ring when exhaust valve timing control solenoid valve is removed.



Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace exhaust valve timing control solenoid valve. Refer to EM-248, "Exploded View".

P0087 FRP CONTROL SYSTEM

DTC Logic

INFOID:0000000012198322

DTC DETECTION LOGIC

NOTE:

- **If DTC P0087 is displayed with DTC P0090 and/or P1197, first perform the trouble diagnosis for DTC P0090 and/or P1197.** Refer to EC-826, "DTC Logic" and/orEC-1071, "DTC Logic".
- DTC P0087 may be displayed when running out of gas or air accumulation.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0087	LOW FUEL PRES (High fuel pressure too low)	• Fuel rail pressure does not reach 1.3 MPa (13 bar, 13.3 kg/cm2, 188.5 psi) at engine cold start [water temperature 5°C (41°F) – 40°C (104°F)]. • Fuel rail pressure remains at 8.5 MPa (85 bar, 86.7 kg/cm2, 1232.8 psi) or less for 1 second or more during engine idle condition after cold start [water temperature 5°C (41°F) – 40°C (104°F)]. • The following condition continues for 5 seconds or more after engine start (regardless of water temperature): Target fuel pressure – Actual fuel pressure ≥ 2.7 MPa (27 bar, 27.5 kg/cm2, 392 psi).	• Fuel system • Leakage in fuel line • High pressure fuel pump • Low pressure fuel pump • Damage in lifter

DTC CONFIRMATION PROCEDURE

1.CHECK FUEL LEAKAGE

1. Turn ignition switch ON.
2. Visually check the piping between low pressure fuel pump and fuel injectors for fuel leakage.
3. Start the engine.
4. Visually check the piping between low pressure fuel pump and fuel injectors for fuel leakage.

Is inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**
- **Before performing the following procedure, check that the fuel tank is 1/8 full of fuel.**

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-1

WITH CONSULT

1. Turn ignition switch ON.
2. Select “COOLAN TEMP/S” in “DATA MONITOR” mode of “ENGNE” using CONSULT.
3. Check the following condition;

COOLAN TEMP/S	**: 5 – 40°C (41 – 104°F)**

WITH GST
Follow the above steps for “WITH CONSULT”.

Is the condition satisfied?

YES >> GO TO 4.
NO >> 1. Satisfy the condition.
2. Retry from step 1.

4.PERFORM DTC CONFIRMATION PROCEDURE-2

WITH CONSULT
1. Start the engine and let it idle for 10 seconds.
2. Check 1st trip DTC.

WITH GST
Follow the above steps for “WITH CONSULT”.

Is 1st trip DTC detected?

YES >> Proceed to EC-820, "Diagnosis Procedure".
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-3

WITH CONSULT
1. Select “COOLAN TEMP/S” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Maintain the following condition for 10 seconds or more at idle.

COOLAN TEMP/S	**: 70°C (104°F) or more**

3. Check 1st trip DTC.

WITH GST
Follow the above steps for “WITH CONSULT”.

Is 1st trip DTC detected?

YES >> Proceed to EC-820, "Diagnosis Procedure".
NO >> INSPECTION END.

Diagnosis Procedure

INFOID:0000000012198323

1.BLEED THE FUEL LINE

1. Start the engine, and let the engine run at idle at least for 10 minutes.
2. Perform DTC confirmation procedure of DTC P0087.

Is 1st trip DTC detected?

YES >> GO TO 2.
NO >> GO TO 6.

2.CHECK LOW FUEL PRESSURE

Check low fuel pressure. Refer to EC-771, "Work Procedure".

Is inspection result normal?

YES >> GO TO 3.
NO >> Check low fuel pressure system. Refer to EC-1234, "Diagnosis Procedure".

3.CHECK LOW PRESSURE FUEL LINE FOR INTERNAL LEAKAGE

1. Turn ignition switch OFF.
2. Turn ignition switch ON.
3. Check the following value 30 minutes after turning the ignition switch ON.

Low fuel pressure : 206 kPa (2.1 bar, 2.2 kgf/cm2, 30 psi) or more

Is inspection result normal?

YES >> GO TO 4.
NO >> Replace low pressure fuel pump. Refer to FL-7, "2WD : Removal and Installation" (2WD models), FL-11, "AWD : Removal and Installation" (AWD models).

4.CHECK HIGH PRESSURE FUEL PUMP

Check high pressure fuel pump. Refer to EC-821, "Component Inspection (High Pressure Fuel Pump)".

Is inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace the error-detected parts.

5.CHECK HIGH PRESSURE FUEL PUMP LIFTER

Check high pressure fuel pump lifter. Refer to EM-203, "Removal and Installation".

Does the lifter top surface have scratches and/or dents?

YES >> Replace the error-detected parts.
NO >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".

6.CHECK LOW PRESSURE FUEL LINE FOR INTERNAL LEAKAGE

1. Turn ignition switch OFF.
2. Connect fuel pressure gauge. Refer to EC-771, "Work Procedure".
3. Turn ignition switch ON.
4. Check the following value 30 minutes after turning the ignition switch ON.

Low fuel pressure : 206 kPa (2.1 bar, 2.2 kgf/cm2, 30 psi) or more

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace low pressure fuel pump. Refer to FL-7, "2WD : Removal and Installation" (2WD models), FL-11, "AWD : Removal and Installation" (AWD models).

Component Inspection (High Pressure Fuel Pump)

INFOID:0000000012198324

1.CHECK HIGH PRESSURE FUEL PUMP-1

1. Turn ignition switch OFF.
2. Disconnect high pressure fuel pump harness connector.
3. Check the resistance between high pressure fuel pump terminals.

+	–	Condition		Resistance (Approx.)
High pressure fuel pump Terminal				
1	2	Temperature °C (°F)	20 – 30 (68 - 86)	0.46 - 0.51 Ω

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace high pressure fuel pump. Refer to EM-203, "Exploded View".

2.CHECK HIGH PRESSURE FUEL PUMP-2

WITH CONSULT

1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check “FUEL PRES SEN V” in “DATA MONITOR” mode of “ECM” using CONSULT.

Monitor item	Condition	Value (Approx.)
FUEL PRES SEN V	Engine speed: idle	1,140 – 1,460 mV
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,300 – 2,900 mV

WITHOUT CONSULT

1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check FRP sensor signal voltage.

ECM			Condition	Value (Approx.)
Connector	+	–		
	Terminal			
F23	25	13	Engine speed: idle	1.14 – 1.46 V
			Engine speed: Revving engine from idle to 4,000 rpm quickly	1.3 – 2.9 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure fuel pump. Refer to EM-203, "Exploded View".

P0088 FRP CONTROL SYSTEM

DTC Logic

INFOID:0000000012198325

DTC DETECTION LOGIC

NOTE:
If DTC P0088 is displayed with DTC P0090, first perform the trouble diagnosis for DTC P0090. Refer to EC-826, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0088	HIGH FUEL PRES (High fuel pressure too high)	• Fuel rail pressure remains at more than 16.5 MPa (165 bar, 168.3 kg/cm^2, 2392.5 psi) for 1 second or more during engine idle condition after cold start [water temperature 5°C (41°F) - 40°C (104°F)]. • The following condition continues for 5 seconds or more after engine start (regardless of water temperature): Actual fuel pressure – Target fuel pressure ≥ 2.7 MPa (27 bar, 27.5 kg/cm^2, 392 psi)	• Harness or connector (The high pressure fuel pump circuit is open or shorted) • High pressure fuel pump

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**
- **Before performing the following procedure, check that the fuel tank is 1/8 full of fuel.**

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Warm up the engine to the normal operating temperature and keep the engine speed at idle for 15 seconds.
   NOTE:
   Warm up the engine until “COOLAN TEMP/S” on “DATA MONITOR” mode of “ENGINE” using CONSULT reaches at least 70°C (158°F).
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-826, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Cool the engine until the engine coolant temperature reaches 60°C (140°F) or less.
2. Start the engine and wait at least 40 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-826, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198326

1.CHECK LOW FUEL PRESSURE

1. Check low fuel pressure. Refer to EC-771, "Work Procedure".

Is inspection result normal?

YES >> GO TO 2.
NO >> Check low fuel pressure system. Refer to EC-1234, "Diagnosis Procedure".

2.CHECK HIGH PRESSURE FUEL PUMP

Check high pressure fuel pump. Refer to EC-824, "Component Inspection (High Pressure Fuel Pump)".

Is inspection result normal?

YES >> GO TO 3.
NO >> Replace error-detected parts.

3.CHECK FUEL LEAKAGE

1. Start the engine.
2. Visually check that the fuel pump, fuel rail, and fuel piping have no fuel leakage.

Is inspection result normal?

YES >> Check that the fuel system has no breakage, bend, and crush. Refer to FL-5, "Inspection".
NO >> Replace or replace the error-detected parts.

Component Inspection (High Pressure Fuel Pump)

INFOID:0000000012198327

1.CHECK HIGH PRESSURE FUEL PUMP-1

1. Turn ignition switch OFF.
2. Disconnect high pressure fuel pump harness connector.
3. Check the resistance between high pressure fuel pump terminals.

+	–	Condition		Resistance (Approx.)
High pressure fuel pump				
Terminal				
1	2	Temperature °C (°F)	20 – 30 (68 - 86)	0.46 - 0.51 Ω

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace high pressure fuel pump. Refer to EM-203, "Exploded View".

2.CHECK HIGH PRESSURE FUEL PUMP-2

WITH CONSULT

1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check “FUEL PRES SEN V” in “DATA MONITOR” mode of “ECM” using CONSULT.

Monitor item	Condition	Value (Approx.)
FUEL PRES SEN V	Engine speed: idle	1,140 – 1,460 mV
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,300 – 2,900 mV

WITHOUT CONSULT

1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check FRP sensor signal voltage.

ECM			Condition	Value (Approx.)
Connector	+	–		
	Terminal			
F23	25	13	Engine speed: idle	1.14 – 1.46 V
			Engine speed: Revving engine from idle to 4,000 rpm quickly	1.3 – 2.9 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure fuel pump. Refer to EM-203, "Exploded View".

P0090 HIGH PRESSURE FUEL PUMP

DTC Logic

INFOID:0000000012198328

DTC DETECTION LOGIC

NOTE:

- If DTC P0090 is displayed with DTC P1197, first perform the trouble diagnosis for DTC P1197. Refer to EC-1071, "DTC Logic".
- DTC P0090 may be displayed when running out of gas.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0090	FUEL PUMP (High pressure fuel pump circuit)	• Fuel rail pressure remains at 1.5 MPa (15 bar, 15.3 kg/ cm^2, 217.5 psi) or less for 3 seconds or more during engine rev. • Fuel rail pressure remains at 18.5 MPa (185 bar, 188.7 kg/ cm^2, 2682.5 psi) or more for 0.3 seconds or more during engine rev.	• Harness or connectors (The fuel pump circuit is open or shorted.) • High pressure fuel pump

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**
- **Before performing the following procedure, check that the fuel tank is 1/8 full of fuel.**

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

WITH CONSULT

1. Start engine.
2. Select “COOLAN TEMP/S” in “DATA MONITOR” mode of “ENGNE” using CONSULT.
3. Maintain the following condition for 5 seconds or more at idle.

COOLAN TEMP/S	**: 70°C (104°F) or more**

4. Check 1st trip DTC.

WITH GST

Follow the above steps for “WITH CONSULT”.

Is 1st trip DTC detected?

YES >> Proceed to EC-826, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198329

1.CHECK HIGH PRESSURE FUEL PUMP CIRCUIT

1. Turn ignition switch ON.
2. Disconnect ECM harness connector and high pressure fuel pump harness connector.
3. Check the continuity between ECM harness connector and high pressure fuel pump harness connector.

+		–		Value (Approx.)
ECM		High pressure fuel pump		
Connector	Terminal	Connector	Terminal	
F23	48	F53	1	Existed
	49		2	

4. Also check harness for short to ground and to power.

Is inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace the error-detected parts.

2.CHECK HIGH PRESSURE FUEL PUMP

Check high pressure fuel pump. Refer to EC-827, "Component Inspection (High Pressure Fuel Pump)".

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace the error-detected parts.

Component Inspection (High Pressure Fuel Pump)

INFOID:0000000012198330

1.CHECK HIGH PRESSURE FUEL PUMP-1

1. Turn ignition switch OFF.
2. Disconnect high pressure fuel pump harness connector.
3. Check the resistance between high pressure fuel pump terminals.

+	–	Condition		Resistance (Approx.)
High pressure fuel pump				
Terminal				
1	2	Temperature °C (°F)	20 – 30 (68 - 86)	0.46 - 0.51 Ω

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace high pressure fuel pump. Refer to EM-203, "Exploded View".

2.CHECK HIGH PRESSURE FUEL PUMP-2

WITH CONSULT

1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check “FUEL PRES SEN V” in “DATA MONITOR” mode of “ECM” using CONSULT.

Monitor item	Condition	Value (Approx.)
FUEL PRES SEN V	Engine speed: idle	1,140 – 1,460 mV
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,300 – 2,900 mV

WITHOUT CONSULT

1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check FRP sensor signal voltage.

ECM			Condition	Value (Approx.)
Connector	+	–		
	Terminal			
F23	25	13	Engine speed: idle	1.14 – 1.46 V
			Engine speed: Revving engine from idle to 4,000 rpm quickly	1.3 – 2.9 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure fuel pump. Refer to EM-203, "Exploded View".

P0096 IAT SENSOR 2

DTC Logic

INFOID:0000000012198331

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0096	IAT SENSOR 2 B1 [Intake air temperature (IAT) sensor 2 circuit range/performance]	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor 1, IAT sensor 2, ECT sensor, FTT sensor, and EOT sensor) shows that the voltage signal of the IAT sensor 2 is higher/lower than that of other temperature sensors when the engine is started with its cold state.	• Harness or connectors (High or low resistance in the IAT sensor 2 circuit) • IAT sensor 2

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 3.
NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-830, "Component Function Check".

NOTE:
Use the component function check to check the overall function of the IAT sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-830, "Diagnosis Procedure".

3.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- **Before performing the following procedure, do not add fuel.**
- **Before performing the following procedure, check that fuel level is between 1/4 and 4/4.**
- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Move the vehicle to a cool place.
   NOTE:
   Cool the vehicle in an environment of ambient air temperature between −10°C (14°F) and 35°C (95°F).
2. Turn ignition switch OFF and leave the vehicle for 12 hours.
   CAUTION:
   Never turn ignition switch ON during this procedure.
   NOTE:
   The vehicle must be cooled with the hood open.
3. Start engine and let it idle for 5 minutes or more.
   CAUTION:
   Never turn ignition switch OFF during idling.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-830, "Diagnosis Procedure".
NO >> INSPECTION END

Component Function Check

INFOID:0000000012198332

1.CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR 2

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost sensor harness connector.
3. Check resistance between turbocharger boost sensor terminals as follows.

Turbocharger boost sensor		Condition		Resistance (kΩ)
+	–			
Terminal				
3	4	Temperature [°C (°F)]	25 (77)	1.80 – 2.20

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Proceed to EC-830, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198333

1.CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR 2

Check intake air temperature sensor 2. Refer to EC-830, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace turbocharger boost sensor (with intake temperature sensor 2). Refer to EM-194, "Exploded View".

Component Inspection

INFOID:0000000012198334

1.CHECK INTAKE AIR TEMPERATURE SENSOR 2

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost sensor harness connector.
3. Check resistance between turbocharger boost sensor terminals as follows.

Turbocharger boost sensor		Condition		Resistance (kΩ)
+	–			
Terminals				
3	4	Temperature [°C (°F)]	25 (77)	1.80 – 2.20

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace turbocharger boost sensor (with intake air temperature sensor 2). Refer to EM-197, "Exploded View".

P0097, P0098 IAT SENSOR 2

DTC Logic

INFOID:0000000012198335

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0097	IAT SENSOR 2 B1 (Intake air temperature sensor 2 circuit low input)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the intake air temperature sensor 2 is 0.085 V or less.	• Harness or connectors (Intake air temperature sensor 2 circuit is open or shorted.) • Intake air temperature sensor 2 • Sensor power supply 2 circuit
P0098	IAT SENSOR 2 B1 (Intake air temperature sensor 2 circuit high input)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the intake air temperature sensor 2 is 4.84 V or more.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-831, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198336

1.CHECK INTAKE AIR TEMPERATURE SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between turbocharger boost sensor harness connector terminals.

Turbocharger boost sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
F75	3	4	5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 4.

2.CHECK INTAKE AIR TEMPERATURE SENSOR 2 SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

+		–		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
F75	3	F24	77	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK INTAKE AIR TEMPERATURE SENSOR 2

Check intake air temperature sensor 2. Refer to EC-833, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace turbocharger boost sensor (with intake air temperature sensor 2). Refer to EM-194, "Exploded View".

4.CHECK INTAKE AIR TEMPERATURE SENSOR 2 POWER SUPPLY CIRCUIT-II

Check the voltage between turbocharger boost sensor harness connector terminal and ground.

+		–	Voltage (Approx.)
Turbocharger boost sensor			
Connector	Terminal		
F75	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 7.

5.CHECK INTAKE AIR TEMPERATURE SENSOR 2 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

+		–		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
F75	4	F23	13	Existed

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
F23	9	Ground	Existed
	10		
	50		
F24	60		
	110		
E19	147		
	149		
	152		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

7. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform EC-1240, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

Component Inspection

INFOID:0000000012198337

1. CHECK INTAKE AIR TEMPERATURE SENSOR 2

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost sensor harness connector.
3. Check resistance between turbocharger boost sensor terminals as follows.

Turbocharger boost sensor		Condition		Resistance (kΩ)
+	–			
Terminals				
3	4	Temperature [°C (°F)]	25 (77)	1.80 – 2.20

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace turbocharger boost sensor (with intake air temperature sensor 2). Refer to EM-194, "Exploded View".

P00B3, P00B4 ENGINE COOLANT TEMPERATURE SENSOR 2

DTC Logic

INFOID:0000000012198338

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P00B3	RADIATOR COOLANT TEMP SEN (Radiator coolant temperature sensor circuit low)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the engine coolant temperature sensor 2 is 0.04 V or less.	• Harness or connectors (Engine coolant temperature sensor 2 circuit is open or shorted.) • Engine coolant temperature sensor 2
P00B4	RADIATOR COOLANT TEMP SEN (Radiator coolant temperature sensor circuit high)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the engine coolant temperature sensor 2 is 4.84 V or more.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11 V at ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-834, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198339

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR 2 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature (ECT) sensor 2 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ECT sensor 2 harness connector and ground.

+		−	Voltage (Approx.)
ECT sensor 2			
Connector	Terminal		
E205	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 4.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR 2 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECT sensor 2 harness connector and ECM harness connector.

+		–		Continuity
ECT sensor 2		ECM		
Connector	Terminal	Connector	Terminal	
E205	2	F23	45	Existed

4. Also check harness for short to ground to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3. CHECK ENGINE COOLANT TEMPERATURE SENSOR 2

Check the engine coolant temperature sensor 2. Refer to EC-835, "Component Inspection (Engine Coolant Temperature Sensor 2)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace engine coolant temperature sensor 2. Refer to CO-46, "Exploded View".

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR 2 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECT sensor 2 harness connector and ECM harness connector.

+		–		Continuity
ECT sensor 2		ECM		
Connector	Terminal	Connector	Terminal	
E205	1	F23	40	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

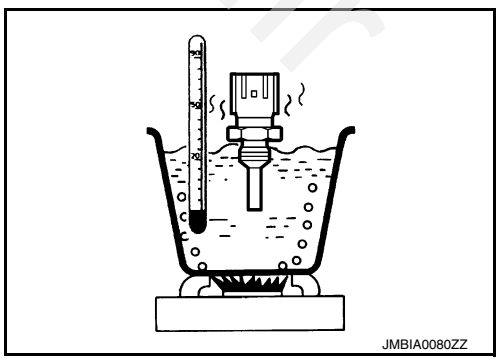
YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

Component Inspection (Engine Coolant Temperature Sensor 2)

INFOID:0000000012198340

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR 2

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor 2 harness connector.
3. Remove engine coolant temperature sensor 2.
4. Check resistance between engine coolant temperature sensor 2 terminals by heating with hot water as shown in the figure.



ECT sensor 2		Condition		Resistance
+	–			
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63 kΩ
			50 (122)	0.68 - 1.00 kΩ
			90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor 2. Refer to CO-46, "Exploded View".

P00C1, P00C2 TURBOCHARGER BYPASS CONTROL VALVE

DTC Logic

INFOID:0000000012198341

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P00C1	TC/SC BYPASS VALVE B (Turbocharger/supercharger bypass valve B control circuit low)	An excessively low voltage from the turbocharger bypass control valve is sent to ECM.	• Harness or connectors (Turbocharger bypass control valve circuit is open or shorted.) • Turbocharger bypass control valve
P00C2	TC/SC BYPASS VALVE B (Turbocharger/supercharger bypass valve B control circuit high)	An excessively high voltage from the turbocharger bypass control valve is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-836, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198342

1.TURBOCHARGER BYPASS CONTROL VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect turbocharger bypass control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between turbocharger bypass control valve harness connector and ground.

+		−	Voltage
Turbocharger bypass control valve			
Connector	Terminal		
F64	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK TURBOCHARGER BYPASS CONTROL VALVE INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger bypass control valve harness connector and ECM harness connector.

+		–		Continuity
Turbocharger bypass control valve		ECM		
Connector	Terminal	Connector	Terminal	
F64	2	F24	105	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3. CHECK TURBOCHARGER BYPASS CONTROL VALVE

Check the turbocharger bypass control valve. Refer to EC-837, "Component Inspection (Turbocharger Bypass Control Valve)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace turbocharger assembly (do not replace bypass control valve only). Refer to EM-242, "Exploded View".

Component Inspection (Turbocharger Bypass Control Valve)

INFOID:0000000012198343

1. CHECK TURBOCHARGER BYPASS CONTROL VALVE

With consult
1. Turn ignition switch ON and engine stopped or engine running (idling, less than 1200rpm).
2. On the CONSULT screen, select ENGINE » ACTIVE TEST »“TC BYPASS VALVE”.
3. Operate “ON” or “OFF” and check if valve operating sound can be heard.

Without consult
1. Turn ignition switch OFF.
2. Disconnect turbocharger bypass control valve harness connector.
3. Apply a voltage of 12V to the positive or negative terminal.

Can the valve operating sound be heard?

YES >> INSPECTION END
NO >> Replace turbocharger assembly (do not replace bypass control valve only). Refer to EM-242, "Exploded View".

P0101 MAF SENSOR

DTC Logic

INFOID:0000000012198344

DTC DETECTION LOGIC

NOTE:
If DTC P0101 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0101	MAF SEN/CIRCUIT-B1 (Mass air flow sensor circuit range/performance)	• A high voltage from the sensor is sent to ECM under light load driving condition. • A low voltage from the sensor is sent to ECM under heavy load driving condition.	• Harness or connectors (The sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor • EVAP control system pressure sensor • Intake air temperature sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle for at least 5 seconds under the following conditions:
   CAUTION:
   Always drive vehicle at safe speed.

Selector lever	Suitable position
Vehicle speed	40 km/h (25 MPH) or more

   NOTE:
   • The gear must be fixed while driving the vehicle.
   • Keep the accelerator pedal as steady as possible during cruising.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-838, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198345

1.CHECK INTAKE SYSTEM

Check the following items to see the installation condition and the connection condition of the joint.
• Air duct
• Vacuum hoses
• Intake air passage between air duct and intake manifold

Is the inspection result normal?

YES >> GO TO 2.
NO >> Reconnect or replace error-detected parts.

2.CHECK MASS AIR FLOW (MAF) SENSOR POWER SUPPLY

1. Disconnect MAF sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between MAF sensor harness connector and ground.

+		–	Voltage
MAF sensor			
Connector	Terminal		
F8	1	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK MASS AIR FLOW (MAF) SENSOR POWER SUPPLY CIRCUIT

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	
F8	1	F23	26	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

4. CHECK MAF SENSOR GROUND CIRCUIT

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	
F8	2	F23	37	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between MAF sensor harness connector and ECM harness connector.

MAF sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F8	3	F23	42	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK INTAKE AIR TEMPERATURE SENSOR 1

Check intake air temperature sensor 1. Refer to EC-840, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.

NO >> Replace MAF sensor (with intake air temperature sensor 1).

7.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check EVAP control system pressure sensor. Refer to EC-1004, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace EVAP control system pressure sensor.

8.CHECK MAF SENSOR

Check MAF sensor. Refer to EC-840, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace MAF sensor. Refer to EM-192, "Exploded View".

Component Inspection

INFOID:0000000012198346

1.CHECK MASS AIR FLOW (MAF) SENSOR-I

With CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select “DATA MONITOR” mode.
5. Select “MASS AIR FLOW SENSOR (Hz)” and check the indication.

Monitor item	Condition	Indication (Hz)
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	6,100 – 6,500 Hz
	Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency rise in response to engine being increased to about 4,000 rpm.

Without CONSULT

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 frequency between ECM harness connector terminals under the following conditions.

ECM			Condition	Frequency (Hz)
Connector	+	–		
	Terminal			
F23	37	42	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	6,100 – 6,500 Hz
			Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MAF SENSOR

1. Turn ignition switch OFF.
2. Check for the cause of uneven air flow through MAF sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK MAF SENSOR-II

With CONSULT

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT and select “DATA MONITOR” mode.
4. Select “MASS AIR FLOW SENSOR (Hz)” and check the indication.

Monitor item	Condition	Indication (Hz)
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	6,100 – 6,500 Hz
	Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency rise in response to engine being increased to about 4,000 rpm.

Without CONSULT

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Check the frequency between ECM harness connector terminals under the following conditions.

ECM			Condition	Frequency (Hz)
Connector	+	–		
	Terminal			
F23	37	42	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	6,100 – 6,500 Hz
			Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency 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 MAF SENSOR-III

With CONSULT

1. Turn ignition switch OFF.
2. Disconnect MAF sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select “DATA MONITOR” mode.
5. Select “MASS AIR FLOW SENSOR (Hz)” and check the indication.

Monitor item	Condition	Indication (Hz)
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	6,100 – 6,500 Hz
	Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency rise in response to engine being increased to about 4,000 rpm.

⊗Without CONSULT
1. Turn ignition switch OFF.
2. Disconnect MAF sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Check the frequency between ECM harness connector terminals under the following conditions.

ECM			Condition	Frequency (Hz)
Connector	+	–		
	Terminal			
F23	37	42	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	6,100 – 6,500 Hz
			Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Clean or replace MAF sensor. Refer to EM-192, "Exploded View".

P0102, P0103 MAF SENSOR

DTC Logic

INFOID:0000000012198347

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0102	MAF SEN/CIRCUIT-B1 (Mass air flow sensor circuit low input)	An excessively low voltage from the mass air flow sensor is sent to ECM.	• Harness or connectors (Mass air flow sensor circuit is open or shorted.) • Intake air leaks • Mass air flow sensor
P0103	MAF SEN/CIRCUIT-B1 (Mass air flow sensor circuit high input)	An excessively high voltage from the mass air flow sensor is sent to ECM.	• Harness or connectors (Mass air flow sensor circuit is open or shorted.) • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

Which DTC is detected?

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0102

1. Start engine and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-843, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-I

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-843, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P0103-II

1. Start engine and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-843, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198348

1.INSPECTION START

Confirm the detected DTC.

Which DTC is detected?

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2.CHECK INTAKE SYSTEM

Check the following for connection.
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold

Is the inspection result normal?

YES >> GO TO 3.
NO >> Reconnect the parts. Refer to EM-192, "Exploded View".

3.CHECK MAF SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect mass air flow (MAF) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between MAF sensor harness connector and ground.

+		–	Voltage
MAF sensor			
Connector	Terminal		
F8	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between MAF sensor harness connector and ECM harness connector.

+		–		Continuity
MAF sensor		ECM		
Connector	Terminal	Connector	Terminal	
F8	1	F23	26	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

5.CHECK MAF SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between MAF sensor harness connector and ECM harness connector.

+		–		Continuity
MAF sensor		ECM		
Connector	Terminal	Connector	Terminal	
F8	3	F23	42	Existed

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK MAF SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between MAF sensor harness connector and ECM harness connector.

+		–		Continuity
MAF sensor		ECM		
Connector	Terminal	Connector	Terminal	
F8	2	F23	37	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

7.CHECK MASS AIR FLOW SENSOR

Check the mass air flow sensor. Refer to EC-845, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace mass air flow sensor. Refer to EM-192, "Exploded View".

Component Inspection

INFOID:0000000012198349

1.CHECK MASS AIR FLOW (MAF) SENSOR-I

With CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select “DATA MONITOR” mode.
5. Select “MASS AIR FLOW SENSOR (Hz)” and check the indication.

Monitor item	Condition	Indication (Hz)
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	6,100 – 6,500 Hz
	Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency rise in response to engine being increased to about 4,000 rpm.

Without CONSULT

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 frequency between ECM harness connector terminals under the following conditions.

ECM			Condition	Frequency (Hz)
Connector	+	–		
	Terminal			
F23	37	42	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	6,100 – 6,500 Hz
			Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK FOR THE CAUSE OF UNEVEN AIR FLOW THROUGH MAF SENSOR

1. Turn ignition switch OFF.
2. Check for the cause of uneven air flow through MAF sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK MAF SENSOR-II

With CONSULT

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT and select “DATA MONITOR” mode.
4. Select “MASS AIR FLOW SENSOR (Hz)” and check the indication.

Monitor item	Condition	Indication (Hz)
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	6,100 – 6,500 Hz
	Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency rise in response to engine being increased to about 4,000 rpm.

Without CONSULT

1. Repair or replace malfunctioning part.
2. Start engine and warm it up to normal operating temperature.
3. Check the frequency between ECM harness connector terminals under the following conditions.

ECM			Condition	Frequency (Hz)
Connector	+	–		
	Terminal			
F23	37	42	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	6,100 – 6,500 Hz
			Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency 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 MAF SENSOR-III

With CONSULT

1. Turn ignition switch OFF.
2. Disconnect MAF sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select “DATA MONITOR” mode.
5. Select “MASS AIR FLOW SENSOR (Hz)” and check the indication.

Monitor item	Condition	Indication (Hz)
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	6,100 – 6,500 Hz
	Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency rise in response to engine being increased to about 4,000 rpm.

Without CONSULT

1. Turn ignition switch OFF.
2. Disconnect MAF sensor harness connector and reconnect it again.
3. Start engine and warm it up to normal operating temperature.
4. Check the frequency between ECM harness connector terminals under the following conditions.

ECM			Condition	Frequency (Hz)
Connector	+	–		
	Terminal			
F23	37	42	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	6,100 – 6,500 Hz
			Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Clean or replace MAF sensor. Refer to EM-192, "Exploded View".

P0106 TC BOOST SENSOR

DTC Logic

INFOID:0000000012198350

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0106	ABSL PRES SEN/CIRC (Turbocharger boost sensor circuit)	Difference between intake manifold air pressure and barometric pressure while engine stopped.	• Harness or connectors • TC boost sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 1 minute before conducting the next test.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Accelerate the vehicle to 60 km/h (37 MPH) in 2nd gear (M/T models), or “SPORT mode” (CVT models) and keep that status 15 seconds.
2. Check DTC.

Is DTC detected?

YES >> EC-848, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198351

1.CHECK TURBOCHARGER BOOST SENSOR FITTING CONDITION

Check turbocharger boost sensor fitting condition.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Adjust parts fitting condition.

2.CHECK FOR CHARGE AIR LEAK

1. Start the engine and let it idle.
2. Listen for an charge air leak.

Is intake air leak detected?

YES >> Repair or replace error-detected parts.
NO >> GO TO 3.

3.CHECK TURBOCHARGER BOOST SENSOR HARNESS CONNECTOR CONNECTIONS

Check turbocharger boost sensor harness connector connection F75.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK TURBOCHARGER BOOST SENSOR

Check turbocharger boost sensor. Refer to EC-849, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace error-detected parts.

5.CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Check the power supply of the turbocharger boost sensor.

+		-	Voltage (Approx.)
Turbocharger boost sensor			
Connector	Terminal		
F75	2	Ground	5.0 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> Perform trouble diagnosis for power supply circuit.

6. CHECK TURBOCHARGER BOOST SENSOR CIRCUIT FOR OPEN AND SHORT

Check turbocharger boost sensor circuit for open and short.

+		-		Continuity
ECM		Turbocharger boost sensor		
Connector	Terminal	Connector	Terminal	
F23	11	F75	1	Existed
	13		4	
	29		2	

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection

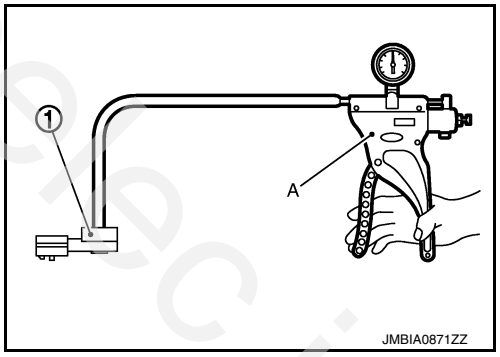
INFOID:0000000012198352

1. CHECK TURBOCHARGER BOOST SENSOR

1. Turn ignition switch OFF.
2. Remove turbocharger boost sensor with its harness connector.
3. Install pressure pump (A) to turbocharger boost sensor (1).

CAUTION:
When insert a pressure pump hose to the sensor, be careful to the damage of the sensor housing.

4. Turn ignition switch ON.
5. Check the voltage between ECM harness connector terminals as per the following conditions.



NOTE:
- Always calibrate the pressure pump gauge when using it.
- Inspection should be done at room temperature [10 - 30°C (50 - 86°F)].

ECM			Condition [Pressure (Relative to atmospheric pressure)]	Voltage (Approx.)
Connector	+	–		
	Terminal			
F23	11	13	0 kPa (0 mbar, 0 mmHg, 0 inHg)	2.03 V
			40 kPa (400 mbar, 300 mmHg, 11.81 inHg)	2.67 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger boost sensor. Refer to EM-194, "Exploded View".

P010A MANIFOLD ABSOLUTE PRESSURE SENSOR

DTC Logic

INFOID:0000000012198353

DTC DETECTION LOGIC

NOTE:
If DTC P010A is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.
Refer to EC-1060, "DTC Logic".

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P010A	Manifold absolute pressure sensor circuit	• An excessively low voltage from the sensor is sent to ECM. • An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Manifold absolute pressure (MAP) sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 10 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-851, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198354

1.CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Check ground connection M95. Refer to Ground Inspection in GI-48, "Circuit Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace ground connection.

2.CHECK MAP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect MAP sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between manifold absolute pressure sensor (MAP) sensor harness connector and ground.

MAP sensor		Ground	Voltage (V)
Connector	Terminal		
F76	1	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK MAP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between MAP sensor harness connector and ECM harness connector.

MAP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F76	3	F23	43	Existed

4. Also check harness for short to ground and 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 MAP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check the continuity between MAP sensor harness connector and ECM harness connector.

MAP sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F76	2	F23	31	Existed

2. Also check harness for short to ground and 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 MAP SENSOR

Refer to EC-852, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace MAP sensor.

6.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

Component Inspection

INFOID:0000000012198355

1.CHECK MAP SENSOR-I

1. Turn ignition switch OFF.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
4. Check the voltage between ECM harness connector terminals as follows.

ECM		
Connector	+	–
	Terminal	
F23	31	43

NOTE:
- To avoid the influence of intake manifold vacuum, check the voltage 1 or more minutes past after engine is stopped.
- Because the sensor is absolute pressure sensor, output value may differ depending on atmospheric pressure and altitude.

5. Measure the atmospheric pressure.

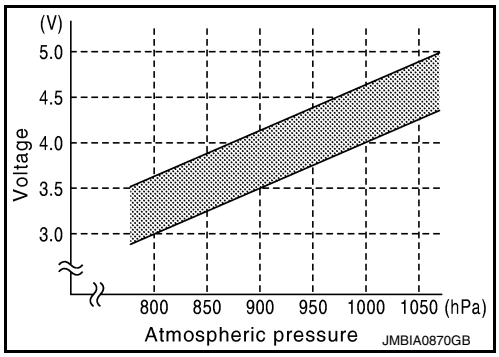
NOTE:

As the atmospheric pressure described on the synoptic chart is the value at sea level, compensate the pressure with the following chart.

Altitude (m)	Compensated pressure (hPa)
0	0
200	-24
400	-47
600	-70
800	-92
1000	-114
1500	-168
2000	-218

6. Check the manifold absolute pressure sensor value corresponding to the atmospheric pressure.

Atmospheric pressure (hPa)	Voltage (V)
800	3.1 – 3.7
850	3.3 – 3.9
900	3.5 – 4.1
950	3.8 – 4.3
1000	4.0 – 4.6
1050	4.2 – 4.8



Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace MAP sensor.

2.CHECK MAP SENSOR-II

1. Start engine and let it idle.
2. Check intake manifold vacuum.
3. Check the voltage between ECM harness connector terminals as follows.

ECM		
Connector	+	–
	Terminal	
F23	31	43

4. Confirm the difference of the voltage when engine is stopped and at idling is within the values shown in the following chart.

Intake manifold vacuum [kPa (mmHg)]	Voltage difference (V)
-40 (-300)	1.5 – 2.0
-53.3 (-400)	2.0 – 2.6
-66.7 (-500)	2.6 – 3.2
-80 (-600)	3.2 – 3.8

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace MAP sensor.

P0111 IAT SENSOR 1

DTC Logic

INFOID:0000000012198356

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0111	IAT SENSOR 1 B1 (Intake air temperature sensor 1 circuit range/performance)	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, FTT sensor, and EOT sensor) shows that the voltage signal of the IAT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	• Harness or connectors (High or low resistance in the IAT sensor 1 circuit) • IAT sensor 1

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 3.
NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-855, "Component Function Check".

NOTE:
Use the component function check to check the overall function of the IAT sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-855, "Diagnosis Procedure".

3.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- **Before performing the following procedure, do not add fuel.**
- **Before performing the following procedure, check that fuel level is between 1/4 and 4/4.**
- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Move the vehicle to a cool place.
   NOTE:
   Cool the vehicle in an environment of ambient air temperature between −10°C (14°F) and 35°C (95°F).
2. Turn ignition switch OFF and leave the vehicle for 12 hours.
   CAUTION:
   Never turn ignition switch ON during this procedure.
   NOTE:
   The vehicle must be cooled with the hood open.
3. Start engine and let it idle for 5 minutes or more.
   CAUTION:
   Never turn ignition switch OFF during idling.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-855, "Diagnosis Procedure".
NO >> INSPECTION END

Component Function Check

INFOID:0000000012198357

1. CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector.
3. Check resistance between mass air flow sensor terminals as follows.

Terminals	Condition		Resistance (kΩ)
3 and 4	Temperature [°C (°F)]	25 (77)	1,800 – 2,200

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Proceed to EC-855, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198358

1. CHECK INTAKE AIR TEMPERATURE (IAT) SENSOR 1

Check intake air temperature sensor 1. Refer to EC-855, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace mass air flow sensor. Refer to EM-192, "Exploded View".

Component Inspection

INFOID:0000000012198359

1. CHECK INTAKE AIR TEMPERATURE SENSOR 1

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.

Mass air flow sensor		Condition		Resistance (kΩ)
+	–			
Terminals				
3	4	Temperature [°C (°F)]	25 (77)	1.800 - 2.200

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace mass air flow sensor. Refer to EM-192, "Exploded View".

P0112, P0113 IAT SENSOR 1

DTC Logic

INFOID:0000000012198360

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0112	IAT SEN/CIRCUIT- B1 (Intake air temperature sensor 1 circuit low input)	An excessively low voltage from the intake air temperature sensor 1 is sent to ECM.	• Harness or connectors (Intake air temperature sensor 1 circuit is open or shorted.) • Intake air temperature sensor 1
P0113	IAT SEN/CIRCUIT- B1 (Intake air temperature sensor 1 circuit high input)	An excessively high voltage from the intake air temperature sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-856, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198361

1.CHECK INTAKE AIR TEMPERATURE SENSOR 1 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor (with intake air temperature sensor 1) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between mass air flow sensor harness connector and ground.

+		−	Voltage (Approx.)
MAF sensor			
Connector	Terminal		
F8	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK INTAKE AIR TEMPERATURE SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

+		–		Continuity
MAF sensor		ECM		
Connector	Terminal	Connector	Terminal	
F8	4	F23	36	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK INTAKE AIR TEMPERATURE SENSOR 1 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between mass air flow sensor harness connector and ECM harness connector.

+		–		Continuity
MAF sensor		ECM		
Connector	Terminal	Connector	Terminal	
F8	3	F23	42	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK INTAKE AIR TEMPERATURE SENSOR 1

Check the intake air temperature sensor 1. Refer to EC-857, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace mass air flow sensor (with intake air temperature sensor 1). Refer to EM-192, "Exploded View".

Component Inspection

INFOID:0000000012198362

1.CHECK INTAKE AIR TEMPERATURE SENSOR 1

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.

Mass air flow sensor		Condition		Resistance (kΩ)
+	–			
Terminals				
3	4	Intake air temperature [°C (°F)]	25 (77)	1.800 - 2.200

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace mass air flow sensor (with intake air temperature sensor 1). Refer to EM-192, "Exploded View".

P0116 ENGINE COOLANT TEMPERATURE SENSOR 1

DTC Logic

INFOID:0000000012198363

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0116	ECT SEN/CIRC (Engine coolant temperature sensor 1 circuit range/performance)	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, FTT sensor, and EOT sensor) shows that the voltage signal of the ECT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	• Harness or connectors (High or low resistance in the ECT sensor circuit) • Engine coolant temperature sensor 1

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 3.
NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-859, "Component Function Check".

NOTE:
Use the component function check to check the overall function of the ECT sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-859, "Diagnosis Procedure".

3.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- **Before performing the following procedure, do not add fuel.**
- **Before performing the following procedure, check that fuel level is between 1/4 and 4/4.**
- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Move the vehicle to a cool place.
   NOTE:
   Cool the vehicle in an environment of ambient air temperature between −10°C (14°F) and 35°C (95°F).
2. Turn ignition switch OFF and leave the vehicle for 12 hours.
   CAUTION:
   Never turn ignition switch ON during this procedure.
   NOTE:
   The vehicle must be cooled with the hood open.
3. Start engine and let it idle for 20 minutes or more.
   CAUTION:
   Never turn ignition switch OFF during idling.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

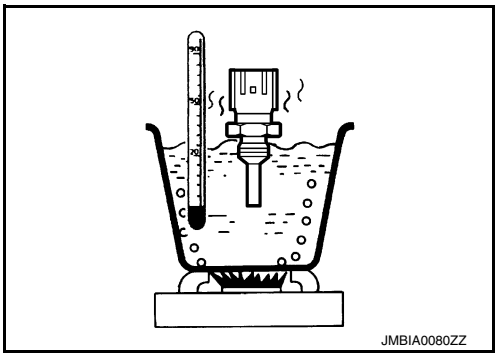
YES >> Proceed to EC-859, "Diagnosis Procedure".
NO >> INSPECTION END

Component Function Check

INFOID:0000000012198364

1. CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect ECT sensor 1 harness connector.
3. Remove ECT sensor 1. Refer to CO-54, "Exploded View".
4. Check resistance between ECT sensor 1 terminals by heating with hot water as shown in the figure.



Terminals	Condition		Resistance (kΩ)
1 and 2	Temperature [°C (°F)]	20 (68)	2.37 – 2.63
		50 (122)	0.68 – 1.00
		90 (194)	0.236 – 0.260

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Proceed to EC-859, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198365

1. CHECK ENGINE COOLANT TEMPERATURE (ECT) SENSOR 1

Check ECT sensor 1. Refer to EC-859, "Component Inspection".

Is the inspection result normal?

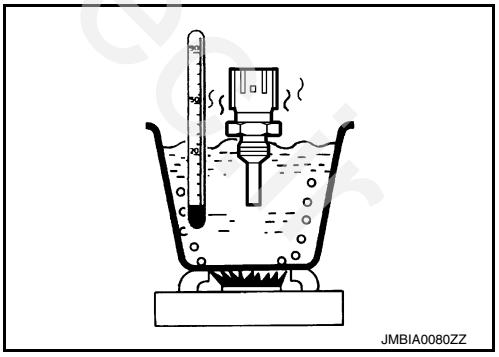
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace ECT sensor 1. Refer to CO-54, "Exploded View".

Component Inspection

INFOID:0000000012198366

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor 1 harness connector.
3. Remove engine coolant temperature sensor 1. Refer to CO-54, "Exploded View".
4. Check resistance between engine coolant temperature sensor 1 terminals as per the following.



ECT sensor		Condition		Resistance (kΩ)
+	–			
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63
			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 1. Refer to CO-54, "Exploded View".

P0117, P0118 ENGINE COOLANT TEMPERATURE SENSOR 1

DTC Logic

INFOID:0000000012198367

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0117	ECT SEN/CIRC (Engine coolant temperature sensor 1 circuit low input)	An excessively low voltage from the engine coolant temperature sensor 1 is sent to ECM.	• Harness or connectors (Engine coolant temperature sensor 1 circuit is open or shorted.) • Engine coolant temperature sensor 1
P0118	ECT SEN/CIRC (Engine coolant temperature sensor 1 circuit high input)	An excessively high voltage from the engine coolant temperature sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-860, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198368

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR 1 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature (ECT) sensor 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ECT sensor 1 harness connector and ground.

+		–	Voltage (Approx.)
ECT sensor 1			
Connector	Terminal		
F50	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 4.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR 1 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECT sensor 1 harness connector and ECM harness connector.

+		–		Continuity
ECT sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F50	2	F23	45	Existed

4. Also check harness for short to ground to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK ENGINE COOLANT TEMPERATURE SENSOR 1

Check the engine coolant temperature sensor 1. Refer to EC-861, "Component Inspection (Engine Coolant Temperature Sensor 1)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace engine coolant temperature sensor 1. Refer to CO-54, "Exploded View".

4.CHECK ENGINE COOLANT TEMPERATURE SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECT sensor 1 harness connector and ECM harness connector.

+		–		Continuity
ECT sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F50	1	F23	35	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

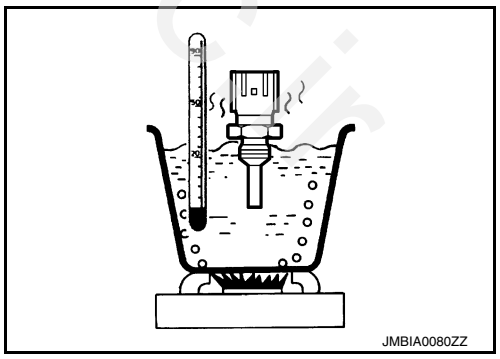
YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

Component Inspection (Engine Coolant Temperature Sensor 1)

INFOID:0000000012198369

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor 1 harness connector.
3. Remove engine coolant temperature sensor 1.
4. Check resistance between engine coolant temperature sensor 1 terminals by heating with hot water as shown in the figure.



ECT sensor 1		Condition		Resistance
+	–			
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63 kΩ
			50 (122)	0.68 - 1.00 kΩ
			90 (194)	0.236 - 0.260 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine coolant temperature sensor 1. Refer to CO-54, "Exploded View".

P011C IAT SENSOR

DTC Logic

INFOID:0000000012198370

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P011C	CAT/IAT CRRLTN B1 (Charge air temperature/Intake air temperature correlation)	• ECM detects a state that the temperature difference between intake air temperature sensor 1 and 2 remains 20°C (68°F) or less continuously for 5 seconds or more. • ECM detects a state that the difference between the temperature of intake air temperature sensor 2 and its estimated temperature calculated by ECM from intake air temperature 1 and turbocharger boost sensor remains 106°C (223°F) or more continuously for 5 seconds or more.	• Harness or connectors (High or low resistance in the intake air temperature sensor 1 circuit) (High or low resistance in the intake air temperature sensor 2 circuit) • Intake air temperature sensor 1 • Intake air temperature sensor 2

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-862, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198371

1.CHECK INTAKE AIR TEMPERATURE SENSOR 2

Check intake air temperature sensor 2. Refer to EC-863, "Component Inspection (Intake Air Temperature Sensor 2)".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace turbocharger boost sensor (with intake air temperature sensor 2). Refer to EM-194, "Exploded View".

2.CHECK INTAKE AIR TEMPERATURE SENSOR 1

Check intake air temperature sensor 1. Refer to EC-863, "Component Inspection (Intake Air Temperature Sensor 1)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace mass air flow sensor (with intake air temperature sensor 1). Refer to EM-192, "Exploded View".

Component Inspection (Intake Air Temperature Sensor 1)

INFOID:0000000012198372

1. CHECK INTAKE AIR TEMPERATURE SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor harness connector.
3. Check resistance between mass air flow sensor terminals as follows.

Mass air flow sensor		Condition		Resistance (kΩ)
+	–			
Terminal				
3	4	Temperature [°C (°F)]	25 (77)	1.80 – 2.20

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace mass air flow sensor (with intake air temperature sensor 1). Refer to EM-192, "Exploded View".

Component Inspection (Intake Air Temperature Sensor 2)

INFOID:0000000012198373

1. CHECK INTAKE AIR TEMPERATURE SENSOR 2

1. Turn ignition switch OFF.
2. Disconnect turbocharger boost sensor harness connector.
3. Check resistance between turbocharger boost sensor terminals as follows.

Turbocharger boost sensor		Condition		Resistance (kΩ)
+	–			
Terminal				
3	4	Temperature [°C (°F)]	25 (77)	1.80 – 2.20

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace turbocharger boost sensor (with intake air temperature sensor 2). Refer to EM-194, "Exploded View".

P0122, P0123 TP SENSOR

DTC Logic

INFOID:0000000012198374

DTC DETECTION LOGIC

NOTE:
If DTC P0122 or P0123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-1060, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0122	TP SEN 2/CIRC-B1 (Throttle position sensor 2 circuit low input)	An excessively low voltage from the TP sensor 2 is sent to ECM.	• Harness or connectors (TP sensor 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 2)
P0123	TP SEN 2/CIRC-B1 (Throttle position sensor 2 circuit high input)	An excessively high voltage from the TP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-864, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198375

1.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric throttle control actuator harness connector and ground.

+		−	Voltage (Approx.)
Electric throttle control actuator			
Connector	Terminal		
F29	5	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	5	F24	83	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	4	F24	85	Existed

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	3	F24	80	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK THROTTLE POSITION SENSOR

Check the throttle position sensor. Refer to EC-865, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace electric throttle control actuator. Refer to EM-197, "Exploded View".

Component Inspection

INFOID:0000000012198376

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform " Throttle Valve Closed Position Learning". Refer to EC-754, "Description".
4. Turn ignition switch ON.
5. Set selector lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition		Voltage
Connector	+	–			
	Terminal				
F24	88	85	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	80			Fully released	Less than 4.75V
				Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace electric throttle control actuator. Refer to EM-197, "Exploded View".

P0125 ECT SENSOR

DTC Logic

INFOID:0000000012198377

DTC DETECTION LOGIC

NOTE:

- **If DTC P0125 is displayed with P0116, first perform the trouble diagnosis for DTC P0116. Refer to EC-858, "DTC Logic".**
- **If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117, P0118. Refer to EC-860, "DTC Logic".**

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0125	ECT SENSOR (Insufficient coolant temperature for closed loop fuel control)	• Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. • Engine coolant temperature is insufficient for closed loop fuel control.	• Harness or connectors (High resistance in the circuit) • Engine coolant temperature sensor 1 • Multi-way control valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.CHECK ENGINE COOLANT TEMPERATURE SENSOR 1 FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT.
3. Check that “COOLANT TEMP/S” is above 10°C (50°F).

Is the temperature above 10°C (50°F)?

YES >> INSPECTION END
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start engine and run it for 65 minutes at idle speed.
   If “COOLANT TEMP/S” increases to more than –7°C (19.4°F) within 65 minutes, stop engine because the test result will be OK.
   CAUTION:
   Never overheat engine.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> EC-867, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198378

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR 1

Check engine coolant temperature sensor 1. Refer to EC-868, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine coolant temperature sensor 1.

2.CHECK MULTI-WAY CONTROL VALVE OPERATION

When the engine is cold [lower than 64°C (147°F)] condition, grasp lower radiator hose and confirm that the engine coolant does not flow.

Is the inspection result normal?

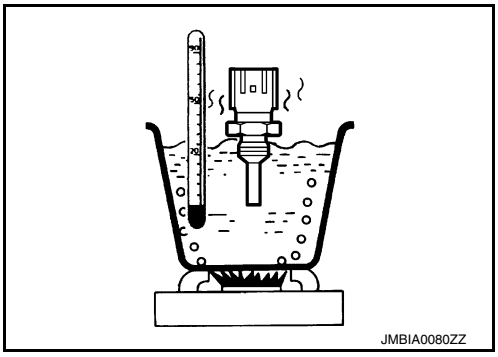
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace water outlet (MCV). Refer to CO-54, "Exploded View".

Component Inspection

INFOID:0000000012198379

1.CHECK ENGINE COOLANT TEMPERATURE SENSOR 1

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature sensor 1 harness connector.
3. Remove engine coolant temperature sensor 1. Refer to CO-54, "Exploded View".
4. Check resistance between engine coolant temperature sensor 1 terminals as per the following.



ECT sensor 1		Condition		Resistance (kΩ)
+	–			
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63
			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 1. Refer to CO-54, "Exploded View".

P0127 IAT SENSOR

DTC Logic

INFOID:0000000012198380

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0127	IAT SENSOR-B1 (Intake air temperature too high)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor 1.	• Harness or connectors (The sensor circuit is open or shorted) • Intake air temperature sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Wait until engine coolant temperature is less than 96°C (205°F)

- Turn ignition switch ON.
- Select “DATA MONITOR” mode with CONSULT.
- Check the engine coolant temperature.
- If the engine coolant temperature is not less than 96°C (205°F), turn ignition switch OFF and cool down engine.

NOTE:

Perform the following steps before engine coolant temperature is above 96°C (205°F).

2. Turn ignition switch ON.
3. Select “DATA MONITOR” mode with CONSULT.
4. Start engine.
5. Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.

CAUTION:

Always drive vehicle at a safe speed.

6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-869, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198381

1.CHECK INTAKE AIR TEMPERATURE SENSOR 1

Check intake air temperature sensor 1. Refer to EC-870, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace mass air flow sensor (with intake air temperature sensor). Refer to EM-192, "Exploded View".

Component Inspection

INFOID:0000000012198382

1. CHECK INTAKE AIR TEMPERATURE SENSOR 1

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.

Mass air flow sensor		Condition		Resistance (kΩ)
+	–			
Terminals				
3	4	Temperature [°C (°F)]	25 (77)	1.800 - 2.200

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace mass air flow sensor. Refer to EM-192, "Exploded View".

P0130 A/F SENSOR 1

DTC Logic

INFOID:0000000012198383

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible Cause
P0130	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 circuit]	A)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly in the range other than approx. 2.2 V.	• Harness or connectors (A/F sensor 1 circuit is open or shorted.) • A/F sensor 1
		B)	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 2.2 V.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Let it idle for 2 minutes.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-872, "Diagnosis Procedure".
NO-1 >> With CONSULT: GO TO 3.
NO-2 >> Without CONSULT: GO TO 7.

3.CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

1. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Check “A/F SEN1 (B1)” indication.

Does the indication fluctuates around 2.2 V?

YES >> GO TO 4.
NO >> Proceed to EC-872, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-I

1. Select “A/F SEN1 (B1) P1276” of “A/F SEN1” in “DTC WORK SUPPORT” mode of “ENGINE” using CONSULT.
2. Touch “START”.
3. When the following conditions are met, “TESTING” will be displayed on the CONSULT screen.

ENG SPEED	1,150 - 2,250 rpm (CVT) 1,150 - 3,000 rpm (M/T)
VHCL SPEED SE	More than 64 km/h (40 mph)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	D position (CVT) 5th position (M/T)

If "TESTING" is not displayed after 20 seconds, retry from step 2.

CAUTION:

Always drive vehicle at a safe speed.

Is "TESTING" displayed on CONSULT screen?

YES >> GO TO 5.
NO >> Check A/F sensor 1 function again. GO TO 3.

5. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-II

Release accelerator pedal fully.

NOTE:

Never apply brake during releasing the accelerator pedal.

Which does "TESTING" change to?

COMPLETED>>GO TO 6.
OUT OF CONDITION>>Retry DTC CONFIRMATION PROCEDURE. GO TO 4.

6. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B-III

Touch "SELF-DIAG RESULT"

Which is displayed on CONSULT screen?

YES >> INSPECTION END
NO >> Proceed to EC-872, "Diagnosis Procedure".

7. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform Component Function Check. Refer to EC-872, "Component Function Check".

NOTE:

Use component function check to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-872, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012198384

1. PERFORM COMPONENT FUNCTION CHECK

With GST

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
3. Shift the selector lever to the D position (CVT) or 5th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (31 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
   NOTE:
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 for five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 for five times.
8. Stop the vehicle.
9. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-872, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198385

1. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Turn ignition switch ON.

4. Check the voltage between A/F sensor 1 harness connector and ground.

+		–	Voltage
A/F sensor 1			
Connector	Terminal		
F72	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between A/F sensor 1 harness connector and IPDM E/R harness connector.

+		–		Continuity
A/F sensor 1		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F72	4	E14	36	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

+		–		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F72	1	F24	79	Existed
	2		74	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

+		–	Continuity
A/F sensor 1			
Connector	Terminal		
F72	1	Ground	Not existed
	2		

+		–	Continuity
ECM			
Connector	Terminal		
F24	74	Ground	Not existed
	79		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK INTERMITTENT INCIDENT

Perform GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. Refer to EM-242, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

P0131 A/F SENSOR 1

DTC Logic

INFOID:0000000012198386

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately low.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P0131	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 circuit low voltage]	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0 V.	• Harness or connectors (A/F sensor 1 circuit is open or shorted.) • A/F sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 2.

2.CHECK A/F SENSOR FUNCTION

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check “A/F SEN1 (B1)” indication.

With GST

Follow the procedure “With CONSULT” above.

Is the indication constantly approx. 0 V?

YES >> Proceed to EC-876, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
   CAUTION:
   Always drive vehicle at a safe speed.
3. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	Suitable position

NOTE:

- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 1, return to step 1.**

4. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-876, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198387

1.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor 1 harness connector and ground.

+		–	Voltage
A/F sensor 1			
Connector	Terminal		
F72	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between A/F sensor 1 harness connector and IPDM E/R harness connector.

+		–		Continuity
A/F sensor 1		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F72	4	E14	36	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

+		–		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F72	1	F24	79	Existed
	2		74	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

+		–	Continuity
A/F sensor 1			
Connector	Terminal		
F72	1	Ground	Not existed
	2		

+		–	Continuity
ECM			
Connector	Terminal		
F24	74	Ground	Not existed
	79		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK INTERMITTENT INCIDENT

Perform GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. Refer to EM-242, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

P0132 A/F SENSOR 1

DTC Logic

INFOID:0000000012198388

DTC DETECTION LOGIC

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the A/F sensor 1 signal is not inordinately high.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0132	A/F SENSOR1 (B1) [Air fuel ratio (A/F) sensor 1 circuit high voltage]	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5 V.	• Harness or connectors (A/F sensor 1 circuit is open or shorted.) • A/F sensor 1

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idle.

>> GO TO 2.

2.CHECK A/F SENSOR FUNCTION

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check “A/F SEN1 (B1)” indication.

With GST

Follow the procedure “With CONSULT” above.

Is the indication constantly approx. 5 V?

YES >> Proceed to EC-879, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
2. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
   CAUTION:
   Always drive vehicle at a safe speed.
3. Maintain the following conditions for about 20 consecutive seconds.

ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 mph)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	Suitable position

NOTE:

- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 1, return to step 1.**

4. Check 1st trip DTC.

With GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC is detected?

YES >> Proceed to EC-879, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198389

1. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Turn ignition switch ON.
4. Check the voltage between A/F sensor 1 harness connector and ground.

+		–	Voltage
A/F sensor 1			
Connector	Terminal		
F72	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between A/F sensor 1 harness connector and IPDM E/R harness connector.

+		–		Continuity
A/F sensor 1		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F72	4	E14	36	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

+		–		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F72	1	F24	79	Existed
	2		74	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

+		–	Continuity
A/F sensor 1			
Connector	Terminal		
F72	1	Ground	Not existed
	2		

+		–	Continuity
ECM			
Connector	Terminal		
F24	74	Ground	Not existed
	79		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK INTERMITTENT INCIDENT

Perform GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. Refer to EM-242, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

P0137 HO2S2

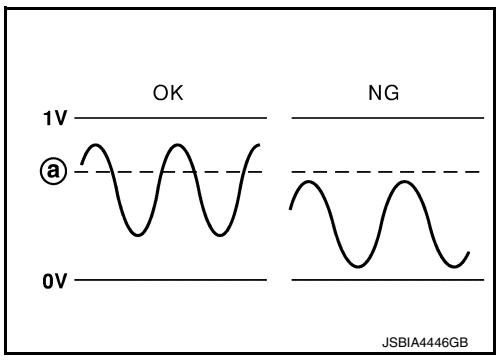
DTC Logic

INFOID:0000000012198390

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.

ⓐ : 0.72 V



DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0137	HO2S2 (B1) (Heated oxygen sensor 2 circuit low voltage)	The maximum voltage from the heated oxygen sensor 2 is not reached to the specified voltage.	• Harness or connectors (Heated oxygen sensor 2 circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that "COOLAN TEMP/S" indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
7. Open engine hood.
8. Select "HO2S2 (B1) P1147" of "HO2S2" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT.

9. Follow the instruction of CONSULT.
NOTE:
It will take at most 10 minutes until “COMPLETED” is displayed.
10. Touch “SELF-DIAG RESULT”.

Which is displayed on CONSULT screen?

OK >> INSPECTION END
NG >> Proceed to EC-883, "Diagnosis Procedure".
CAN NOT BE DIAGNOSED>>GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Perform DTC CONFIRMATION PROCEDURE again.

>> GO TO 3.

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-882, "Component Function Check".
NOTE:
Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-883, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012198391

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F24	84	78	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.72 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F24	84	78	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.72 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F24	84	78	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.72 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-883, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198392

1.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-762, "Description".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171. Refer to EC-905, "DTC Logic".
NO >> GO TO 2.

2.CHECK HO2S2 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F71	1	F24	78	Existed

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK HO2S2 INPUT SIGNAL CIRCUIT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F71	2	F24	84	Existed

2. Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

+		–	Continuity
HO2S2			
Connector	Terminal		
F71	2	Ground	Not existed

+		–	Continuity
ECM			
Connector	Terminal		
F24	84	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK HEATED OXYGEN SENSOR 2

Check the heated oxygen sensor 2. Refer to EC-884, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 5.

5.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

Component Inspection

INFOID:0000000012198393

1.INSPECTION START

Do you have CONSULT?

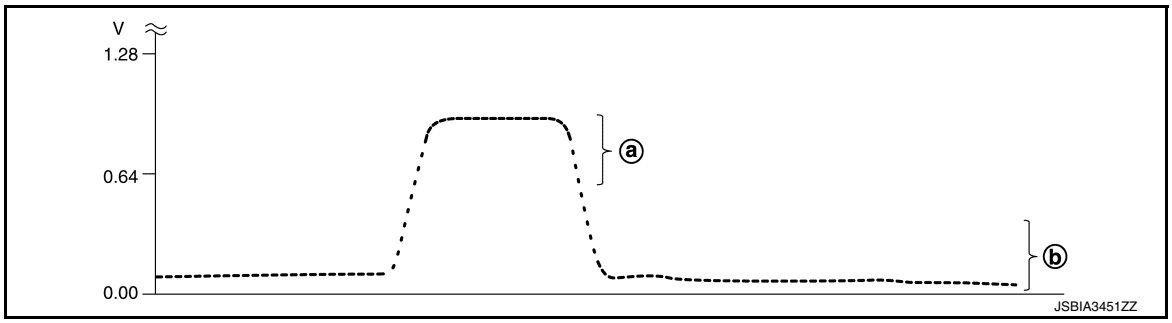
Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

With CONSULT

1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode of “ENGINE” using CONSULT, and select “HO2S2 (B1)” as the monitor item with CONSULT.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ± 25%.



ⓐ : The voltage should be above 0.72 V at least on time.

ⓑ : The voltage should be below 0.28 V at least on time.

"HO2S2 (B1)" should be above 0.72 V at least once when the "FUEL INJECTION" is + 25%.
"HO2S2 (B1)" should be below 0.28 V at least once when the "FUEL INJECTION" is − 25%.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	−		
	Terminal			
F24	84	78	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.28 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	−		
	Terminal			
F24	84	78	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.28 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	−		
	Terminal			
F24	84	78	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.28 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END

NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

P0138 HO2S2

DTC Logic

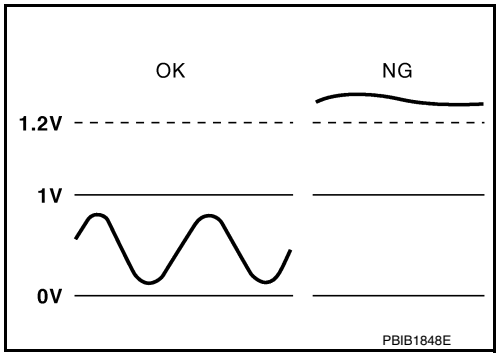
INFOID:0000000012198394

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time.

MALFUNCTION A

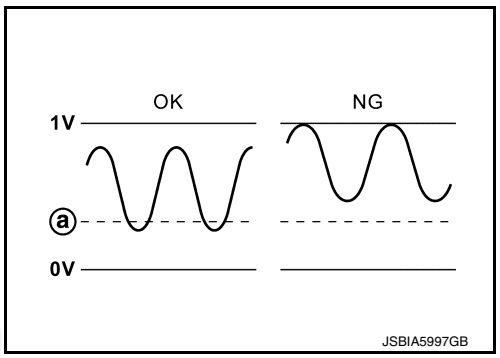
To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



MALFUNCTION B

To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.

ⓐ : 0.28 V



DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition		Possible cause
P0138	HO2S2 (B1) (Heated oxygen sensor 2 circuit high voltage)	A)	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2
		B)	The minimum voltage from the sensor is not reached to the specified voltage.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel pressure • Fuel injector

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 2 minutes.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-889, "Diagnosis Procedure".
NO-1 >> With CONSULT: GO TO 3.
NO-2 >> Without CONSULT: GO TO 5.

3. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

NOTE:
For better results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

1. Turn ignition switch ON and select "DATA MONITOR" mode of "ENGINE" using CONSULT.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that "COOLAN TEMP/S" indication is more than 70°C (158°F).
   If not, warm up engine and go to next step when "COOLAN TEMP/S" indication reaches 70°C (158°F).
7. Open engine hood.
8. Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode of "ENGINE" using CONSULT.
9. Follow the instruction of CONSULT.
   NOTE:
   It will take at most 10 minutes until "COMPLETED" is displayed.
10. Touch "SELF-DIAG RESULT".

Which is displayed on CONSULT

OK >> INSPECTION END
NG >> Proceed to EC-889, "Diagnosis Procedure".
CAN NOT BE DIAGNOSED>>GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B AGAIN

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Perform DTC confirmation procedure again.

>> GO TO 3.

5. PERFORM COMPONENT FUNCTION CHECK FOR MALFUNCTION B

Perform component function check. Refer to EC-889, "Diagnosis Procedure".
NOTE:
Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-889, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012198395

1. PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F24	84	78	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.28 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F24	84	78	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.28 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F24	84	78	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.28 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-889, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198396

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-887, "DTC Logic".

Which malfunction is detected?

A >> GO TO 2.
B >> GO TO 7.

2.CHECK HO2S2 CONNECTOR FOR WATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Check connectors for water.

Water should not exist.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK HO2S2 GROUND CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between HO2S2 harness connector and ECM harness connector.

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F71	1	F24	78	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK HO2S2 INPUT SIGNAL CIRCUIT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F71	2	F24	84	Existed

2. Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

+		–	Continuity
HO2S2			
Connector	Terminal		
F71	2	Ground	Not existed

+		–	Continuity
ECM			
Connector	Terminal		
F24	84	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK HEATED OXYGEN SENSOR 2

Check the heated oxygen sensor 2. Refer to EC-892, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

7. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-762, "Description".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0172. Refer to EC-887, "DTC Logic".
NO >> GO TO 8.

8. CHECK HO2S2 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F71	1	F24	78	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9. CHECK HO2S2 INPUT SIGNAL CIRCUIT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F71	2	F24	84	Existed

2. Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

+		–	Continuity
HO2S2			
Connector	Terminal		
F71	2	Ground	Not existed

+		–	Continuity
ECM			
Connector	Terminal		
F24	84	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK HEATED OXYGEN SENSOR 2

Check the heated oxygen sensor 2. Refer to EC-892, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 11.

11. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

Component Inspection

INFOID:0000000012198397

1. INSPECTION START

Do you have CONSULT?

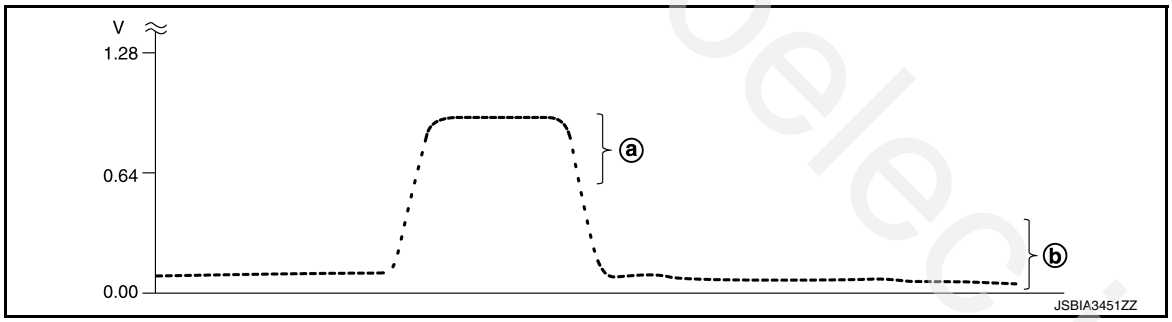
Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 3.

2. CHECK HEATED OXYGEN SENSOR 2

With CONSULT

1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode of “ENGINE” using CONSULT, and select “HO2S2 (B1)” as the monitor item with CONSULT.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ± 25%.



ⓐ : The voltage should be above 0.72 V at least on time.

ⓑ : The voltage should be below 0.28 V at least on time.

“HO2S2 (B1)” should be above 0.72 V at least once when the “FUEL INJECTION” is + 25%.
“HO2S2 (B1)” should be below 0.28 V at least once when the “FUEL INJECTION” is − 25%.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3. CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.

5. Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F24	84	78	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.28 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F24	84	78	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.28 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F24	84	78	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.28 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

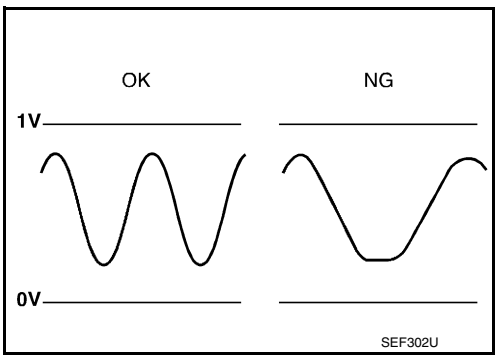
P0139 HO2S2

DTC Logic

INFOID:0000000012198398

DTC DETECTION LOGIC

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during various driving conditions such as fuel cut.



DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0139	HO2S2 (B1) (Heated oxygen sensor 2 circuit slow response)	The switching time between rich and lean of a heated oxygen sensor 2 signal delays more than the specified time computed by ECM.	• Harness or connectors (The sensor circuit is open or shorted) • Heated oxygen sensor 2 • Fuel system • Intake air system

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 7.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
For better results, perform “DTC WORK SUPPORT” at a temperature of 0 to 30°C (32 to 86°F).

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
7. Let engine idle for 1 minute.
8. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
9. Drive the vehicle in a proper at 60 km/h (38MPH) and maintain the speed.

CAUTION:
Always drive vehicle at a safe speed.

10. Release the accelerator pedal fully at least 5 seconds.
CAUTION:
- **Enable engine brake.**
- **Always drive carefully.**
- **Never apply brake when releasing the accelerator pedal.**

11. Repeat step 9 and 10 at least 8 times.
12. Check the following item of “DATA MONITOR”.

Data monitor item	Status
HO2 S2 DIAG1(B1)	CMPLT
HO2 S2 DIAG2(B1)	

Is “CMPLT” displayed on CONSULT screen?

YES >> GO TO 6.
NO-1: “CMPLT” is not displayed on DIAG 1>>Perform DTC confirmation procedure again.
NO-2: “CMPLT” is not displayed on DIAG 2>>GO TO 4.

4.PERFORM DTC WORK SUPPORT

1. Open engine hood.
2. Select “HO2S2 (B1) P0139” in “DTC WORK SUPPORT” mode of “ENGINE” using CONSULT.
3. Start engine and follow the instruction of CONSULT display.
NOTE:
It will take at most 10 minutes until “COMPLETED” is displayed.

Is “COMPLETED” displayed on CONSULT screen?

YES >> GO TO 6.
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
2. Perform DTC confirmation procedure again.

>> GO TO 3.

6.PERFORM SELF-DIAGNOSIS

With CONSULT
Perform ECM self-diagnosis.

Is DTC “P0139” detected?

YES >> Proceed to EC-896, "Diagnosis Procedure".
NO >> INSPECTION END

7.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-895, "Component Function Check".
NOTE:
Use component function check to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-896, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012198399

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F24	84	78	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.66 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F24	84	78	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.66 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F24	84	78	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.66 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-883, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198400

1.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-762, "Description".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-905, "DTC Logic" or EC-909, "DTC Logic".
NO >> GO TO 2.

2.CHECK HO2S2 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F71	1	F24	78	Existed

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK HO2S2 INPUT SIGNAL CIRCUIT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F71	2	F24	84	Existed

2. Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

+		–	Continuity
HO2S2			
Connector	Terminal		
F71	2	Ground	Not existed

+		–	Continuity
ECM			
Connector	Terminal		
F24	84	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK HEATED OXYGEN SENSOR 2

Check the heated oxygen sensor 2. Refer to EC-898, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 5.

5.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

Component Inspection

INFOID:0000000012198401

1.INSPECTION START

Do you have CONSULT?

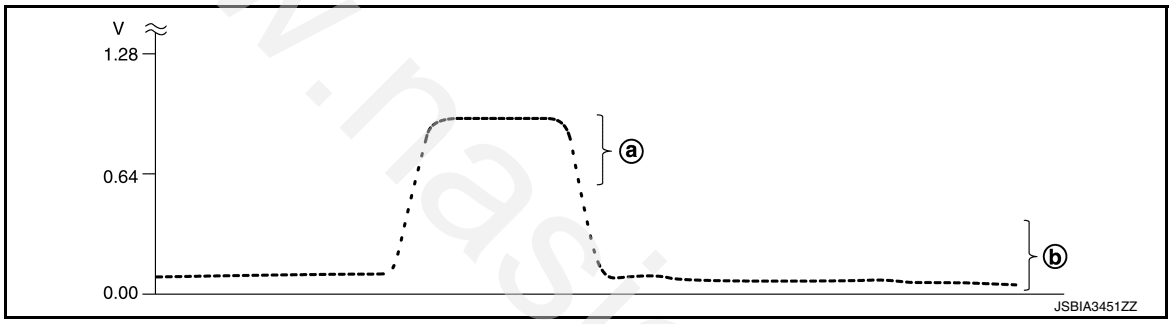
Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

With CONSULT

1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode of “ENGINE” using CONSULT, and select “HO2S2 (B1)” as the monitor item with CONSULT.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ± 25%.



ⓐ : The voltage should be above 0.72 V at least on time.

ⓑ : The voltage should be below 0.28 V at least on time.

“HO2S2 (B1)” should be above 0.72 V at least once when the “FUEL INJECTION” is + 25%.
“HO2S2 (B1)” should be below 0.28 V at least once when the “FUEL INJECTION” is − 25%.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	−		
	Terminal			
F24	84	78	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.28 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F24	84	78	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.28 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5. CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F24	84	78	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.28 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

6. REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

P014C, P014D, P015A, P015B A/F SENSOR 1

DTC Description

INFOID:0000000012198402

DTC DETECTION LOGIC

To judge malfunctions, this diagnosis measures response time of the A/F signal computed by ECM from the A/F sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the A/F sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P014C	A/F SENSOR1 (B1) (O2 sensor slow response - rich to lean bank 1 sensor 1)	• The response time of a A/F sensor 1 signal delays more than the specified time computed by ECM.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • A/F sensor 1
P014D	A/F SENSOR1 (B1) (O2 sensor slow response - lean to rich bank 1 sensor 1)		
P015A	A/F SENSOR1 (B1) (O2 sensor delayed response - rich to lean bank 1 sensor 1)		
P015B	A/F SENSOR1 (B1) (O2 sensor delayed response - lean to rich bank 1 sensor 1)		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 6.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
6. Let engine idle for 1 minute.
7. Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds.
8. Fully release accelerator pedal and then let engine idle for about 1 minute.
9. Check the items status of “DATA MONITOR” as follows.

NOTE:

If “PRSNT” changed to “ABSNT”, refer to EC-785, "Component Function Check".

Data monitor item	Status
A/F SEN1 DIAG3 (B1)	PRSNT

Is “PRSNT” displayed on CONSULT screen?

YES >> GO TO 4.
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT
Perform DTC confirmation procedure-1 again.

Is “PRSNT” displayed on CONSULT screen?

YES >> GO TO 4.
NO >> Refer to EC-785, "Component Function Check".

4. PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT
1. Wait for about 20 seconds at idle.
2. Check the items status of “DATA MONITOR” as follows.
   NOTE:
   If “CMPLT” changed to “INCMP”, refer to EC-785, "Component Function Check".

Data monitor item	Status
A/F SEN1 DIAG1 (B1)	CMPLT
A/F SEN1 DIAG2 (B1)	

Is “CMPLT” displayed on CONSULT screen?

YES >> GO TO 5.
NO >> Refer to EC-785, "Component Function Check".

5. PERFORM SELF-DIAGNOSIS

With CONSULT
Check the “SELF-DIAG RESULT”.

Is any DTC detected?

YES >> Proceed to EC-902, "Diagnosis Procedure".
NO >> INSPECTION END

6. CHECK AIR-FUEL RATIO SELF-LEARNING VALUE

With GST
1. Start engine and warm it up to normal operating temperature.
2. Select Service $01 with GST.
3. Calculate the total value of “Short term fuel trim” and “Long term fuel trim” indications.

Is the total percentage within ±15%?

YES >> GO TO 8.
NO >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.
- Intake air leaks
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Fuel injector
- Incorrect PCV hose connection
- PCV valve
- Mass air flow sensor

>> Repair or replace malfunctioning part.

8. PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Increase the engine speed up to about 3,600 rpm and keep it for 10 seconds.
7. Fully release accelerator pedal and then let engine idle for about 1 minute.
8. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-902, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198403

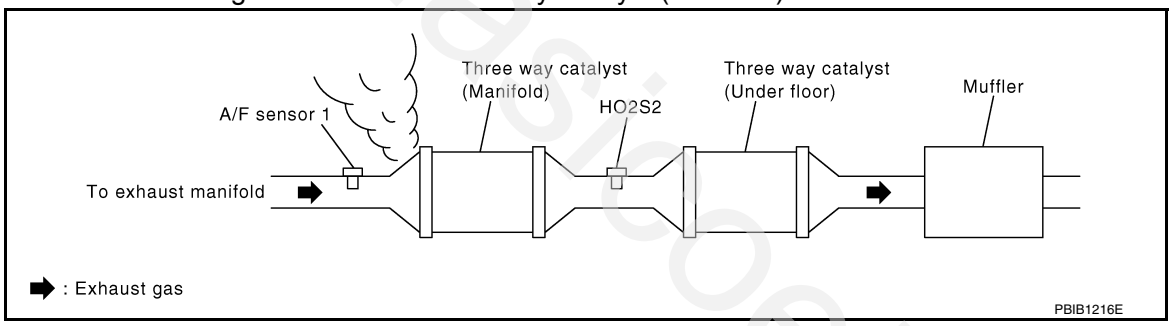
1. RETIGHTEN A/F SENSOR 1

Loosen and retighten the A/F sensor 1. Refer to EM-242, "Exploded View".

>> GO TO 2.

2. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace.
NO >> GO TO 3.

3. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace.
NO >> GO TO 4.

4. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-762, "Description".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-905, "DTC Logic" or EC-909, "DTC Logic".
NO >> GO TO 5.

5. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

+		–	Voltage
A/F sensor 1			
Connector	Terminal		
F72	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

+		–		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F72	1	F24	79	Existed
	2		74	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

+		–	Continuity
A/F sensor 1			
Connector	Terminal		
F72	1	Ground	Not existed
	2		

+		–	Continuity
ECM			
Connector	Terminal		
F24	74	Ground	Not existed
	79		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to EC-806, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 11.

8.CHECK MASS AIR FLOW SENSOR

Refer to EC-845, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace mass air flow sensor. Refer to EM-242, "Exploded View".

9.CHECK PCV VALVE

Refer to EC-1255, "Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace PCV valve. Refer to EM-214, "Exploded View".

10. CHECK INTERMITTENT INCIDENT

Perform GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace.

11. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace air fuel ratio (A/F) sensor 1. Refer to EM-242, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

P0171 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000012198404

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0171	FUEL SYS-LEAN-B1 (Fuel injection system too lean)	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	• Intake air leaks • A/F sensor 1 • Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Lack of fuel • Mass air flow sensor • Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to EC-762, "Description".
2. Start engine.

Is it difficult to start engine?

YES >> GO TO 3.
NO >> GO TO 4.

3.RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.
Crank engine while depressing accelerator pedal.
NOTE:
When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Proceed to EC-906, "Diagnosis Procedure".
NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Start engine and let it idle for at least 5 minutes.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-906, "Diagnosis Procedure".
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine.
3. Maintain the following conditions for at least 10 consecutive minutes.
   Hold the accelerator pedal as steady as possible.

VHCL SPEED SE	50 - 120 km/h (31 - 75 MPH)

CAUTION:
Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

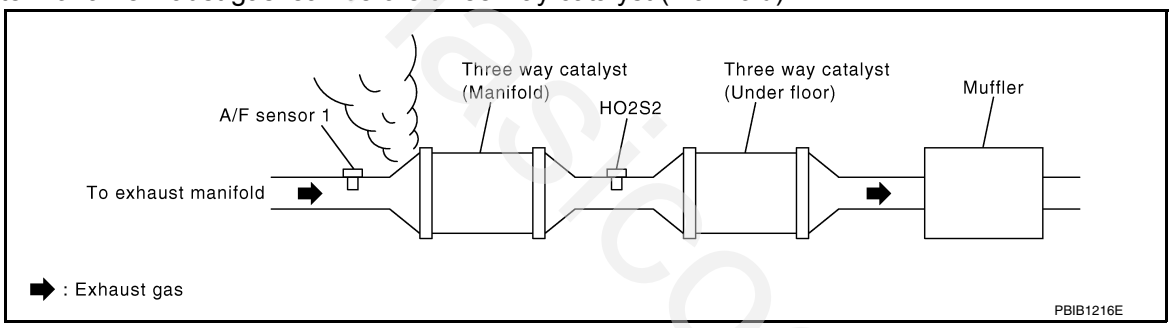
YES >> Proceed to EC-906, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198405

1.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace error-detected parts.
NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAK

1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

Intake air leak detected?

YES >> Repair or replace error-detected parts.
NO >> GO TO 3.

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect corresponding A/F sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

+		–		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F72	1	F24	79	Existed
	2		74	

5. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

+		–	Continuity
A/F sensor 1			
Connector	Terminal		
F72	1	Ground	Not existed
	2		

+		–	Continuity
ECM			
Connector	Terminal		
F24	79	Ground	Not existed
	74		

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK FUEL PRESSURE

Check fuel pressure. Refer to EC-771, "Work Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging. Refer to EM-203, "Exploded View".

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”. Refer to FL-6, "2WD : Exploded View" (2WD) or FL-10, "AWD : Exploded View" (AWD).
NO >> Repair or replace error-detected parts.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select “DATA MONITOR” mode.
5. Select “MASS AIR FLOW SENSOR (Hz)” and check the indication.

Monitor item	Condition	Indication (Hz)
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	6,100 – 6,500 Hz
	Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency rise in response to engine being increased to about 4,000 rpm.

Without CONSULT

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 frequency between ECM harness connector terminals under the following conditions.

ECM			Condition	Frequency (Hz)
Connector	+	–		
	Terminal			
F23	37	42	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	6,100 – 6,500 Hz
			Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

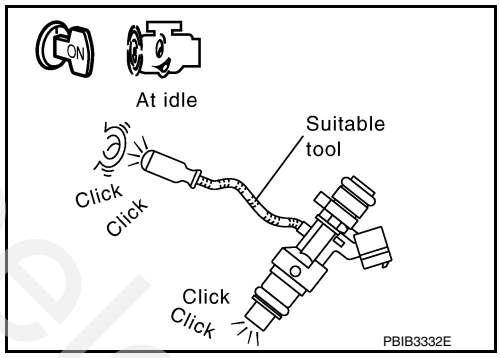
YES >> GO TO 7.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-843, "DTC Logic".

7. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT
1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Perform trouble diagnosis for “FUEL INJECTOR”, refer to EC-1204, "Component Function Check".

P0172 FUEL INJECTION SYSTEM FUNCTION

DTC Logic

INFOID:0000000012198406

DTC DETECTION LOGIC

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the A/F sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input signal to ECM	ECM function	Actuator
A/F sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0172	FUEL SYS-RICH-B1 (Fuel injection system too rich)	• Fuel injection system does not operate properly. • The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	• A/F sensor 1 • Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Clear the mixture ratio self-learning value. Refer to EC-762, "Description".
2. Start engine.

Is it difficult to start engine?

YES >> GO TO 3.
NO >> GO TO 4.

3.RESTART ENGINE

If it is difficult to start engine, the fuel injection system has a malfunction, too.
Crank engine while depressing accelerator pedal.

NOTE:
When depressing accelerator pedal three-fourths (3/4) or more, the control system does not start the engine. Do not depress accelerator pedal too much.

Does engine start?

YES >> Proceed to EC-910, "Diagnosis Procedure".
NO >> Check exhaust and intake air leak visually.

4.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Start engine and let it idle for at least 5 minutes.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-910, "Diagnosis Procedure".
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine.
3. Maintain the following conditions for at least 10 consecutive minutes.
   Hold the accelerator pedal as steady as possible.

VHCL SPEED SE	50 - 120 km/h (31 - 75 MPH)

CAUTION:
Always drive vehicle at a safe speed.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

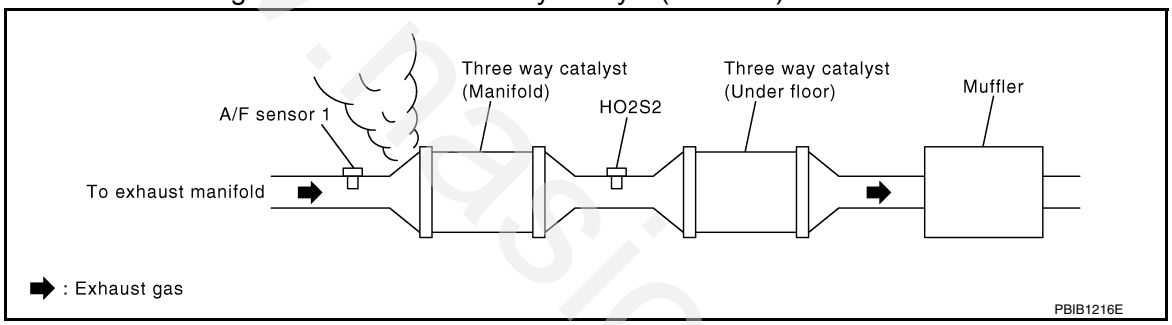
YES >> Proceed to EC-910, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198407

1.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace error-detected parts.
NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Intake air leak detected?

YES >> Repair or replace error-detected parts.
NO >> GO TO 3.

3.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect corresponding A/F sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

+		–		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F72	1	F24	79	Existed
	2		74	

5. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

+		–	Continuity
A/F sensor 1			
Connector	Terminal		
F72	1	Ground	Not existed
	2		

+		–	Continuity
ECM			
Connector	Terminal		
F24	79	Ground	Not existed
	74		

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK FUEL PRESSURE

Check fuel pressure. Refer to EC-771, "Work Procedure".

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging. Refer to EM-203, "Exploded View".

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”. Refer to FL-6, "2WD : Exploded View" (2WD) or FL-10, "AWD : Exploded View" (AWD).
NO >> Repair or replace error-detected parts.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select “DATA MONITOR” mode.
5. Select “MASS AIR FLOW SENSOR (Hz)” and check the indication.

Monitor item	Condition	Indication (Hz)
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	6,100 – 6,500 Hz
	Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency rise in response to engine being increased to about 4,000 rpm.

Without CONSULT

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 frequency between ECM harness connector terminals under the following conditions.

ECM			Condition	Frequency (Hz)
Connector	+	–		
	Terminal			
F23	37	42	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	6,100 – 6,500 Hz
			Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

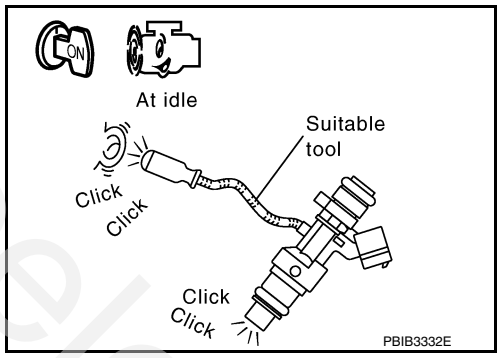
YES >> GO TO 7.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-843, "DTC Logic".

7. CHECK FUNCTION OF FUEL INJECTOR

With CONSULT
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

Without CONSULT
1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Perform trouble diagnosis for “FUEL INJECTOR”, refer to EC-1204, "Component Function Check".

P0181 FTT SENSOR

DTC Logic

INFOID:0000000012198408

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition		Possible cause
P0181	FTT SENSOR (Fuel temperature sensor a circuit range/performance)	A)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from ECT sensor and intake air temperature sensor.	• Harness or connectors (The FTT sensor circuit is open or shorted) • FTT sensor
		B)	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, EOT sensor, and FTT sensor) shows that the voltage signal of the FTT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	• Harness or connectors (High or low resistance in the FTT sensor circuit) • FTT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 7.
NO >> GO TO 2.

2.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-I

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-915, "Diagnosis Procedure".
NO >> GO TO 4.

4.CHECK ENGINE COOLANT TEMPERATURE

With CONSULT
1. Select “COOLANT TEMP/S” in “DATA MONITOR” with CONSULT.
2. Check “COOLANT TEMP/S” value.

With GST
Follow the procedure “With CONSULT” above.

“COOLANT TEMP/S” less than 60°C (140°F)?

YES >> INSPECTION END
NO >> GO TO 5.

5.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A-II

With CONSULT
1. Cool engine down until “COOLANT TEMP/S” is less than 60°C (140°F).

2. Wait at least 10 seconds.
3. Check 1st trip DTC.

With GST
Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-915, "Diagnosis Procedure".
NO >> GO TO 6.

6.PERFORM COMPONENT FUNCTION CHECK (FOR MALFUNCTION B)

Perform component function check. Refer to EC-914, "Component Function Check".

NOTE:
Use the component function check to check the overall function of the FTT sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-915, "Diagnosis Procedure".

7.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
- **Before performing the following procedure, do not add fuel.**
- **Before performing the following procedure, check that fuel level is between 1/4 and 4/4.**
- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**

>> GO TO 8.

8.PERFORM DTC CONFIRMATION PROCEDURE B

1. Move the vehicle to a cool place.
   NOTE:
   Cool the vehicle in an environment of ambient air temperature between −10°C (14°F) and 35°C (95°F).
2. Turn ignition switch OFF and leave the vehicle for 12 hours.
   CAUTION:
   Never turn ignition switch ON during this procedure.
   NOTE:
   The vehicle must be cooled with the hood open.
3. Start engine and let it idle for 5 minutes or more.
   CAUTION:
   Never turn ignition switch OFF during idling.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-915, "Diagnosis Procedure".
NO >> INSPECTION END

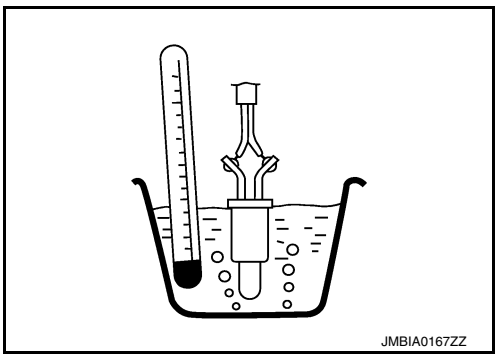
Component Function Check

INFOID:0000000012198409

1.CHECK FUEL TANK TEMPERATURE (FTT) SENSOR

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Remove fuel level sensor unit. Refer to FL-7, "2WD : Removal and Installation" (2WD models), FL-11, "AWD : Removal and Installation" (AWD models).

4. Check resistance between fuel level sensor unit and fuel pump terminals by heating with hot water as shown in the figure.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Terminals	Condition		Resistance (kΩ)
4 and 5	Temperature [°C (°F)]	20 (68)	2.3 – 2.7
		50 (122)	0.79 – 0.90

Is the inspection result normal?

YES >> GO TO 2.
NO >> Proceed to EC-915, "Diagnosis Procedure".

2.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-915, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198410

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-913, "DTC Logic".

Which malfunction is detected?

A >> GO TO 2.
B >> GO TO 5.

2.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel level sensor unit and fuel pump harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage
Connector	Terminal		
B46	4	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel tank temperature sensor harness connector and ECM harness connector.

Fuel level sensor unit and fuel pump		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B46	4	E19	128	Existed

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

3. Check the continuity between fuel level sensor unit and fuel pump harness connector and ECM harness connector.

Fuel level sensor unit and fuel pump		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B46	5	E19	148	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 connector.

5. CHECK FUEL TANK TEMPERATURE SENSOR

Check fuel tank temperature sensor. Refer to EC-916, "Component Inspection".

Is the inspection result normal?

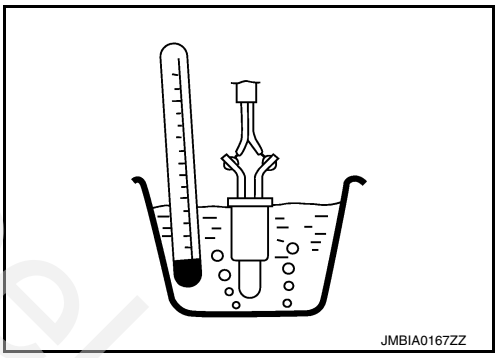
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace fuel level sensor unit and fuel pump. Refer to FL-7, "2WD : Removal and Installation" (2WD models), FL-11, "AWD : Removal and Installation" (AWD models).

Component Inspection

INFOID:0000000012198411

1. CHECK FUEL TANK TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Remove fuel level sensor unit. Refer to FL-7, "2WD : Removal and Installation" (2WD models), FL-11, "AWD : Removal and Installation" (AWD models).
3. Check resistance between “fuel level sensor unit and fuel pump” terminals by heating with hot water as shown in the figure.



Mass air flow sensor		Condition		Resistance (kΩ)
+	–			
Terminals				
4	5	Temperature [°C (°F)]	20 (68)	2.3 - 2.7 kΩ
			50 (122)	0.79 - 0.90 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel level sensor unit and fuel pump. Refer to FL-7, "2WD : Removal and Installation" (2WD models), FL-11, "AWD : Removal and Installation" (AWD models).

P0182, P0183 FTT SENSOR

DTC Logic

INFOID:0000000012198412

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0182	FTT_SEN/CIRCUIT (Fuel temperature sensor “A” circuit low)	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The sensor circuit is open or shorted.) • Fuel tank temperature sensor
P0183	FTT_SEN/CIRCUIT (Fuel temperature sensor “A” circuit high)	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-917, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198413

1.INSPECTION START

Confirm the detected malfunction (A or B). Refer to EC-913, "DTC Logic".

Which malfunction is detected?

A >> GO TO 2.
B >> GO TO 5.

2.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel pump harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel level sensor unit and fuel pump harness connector and ground.

Fuel level sensor unit and fuel pump		Ground	Voltage
Connector	Terminal		
B46	4	Ground	Approx. 5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.
3. Check the continuity between fuel tank temperature sensor harness connector and ECM harness connector.

Fuel level sensor unit and fuel pump		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B46	4	E19	128	Existed

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4. CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel level sensor unit and fuel pump harness connector and ECM harness connector.

Fuel level sensor unit and fuel pump		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B46	5	E19	148	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 connector.

5. CHECK FUEL TANK TEMPERATURE SENSOR

Check fuel tank temperature sensor. Refer to EC-916, "Component Inspection".

Is the inspection result normal?

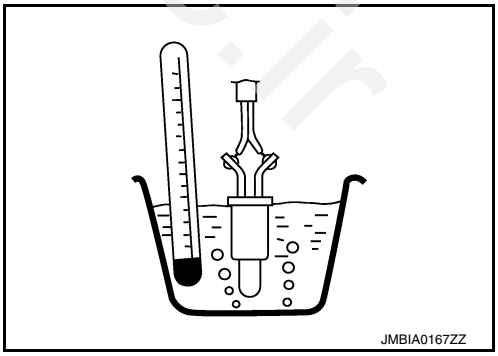
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace fuel level sensor unit and fuel pump. Refer to FL-7, "2WD : Removal and Installation" (2WD models), FL-11, "AWD : Removal and Installation" (AWD models).

Component Inspection

INFOID:0000000012198414

1. CHECK FUEL TANK TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Remove fuel level sensor unit. Refer to FL-7, "2WD : Removal and Installation" (2WD models), FL-11, "AWD : Removal and Installation" (AWD models).
3. Check resistance between “fuel level sensor unit and fuel pump” terminals by heating with hot water as shown in the figure.



Mass air flow sensor		Condition		Resistance (kΩ)
+	–			
Terminals				
4	5	Temperature [°C (°F)]	20 (68)	2.3 - 2.7 kΩ
			50 (122)	0.79 - 0.90 kΩ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel level sensor unit and fuel pump. Refer to FL-7, "2WD : Removal and Installation" (2WD models), FL-11, "AWD : Removal and Installation" (AWD models).

P0190, P0192, P0193 FRP SENSOR

DTC Logic

INFOID:0000000012198415

DTC DETECTION LOGIC

NOTE:
If DTC P0193 is displayed with DTC P0190 or P119C, perform the trouble diagnosis for DTC P0190 or P119C. Refer to EC-706, "DTC Index".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0190	FUEL PRES SEN/CIRCUIT (Fuel rail pressure sensor circuit low input and high input)	Signal voltage from the fuel rail pressure sensor remains at more than 4.84 V / less than 0.2 V for 5 seconds or more.	• Harness or connectors (Fuel rail pressure sensor circuit is open or shorted.) • Fuel rail pressure sensor • Sensor power supply 2
P0192	FRP SEN/CIRC (Fuel rail pressure sensor circuit low input)	Signal voltage from the fuel rail pressure sensor remains at less than 0.37 V for 5 seconds or more.	
P0193	FRP SEN/CIRC (Fuel rail pressure sensor circuit high input)	Signal voltage from the fuel rail pressure sensor remains at more than 3.46 V for 5 seconds or more.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine ON and wait at least 60 seconds.
2. Check DTC or 1st trip DTC.

Is DTC or 1st trip DTC detected?

YES >> Proceed to EC-919, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198416

NOTE:
Turning the ignition switch ON with FRP sensor harness connector disconnected causes ECM to detect DTC P0190. Be sure to erase the DTC when the diagnosis procedure.

1.CHECK FUEL RAIL PRESSURE (FRP) SENSOR POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect FRP sensor connector.
3. Turn ignition switch ON.
4. Check the voltage between FRP sensor harness connector terminals.

FRP sensor			Voltage (Approx.)
Connector	+	–	
	terminal		
F7	1	3	5 V

Inspection result normal?

YES >> GO TO 6.
NO >> GO TO 2.

2.CHECK FRP SENSOR POWER SUPPLY-II

Check the voltage between FRP sensor harness connector and the ground.

+		−	Voltage (Approx.)
FRP sensor			
Connector	Terminal		
F7	1	Ground	5 V

Is inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform EC-1240, "Diagnosis Procedure".

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK FRP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between FRP sensor harness connector and ECM harness connector.

+		−		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F7	3	F23	13	Existed

4. Also check harness for short to power.

Is inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and the ground.

ECM		Ground	Continuity
Connector	Terminal		
F23	9	Ground	Existed
	10		
	50		
F24	60		
	110		
E19	147		
	149		
	152		

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

6.CHECK FRP SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between FRP sensor harness connector and ECM harness connector.

+		–		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F7	2	F23	25	Existed

4. Also check harness for short to ground and to power.

Is inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK FRP SENSOR

Check the FRP sensor. Refer to EC-921, "Component Inspection".

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection

INFOID:0000000012198417

1.CHECK FRP SENSOR

WITH CONSULT

1. Turn ignition switch OFF.
2. Reconnect harness connector disconnected.
3. Start the engine.
4. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
5. Check that the “FUEL PRES SEN V” indication.

Monitor Item	Condition	Values/Status
FUEL PRES SEN V	Engine speed: Idle	1,140 – 1,460 mV
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,300 – 2,900 mV

WITHOUT CONSULT

1. Turn ignition switch OFF.
2. Reconnect harness connector disconnected.
3. Start the engine.
4. Check FRP sensor signal voltage.

ECM			Condition	Value (Approx.)
Connector	+	–		
	Terminal			
F23	25	13	[Engine is running] • Warm-up condition • Idle speed	1.14– 1.46 V
			[Engine is running] • Warm-up condition • Revving engine from idle to 4,000 rpm quickly	1.3 – 2.9 V

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Replace FRP sensor. Refer to EM-208, "Exploded View".

P0196 EOT SENSOR

DTC Logic

INFOID:0000000012198418

DTC DETECTION LOGIC

NOTE:
If DTC P0196 is displayed with DTC P0197 or P0198, first perform the trouble diagnosis for DTC P0197 or P0198. Refer to EC-926, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition		Possible cause
P0196	EOT SENSOR (Engine oil temperature sensor range/performance)	A)	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from EOT sensor and intake air temperature sensor.	• Harness or connectors (The EOT sensor circuit is open or shorted) • EOT sensor
		B)	The comparison result of signals transmitted to ECM from each temperature sensor (IAT sensor, ECT sensor, FTT sensor, and EOT sensor) shows that the signal voltage of the EOT sensor is higher/lower than that of other temperature sensors when the engine is started with its cold state.	• Harness or connectors (High or low resistance in the EOT sensor circuit) • EOT sensor

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Is it necessary to erase permanent DTC?

YES >> GO TO 6.
NO >> GO TO 2.

2.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MULFUNCTION A-I

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and let it idle for 5 minutes and 10 seconds.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-924, "Diagnosis Procedure".
NO >> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE FOR MULFUNCTION A-II

With CONSULT
1. Select “DATA MONITOR” mode with CONSULT.
2. Check that “COOLANT TEMP/S” indicates above 70°C (158°F).
   If it is above 70°C (158°F), go to the following steps.

If it is below 70°C (158°F), warm engine up until “COOLANT TEMP/S” indicates more than 70°C (158°F). Then perform the following steps.

3. Turn ignition switch OFF and soak the vehicle in a cool place.
4. Turn ignition switch ON.
   NOTE:
   Do not turn ignition switch OFF until step 8.
5. Select “DATA MONITOR” mode with CONSULT.
6. Check the following.

COOLANT TEMP/S	Below 40°C (104°F)
INT/A TEMP SE	Below 40°C (104°F)
Difference between “COOLANT TEMP/S” and “INT/A TEMP SE”	Within 6°C (11°F)

If they are within the specified range, perform the following steps.
If they are out of the specified range, soak the vehicle to meet the above conditions. Then perform the following steps.
NOTE:
- **Do not turn ignition switch OFF.**
- **If it is supposed to need a long period of time, do not deplete the battery.**

7. Start engine and let it idle for 5 minutes.
8. Check 1st trip DTC.

With GST
Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-924, "Diagnosis Procedure".
NO >> GO TO 5.

5.PERFORM COMPONENT FUNCTION CHECK (FOR MULFUNCTION B)

Perform component function check. Refer to EC-924, "Component Function Check".
NOTE:
Use the component function check to check the overall function of the EOT sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-924, "Diagnosis Procedure".

6.PRECONDITIONING

If DTC CONFIRMATION PROCEDURE has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
- **Before performing the following procedure, do not add fuel.**
- **Before performing the following procedure, check that fuel level is between 1/4 and 4/4.**
- **Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.**

>> GO TO 7.

7.PERFORM DTC CONFIRMATION PROCEDURE B

1. Move the vehicle to a cool place.
   NOTE:
   Cool the vehicle in an environment of ambient air temperature between −10°C (14°F) and 35°C (95°F).
2. Turn ignition switch OFF and leave the vehicle for 12 hours.
   CAUTION:
   Never turn ignition switch ON during this procedure.
   NOTE:
   The vehicle must be cooled with the hood open.
3. Start engine and let it idle for 5 minutes or more.

CAUTION:
Never turn ignition switch OFF during idling.

4. Check 1st trip DTC.

Is 1st trip DTC detected?

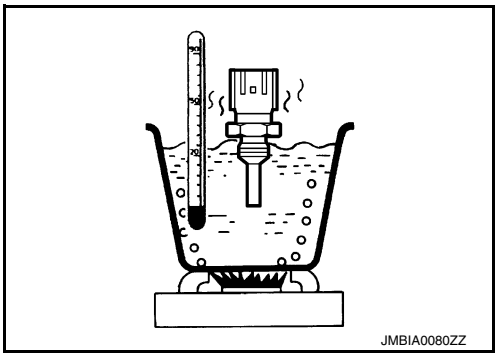
YES >> Proceed to EC-924, "Diagnosis Procedure".
NO >> INSPECTION END

Component Function Check

INFOID:0000000012198419

1.CHECK ENGINE OIL TEMPERATURE (EOT) SENSOR

1. Turn ignition switch OFF.
2. Disconnect EOT sensor harness connector.
3. Remove EOT sensor. Refer to EM-286, "Exploded View".
4. Check resistance between EOT sensor terminals by heating with hot water as shown in the figure.



Terminals	Condition		Resistance (kΩ)
1 and 2	Temperature [°C (°F)]	20 (68)	2.37 – 2.63
		50 (122)	0.68 – 1.00
		90 (194)	0.236 – 0.260

Is the inspection result normal?

YES >> GO TO 2.
NO >> Proceed to EC-924, "Diagnosis Procedure".

2.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-924, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198420

1.CHECK ENGINE OIL TEMPERATURE SENSOR

Check engine oil temperature sensor. Refer to EC-924, "Component Inspection".

Is the inspection result normal?

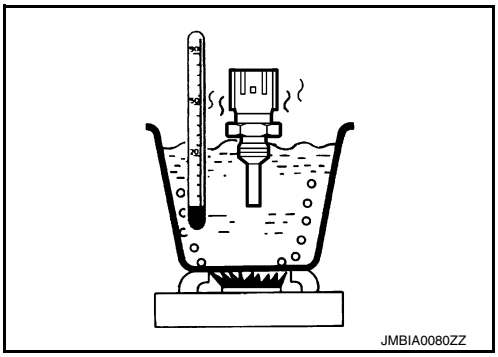
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace engine oil temperature sensor. Refer to EM-286, "Exploded View".

Component Inspection

INFOID:0000000012198421

1.CHECK ENGINE OIL TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine oil temperature sensor harness connector.
3. Remove engine oil temperature sensor. Refer to EM-286, "Exploded View".
4. Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.



Terminals	Condition		Resistance (kΩ)
1 and 2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63
		50 (122)	0.68 - 1.00
		90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace engine oil temperature sensor. Refer to EM-286, "Exploded View".

P0197, P0198 EOT SENSOR

DTC Logic

INFOID:0000000012198422

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC Detecting Condition	Possible Cause
P0197	EOT SEN/CIRC (Engine oil temperature sensor circuit low input)	An excessively low voltage from the engine oil temperature sensor is sent to ECM.	• Harness or connectors (EOT sensor circuit is open or shorted.) • Engine oil temperature sensor
P0198	EOT SEN/CIRC (Engine oil temperature sensor circuit high input)	An excessively high voltage from the engine oil temperature sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-926, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198423

1.CHECK ENGINE OIL TEMPERATURE SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect engine oil temperature (EOT) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EOT sensor harness connector and ground.

+		−	Voltage (Approx.)
EOT sensor			
Connector	Terminal		
F48	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK ENGINE OIL TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EOT sensor harness connector and ECM harness connector.

+		–		Continuity
EOT sensor		ECM		
Connector	Terminal	Connector	Terminal	
F48	1	F23	22	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK EOT SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EOT sensor harness connector and ECM harness connector.

+		–		Continuity
EOT sensor		ECM		
Connector	Terminal	Connector	Terminal	
F48	2	F23	45	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK ENGINE OIL TEMPERATURE SENSOR

Check the engine oil temperature sensor. Refer to EC-927, "Component Inspection".

Is the inspection result normal?

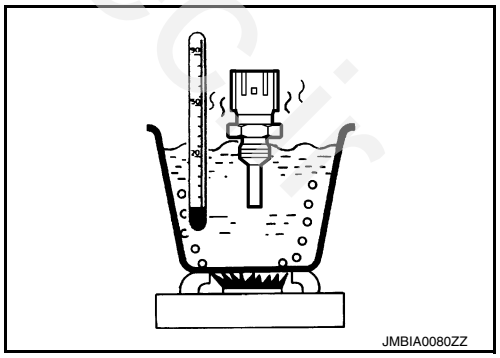
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace engine oil temperature sensor. Refer to EM-286, "Exploded View".

Component Inspection

INFOID:0000000012198424

1.CHECK ENGINE OIL TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect engine oil temperature sensor harness connector.
3. Remove engine oil temperature sensor.
4. Check resistance between engine oil temperature sensor terminals by heating with hot water as shown in the figure.



Engine oil temperature sensor		Condition		Resistance (kΩ)
+	–			
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63
			50 (122)	0.68 - 1.00
			90 (194)	0.236 - 0.260

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine oil temperature sensor. Refer to EM-286, "Exploded View".

P0201, P0202, P0203, P0204 FUEL INJECTOR

DTC Logic

INFOID:0000000012198425

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0201	INJECTOR CIRC-CYL1 (No.1 fuel injector circuit)	ECM detects No. 1 injector circuit is open or shorted.	• The fuel injector circuit is open or shorted • Fuel injector • ECM
P0202	INJECTOR CIRC-CYL2 (No. 2 fuel injector circuit)	ECM detects No. 2 injector circuit is open or shorted.	
P0203	INJECTOR CIRC-CYL3 (No. 3 fuel injector circuit)	ECM detects No. 3 injector circuit is open or shorted.	
P0204	INJECTOR CIRC-CYL4 (No. 4 fuel injector circuit)	ECM detects No. 4 injector circuit is open or shorted.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, conform that battery voltage is 11 V or more at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start the engine and let it idle at least 30 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-928, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198426

1.PERFORM TROUBLE DIAGNOSIS FOR INJECTOR

Perform trouble diagnosis for injector. Refer to EC-1204, "Component Function Check".

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P0222, P0223 TP SENSOR

DTC Logic

INFOID:0000000012198427

DTC DETECTION LOGIC

NOTE:
If DTC P0222 or P0223 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-952, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0222	TP SEN 1/CIRC-B1 (Throttle position sensor 1 circuit low input)	An excessively low voltage from the TP sensor 1 is sent to ECM.	• Harness or connectors (TP sensor 1 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1)
P0223	TP SEN 1/CIRC-B1 (Throttle position sensor 1 circuit high input)	An excessively high voltage from the TP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-929, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198428

1.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric throttle control actuator harness connector and ground.

+		–	Voltage (Approx.)
Electric throttle control actuator			
Connector	Terminal		
F29	5	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	5	F24	83	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	4	F24	85	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	6	F24	88	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Check the throttle position sensor. Refer to EC-931, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace electric throttle control actuator. Refer to EM-197, "Exploded View".

Component Inspection

INFOID:0000000012198429

1. CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Perform " Throttle Valve Closed Position Learning". Refer to EC-754, "Description".
4. Turn ignition switch ON.
5. Set selector lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition		Voltage
Connector	+	–			
	Terminal				
F24	88	85	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	80			Fully released	Less than 4.75V
				Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace electric throttle control actuator. Refer to EM-197, "Exploded View".

P0234 TC SYSTEM

DTC Logic

INFOID:0000000012198430

DTC DETECTION LOGIC

NOTE:
If DTC P0234 is displayed with DTC P0237 or P0238, first perform the trouble diagnosis for DTC P0237 or P0238. Refer to EC-938, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0234	TC SYSTEM-B1 (Turbocharger overboost condition)	Turbocharger boost is higher than the target value.	• Turbocharger boost sensor • Turbocharger bypass control valve solenoid valve • Exhaust manifold and turbocharger assembly • Disconnection, looseness or improper connection of boost control actuator hose

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-932, "Component Function Check".
NOTE:
Use component function check to check the overall function of the turbocharger system circuit. During this check, DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-933, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012198431

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

With CONSULT
1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “WASTEGATE ACTUATOR”.
3. Operate “Up” or “Down”, set “W/G ACTUATOR POSITION B1” to 0.002 m, and make a quick short note of value “V1” of “W/G ACTUATOR POSI SEN B1”.
4. Operate “Up” or “Down”, set “W/G ACTUATOR POSITION B1” to 0.006 m, and make a quick short note of value “V2” of “W/G ACTUATOR POSI SEN B1”.

Do the values of “V1” and “V2” change (visually, ACTUATOR SHAFT operates) and “V2” minus “V1” becomes equal to or more than 1.3V?

YES >> INSPECTION END
NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator only). Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

3.CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

Without CONSULT
1. Turn ignition switch OFF.
2. Disconnect Wastegate control actuator harness connector.
3. While checking the POSITION SENSOR OUT voltage with an oscilloscope, apply a voltage of 12 V to the positive or negative terminal.

Does ACTUATOR SHAFT visually operate and POSITION SENSOR OUT voltage change?

YES >> INSPECTION END

NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator only). Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

Diagnosis Procedure

INFOID:0000000012198432

1.CHECK BOOST CONTROL ACTUATOR HOSE

Check disconnection, looseness or improper connection of hose between turbocharger bypass control valve solenoid valve and boost control actuator.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK TURBOCHARGER BYPASS CONTROL VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect turbocharger bypass control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between turbocharger bypass control valve harness connector and ground.

+		–	Voltage
Turbocharger bypass control valve			
Connector	Terminal		
F64	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK TURBOCHARGER BYPASS CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between turbocharger bypass control valve harness connector and IPDM E/R harness connector.

+		–		Continuity
Turbocharger bypass control valve		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F64	1	E14	36	Existed

4. Also check harness for short to ground and short.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK TURBOCHARGER BYPASS CONTROL VALVE GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger bypass control valve harness connector and ECM harness connector.

+		–		Continuity
Turbocharger bypass control valve		ECM		
Connector	Terminal	Connector	Terminal	
F64	2	F24	105	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK TURBOCHARGER BYPASS CONTROL VALVE

Check the turbocharger bypass control valve. Refer to EM-244, "Inspection".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace turbocharger bypass control valve. Refer to EM-242, "Exploded View".

6. CHECK BOOST CONTROL ACTUATOR

Check the boost control actuator. Refer to EM-244, "Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace exhaust manifold and turbocharger assembly. Refer to EM-242, "Exploded View".

7. CHECK TURBOCHARGER BOOST SENSOR

Check the turbocharger boost sensor. Refer to EC-939, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace turbocharger boost sensor. Refer to EM-194, "Exploded View".

P0235 TC BOOST SENSOR

DTC Logic

INFOID:0000000012198433

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0235	TURBO BOOST SENSOR (Turbocharger/supercharger boost sensor A circuit)	An excessively low voltage from the turbocharger boost sensor is sent to ECM.	• Harness or connectors (Turbocharger boost sensor circuit is open or shorted.) • Turbocharger boost sensor • Sensor power supply 2 circuit

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-935, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198434

1.CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY

1. Disconnect turbocharger boost sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger boost sensor harness connector and ground.

+		−	Voltage (Approx.)
Turbocharger boost sensor			
Connector	Terminal		
F75	2	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform EC-1240, "Diagnosis Procedure".

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK TURBOCHARGER BOOST SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

+		–		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
F75	4	F23	13	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK TURBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

+		–		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
F75	1	F23	11	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK TURBOCHARGER BOOST SENSOR

Check the turbocharger boost sensor. Refer to EC-936, "Component Inspection".

Is the inspection result normal?

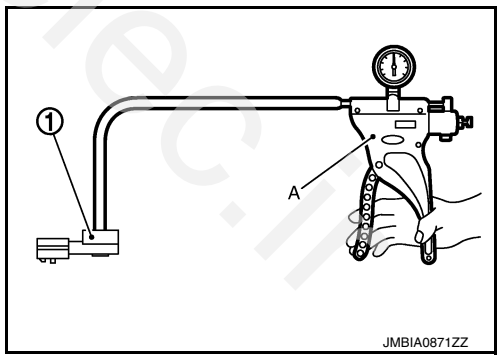
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace turbocharger boost sensor. Refer to EM-194, "Exploded View".

Component Inspection

INFOID:0000000012198435

1.CHECK TURBOCHARGER BOOST SENSOR

1. Turn ignition switch OFF.
2. Remove turbocharger boost sensor with its harness connector.
3. Install pressure pump (A) to turbocharger boost sensor (1).
   CAUTION:
   When insert a pressure pump hose to the sensor, be careful to the damage of the sensor housing.
4. Turn ignition switch ON.
5. Check the voltage between ECM harness connector terminals as per the following conditions.



NOTE:
- Always calibrate the pressure pump gauge when using it.
- Inspection should be done at room temperature [10 - 30°C (50 - 86°F)].

ECM			Condition [Pressure (Relative to atmospheric pressure)]	Voltage (Approx.)
Connector	+	–		
	Terminal			
F23	11	13	0 kPa (0 mbar, 0 mmHg, 0 inHg)	2.03 V
			40 kPa (400 mbar, 300 mmHg, 11.81 inHg)	2.67 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger boost sensor. Refer to EM-194, "Exploded View".

P0237, P0238 TC BOOST SENSOR

DTC Logic

INFOID:0000000012198436

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0237	TC BOOST SEN/CIRC-B1 (Turbocharger boost sensor circuit low input)	An excessively low voltage from the turbocharger boost sensor is sent to ECM.	• Harness or connectors (Turbocharger boost sensor circuit is open or shorted.) • Turbocharger boost sensor • Sensor power supply 2 circuit
P0238	TC BOOST SEN/CIRC-B1 (Turbocharger boost sensor circuit high input)	An excessively high voltage from the turbocharger boost sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-938, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198437

1.CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY

1. Disconnect turbocharger boost sensor harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger boost sensor harness connector and ground.

+		−	Voltage (Approx.)
Turbocharger boost sensor			
Connector	Terminal		
F75	2	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform EC-1240, "Diagnosis Procedure".

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK TURBOCHARGER BOOST SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

3. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

+		–		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
F75	4	F23	13	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK TURBOCHARGER BOOST SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between turbocharger boost sensor harness connector and ECM harness connector.

+		–		Continuity
Turbocharger boost sensor		ECM		
Connector	Terminal	Connector	Terminal	
F75	1	F23	11	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK TURBOCHARGER BOOST SENSOR

Check the turbocharger boost sensor. Refer to EC-939, "Component Inspection".

Is the inspection result normal?

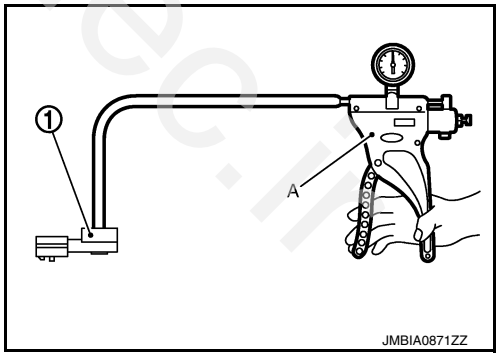
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace turbocharger boost sensor. Refer to EM-194, "Exploded View".

Component Inspection

INFOID:0000000012198438

1. CHECK TURBOCHARGER BOOST SENSOR

1. Turn ignition switch OFF.
2. Remove turbocharger boost sensor with its harness connector.
3. Install pressure pump (A) to turbocharger boost sensor (1).
   CAUTION:
   When insert a pressure pump hose to the sensor, be careful to the damage of the sensor housing.
4. Turn ignition switch ON.
5. Check the voltage between ECM harness connector terminals as per the following conditions.



NOTE:
- Always calibrate the pressure pump gauge when using it.
- Inspection should be done at room temperature [10 - 30°C (50 - 86°F)].

ECM			Condition [Pressure (Relative to atmospheric pressure)]	Voltage (Approx.)
Connector	+	–		
	Terminal			
F23	11	13	0 kPa (0 mbar, 0 mmHg, 0 inHg)	2.03 V
			40 kPa (400 mbar, 300 mmHg, 11.81 inHg)	2.67 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger boost sensor. Refer to EM-194, "Exploded View".

P0300, P0301, P0302, P0303, P0304 MISFIRE

DTC Logic

INFOID:0000000012198439

DTC DETECTION LOGIC

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the 1st trip, when a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
   If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0300	MULTI CYL MISFIRE (Multiple cylinder misfire detected)	Multiple cylinder misfire.	• Improper spark plug • Insufficient compression • Incorrect fuel pressure • Fuel Injector circuit is open or shorted • Fuel injector • Intake air leak • Ignition signal circuit is open or shorted • Lack of fuel • Signal plate • A/F sensor 1 • Incorrect PCV hose connection

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for following time.

About 15 minutes

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-942, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and drive the vehicle as per the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
   Hold the accelerator pedal as steady as possible.
   The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.
   CAUTION:
   Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).
	When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).

The time to driving varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-942, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198440

1.CHECK GROUND CONNECTION

Check the following.
- Connection condition of the ground F6 and F9
- Connection condition of the ground harness between engine assembly and vehicle body (If equipped)

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.
3. Check PCV hose connection.

Is intake air leak detected?

YES >> Discover air leak location and repair.
NO >> GO TO 3.

3.CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 4.
YES-2 >> Without CONSULT: GO TO 5.

NO >> Repair or replace it.

4. PERFORM POWER BALANCE TEST

With CONSULT
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Make sure that each circuit produces a momentary engine speed drop.

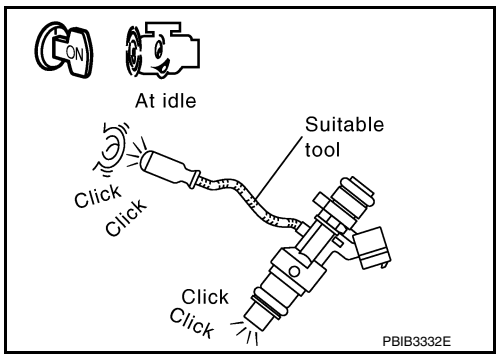
Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 5.

5. CHECK FUNCTION OF FUEL INJECTOR

1. Start engine and let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



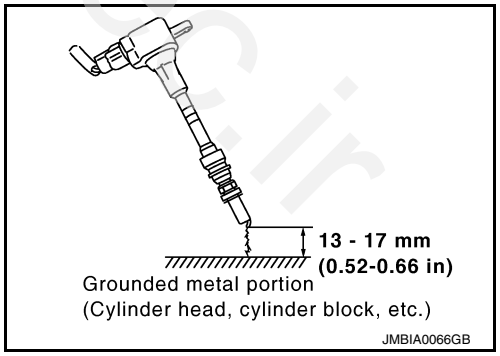
Is the inspection result normal?

YES >> GO TO 6.
NO >> Perform trouble diagnosis for FUEL INJECTOR. Refer to EC-1204, "Diagnosis Procedure".

6. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:
- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.**

NOTE:
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 10.

NO >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

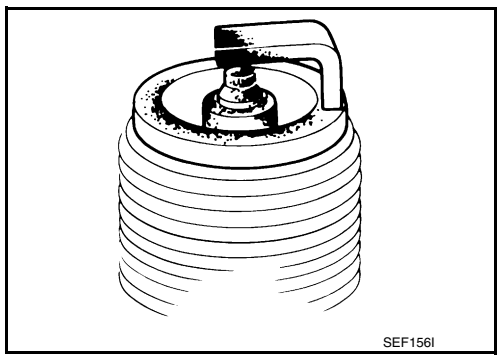
YES >> GO TO 8.
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-1229, "Diagnosis Procedure".

8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-190, "Inspection".
NO >> Repair or clean spark plug. Then GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace spark plug(s) with standard type one(s). For spark plug type. Refer to EM-214, "Removal and Installation".

10. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-182, "Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

11. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to EC-771, "Work Procedure".
3. Install fuel pressure gauge and check fuel pressure. Refer to EC-771, "Work Procedure".

At idling: Approximately 500 kPa (5.0 bar, 5.1 kg/cm^2, 73 psi)

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace “fuel filter and fuel pump assembly”. Refer to FL-6, "2WD : Exploded View" (2WD) or FL-10, "AWD : Exploded View" (AWD).
NO >> Repair or replace.

13. CHECK IGNITION TIMING

Check the following items.
For procedure, refer to EC-765, "Work Procedure".
For specification, refer to EC-1258, "Ignition Timing".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Follow the EC-765, "Work Procedure".

14. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

+		–		Continuity
A/F sensor 1		ECM		
Connector	Terminal	Connector	Terminal	
F72	1	F24	79	Existed

5. Check the continuity between A/F sensor 1 harness connector or ECM harness connector and ground.

+		–	Continuity
A/F sensor 1			
Connector	Terminal		
F72	1	Ground	Not existed

+		–	Continuity
ECM			
Connector	Terminal		
F24	79	Ground	Not existed

6. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 15.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK A/F SENSOR 1 HEATER

Check the A/F sensor 1 heater. Refer to EC-806, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace A/F sensor 1. Refer to EM-242, "Exploded View".

16. CHECK MASS AIR FLOW SENSOR

With CONSULT
1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Start engine and warm it up to normal operating temperature.
4. Connect CONSULT and select “DATA MONITOR” mode.
5. Select “MASS AIR FLOW SENSOR (Hz)” and check the indication.

Monitor item	Condition	Indication (Hz)
MASS AIR FLOW SENSOR (Hz)	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
	Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
	2,500 rpm (Engine is warmed-up to normal operating temperature.)	6,100 – 6,500 Hz
	Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency rise in response to engine being increased to about 4,000 rpm.

Without CONSULT
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 frequency between ECM harness connector terminals under the following conditions.

ECM			Condition	Frequency (Hz)
Connector	+	–		
	Terminal			
F23	37	42	Ignition switch ON (Engine stopped.)	Approx. 3,700 Hz
			Idle (Engine is warmed-up to normal operating temperature.)	5,100 – 5,500 Hz
			2,500 rpm (Engine is warmed-up to normal operating temperature.)	6,100 – 6,500 Hz
			Idle to about 4,000 rpm	5,100 – 5,500 to Approx. 7,000 Hz*

*: Check for linear frequency rise in response to engine being increased to about 4,000 rpm.

Is the inspection result normal?

YES >> GO TO 17.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-843, "DTC Logic".

17. CHECK SYMPTOM TABLE

Check items on the rough idle symptom in EC-1242, "Symptom Table".

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair or replace error-detected parts.

18. ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-658, "Diagnosis Description".

>> GO TO 19.

19. CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

>> INSPECTION END

P0327, P0328 KS

DTC Logic

INFOID:0000000012198441

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detected condition	Possible cause
P0327	KNOCK SEN/CIRC-B1 (Knock sensor circuit low input)	An excessively low voltage from the knock sensor is sent to ECM.	• Harness or connectors (Knock sensor circuit is open or shorted.) • Knock sensor
P0328	KNOCK SEN/CIRC-B1 (Knock sensor circuit high input)	An excessively high voltage from the knock sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and run it for at least 5 seconds at idle speed.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-947, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198442

1.CHECK KNOCK SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect knock sensor harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between knock sensor harness connector and ECM harness connector.

+		–		Continuity
Knock sensor		ECM		
Connector	Terminal	Connector	Terminal	
F12	2	F23	20	Existed

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between knock sensor harness connector and ECM harness connector.

+		–		Continuity
Knock sensor		ECM		
Connector	Terminal	Connector	Terminal	
F12	1	F23	15	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

3.CHECK KNOCK SENSOR

Check the knock sensor. Refer to EC-948, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace knock sensor. Refer to EM-286, "Exploded View".

Component Inspection

INFOID:0000000012198443

1.CHECK KNOCK SENSOR

1. Turn ignition switch OFF.
2. Disconnect knock sensor harness connector.
3. Check resistance between knock sensor terminals as per the following.
   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Knock sensor		Resistance
+	-	
Terminals		
1	2	Approx. 532 - 588 kΩ [at 20°C (68°F)]

CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace knock sensor. Refer to EM-286, "Exploded View".

P0335 CKP SENSOR (POS)

DTC Logic

INFOID:0000000012198444

DTC DETECTION LOGIC

NOTE:
If DTC P0340 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643.
Refer to EC-1060, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0335	CKP SEN/CIRCUIT [Crankshaft position sensor (POS) circuit]	• The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. • The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. • The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	• Harness or connectors [Crankshaft position sensor (POS) circuit is open or shorted.] • Crankshaft position sensor (POS) • Signal plate

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-949, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198445

1.CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch ON.
3. Check the voltage between CKP sensor (POS) harness connector and ground.

+		–	Voltage (Approx.)
CKP sensor (POS)			
Connector	Terminal		
F107	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

+		–		Continuity
CKP sensor (POS)		ECM		
Connector	Terminal	Connector	Terminal	
F107	3	F23	27	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK CKP SENSOR (POS) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

+		–		Continuity
CKP sensor (POS)		ECM		
Connector	Terminal	Connector	Terminal	
F107	2	F23	44	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT

1. Check the continuity between CKP sensor (POS) harness connector and ECM harness connector.

+		–		Continuity
CKP sensor (POS)		ECM		
Connector	Terminal	Connector	Terminal	
F107	1	F23	33	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK CRANKSHAFT POSITION SENSOR (POS)

Check the crankshaft position sensor (POS). Refer to EC-951, "Component Inspection".

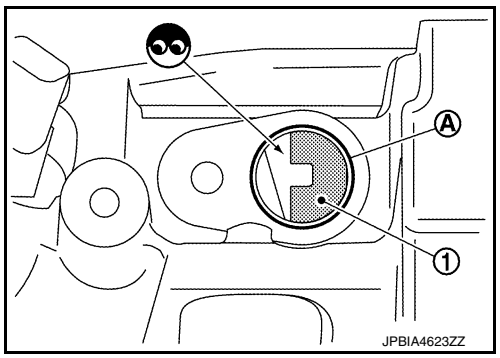
Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace crankshaft position sensor (POS). Refer to EM-286, "Exploded View".

6.CHECK GEAR TOOTH

1. Remove crankshaft position sensor (POS). Refer to EM-286, "Exploded View".

2. Look into the mounting hole (A) of the crankshaft position sensor (POS) to check that there is no missing gear tooth in the signal plate (1).



Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace the signal plate. Refer to EM-286, "Exploded View".

Component Inspection

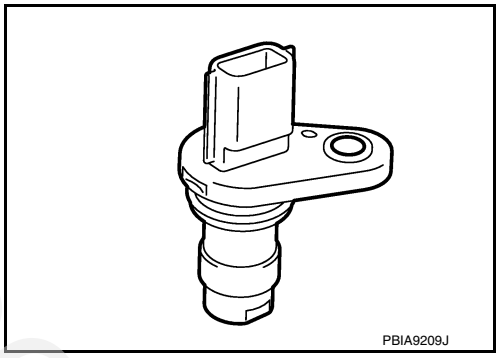
INFOID:0000000012198446

1. CHECK CRANKSHAFT POSITION SENSOR (POS)-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect crankshaft position sensor (POS) harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace crankshaft position sensor (POS). Refer to EM-286, "Exploded View".



2. CHECK CRANKSHAFT POSITION SENSOR (POS)-II

Check the resistance between crankshaft position sensor (POS) terminals as per the following.

Crankshaft position sensor (POS)		Resistance [at 25°C (77°F)]
+	–	
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace crankshaft position sensor (POS). Refer to EM-286, "Exploded View".

P0340 CMP SENSOR (PHASE)

DTC Logic

INFOID:0000000012198447

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0340	CMP SEN/CIRC-B1 [Camshaft position sensor (PHASE) circuit]	• The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. • The cylinder No. signal is not sent to ECM during engine running. • The cylinder No. signal is not in the normal pattern during engine running.	• Harness or connectors (Camshaft position sensor circuit is open or shorted) • Camshaft position sensor • Camshaft (Intake) • Starter motor • Starting system circuit • Dead (Weak) battery • Sensor power supply 2 circuit

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5 V with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-952, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-952, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198448

1.CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

YES >> GO TO 2.
NO >> Check starting system (Refer to EC-743, "Work Flow".).

2.CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY

1. Turn ignition switch OFF.

2. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between CMP sensor (PHASE) harness connector and ground.

+		–	Voltage (Approx.)
CMP sensor (PHASE)			
Connector	Terminal		
F109	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform EC-1240, "Diagnosis Procedure".

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

+		–		Continuity
CMP sensor (PHASE)		ECM		
Connector	Terminal	Connector	Terminal	
F109	2	F24	71	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between CMP sensor (PHASE) harness connector and ECM harness connector.

+		–		Continuity
CMP sensor (PHASE)		ECM		
Connector	Terminal	Connector	Terminal	
F109	3	F24	67	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Check the camshaft position sensor (PHASE). Refer to EC-954, "Component Inspection".

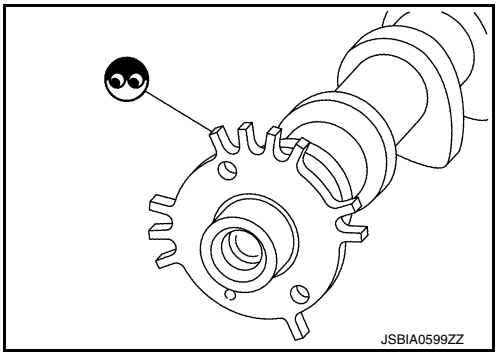
Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace camshaft position sensor (PHASE). Refer to EM-261, "Removal and Installation".

7. CHECK CAMSHAFT (INT)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".

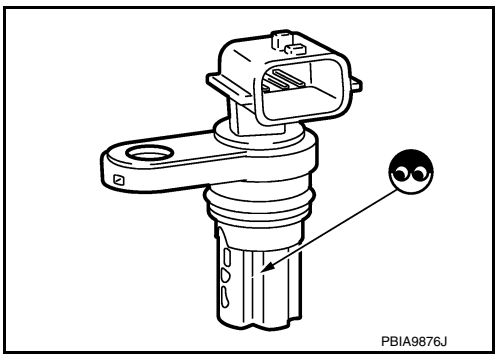
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-261, "Removal and Installation".

Component Inspection

INFOID:0000000012198449

1. CHECK CAMSHAFT POSITION SENSOR (PHASE)-I

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect camshaft position sensor (PHASE) harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.



Is the inspection result normal?

YES >> GO TO 2.

NO >> Replace camshaft position sensor (PHASE).

2. CHECK CAMSHAFT POSITION SENSOR (PHASE)-II

Check the resistance camshaft position sensor (PHASE) terminals as per the following.

Camshaft position sensor (PHASE)		Resistance [Ω at 25°C (77°F)]
+	−	
Terminals (Polarity)		
1	2	Except 0 or ∞
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace camshaft position sensor (PHASE). Refer to EM-261, "Removal and Installation".

P0365 EXHAUST VALVE TIMING CONTROL POSITION SENSOR

DTC Description

INFOID:0000000012198450

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition
P0365	CMP SEN/CIRC-B1 (Camshaft position sensor circuit bank 1)	• EVT control position sensor signal is not sent to ECM during engine cranking. • EVT control position sensor signal is not sent to ECM during engine running. • The pulse signal sent from the EVT control position sensor to ECM is not in the normal pattern during engine running.

Possible Cause

• Harness or connectors
- Exhaust valve timing control position sensor circuit is open or shorted.
- Sensor power supply 2 circuit is shorted.
• Exhaust valve timing control position sensor
• Exhaust camshaft
• Starter motor
• Starting circuit
• Battery deterioration
• Sensor power supply 1 circuit sensors

FAIL-SAFE

Engine operating condition in fail-safe mode	
Fail safe mode	Vehicle behavior
Device fix mode	• This mode fixes the IVT control solenoid valve and the EVT control solenoid valve in the reference position. • The intake manifold runner control valve motor is turned OFF (intake manifold runner control valve opens).

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5 V at idling.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Start engine and let it idle for at least 5 seconds.
   If engine does not start, crank engine for at least 2 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-956, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Keep the engine speed at more than 800 rpm for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-956, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-45, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000012198451

1.CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over? Does the starter motor operate?

YES >> GO TO 2.
NO >> Check starting system. Refer to EC-743, "Work Flow".

2.CHECK EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect exhaust valve timing (EVT) control position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVT control position sensor harness connector terminals.

EVT control position sensor			Voltage (Approx.)
Connector	+	–	
	Terminals		
F111	1	2	5 V

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 3.

3.CHECK EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT-2

Check the voltage between EVT control position sensor harness connector and ground.

+		–	Voltage (Approx.)
EVT control position sensor			
Connector	Terminal		
F111	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 4.

4.CHECK EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR POWER SUPPLY CIRCUIT-3

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVT control position sensor harness connector and ECM harness connector.

+		–		Continuity
EVT control position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F111	1	F24	73	Existed

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK SENSOR POWER SUPPLY 1 CIRCUIT

Refer to EC-1061, "Diagnosis Procedure".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning parts.

6. CHECK EVT CONTROL POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVT control position sensor harness connector and ECM harness connector.

+		–		Continuity
EVT control position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F111	2	F24	63	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

+		–	Continuity
ECM			
Connector	Terminal		
F23	9	Ground	Existed
	10		
	50		
F24	60		
	110		
E19	147		
	149		
	152		

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace error-detected parts.

8. CHECK EVT CONTROL POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between EVT control position sensor harness connector and ECM harness connector.

+		–		Continuity
EVT control position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F111	3	F24	69	Existed

2. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9.CHECK EVT CONTROL POSITION SENSOR

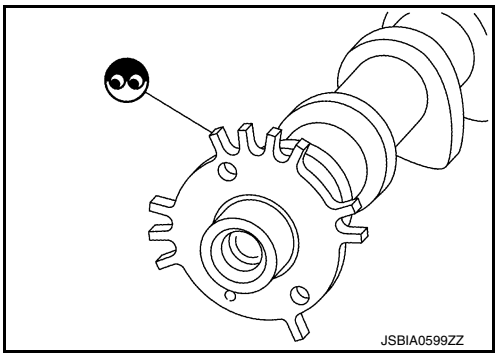
Refer to EC-958, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace EVT control position sensor. Refer to EM-248, "Exploded View".

10.CHECK CAMSHAFT (EXT)

Check the following.
- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end



Is the inspection result normal?

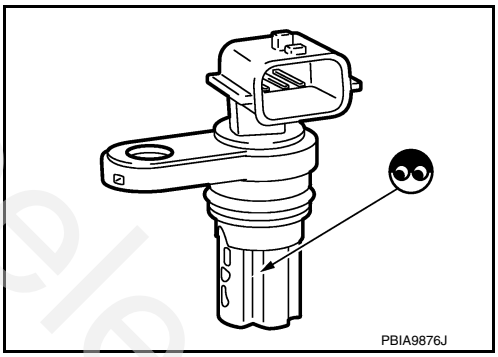
YES >> INSPECTION END
NO >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft. Refer to EM-261, "Removal and Installation".

Component Inspection

INFOID:0000000012198452

1.EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR-1

1. Turn ignition switch OFF.
2. Loosen the sensor mounting bolt.
3. Disconnect the EVT control position sensor harness connector.
4. Remove the EVT control position sensor.
5. Visually check the sensor for chipping.



Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace the EVT control position sensor. Refer to EM-248, "Exploded View".

2.EXHAUST VALVE TIMING (EVT) CONTROL POSITION SENSOR-2

Check resistance between EVT control position sensor terminals as shown below.

EVT control position sensor		Resistance
+	–	
Terminals		
1	2	Except 0 Ω [at 25°C (77°F)]
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace the EVT control position sensor. Refer to EM-248, "Exploded View".

P0401, P0402 EGR SYSTEM

DTC Logic

INFOID:0000000012198453

DTC DETECTION LOGIC

NOTE:

- If DTC P0404 is displayed with DTCs of mass air flow sensor, first perform trouble diagnosis for DTCs of mass air flow sensor. Refer to EC-843, "DTC Logic".
- If DTC P0404 is displayed with DTCs of EGR pressure sensor, first perform trouble diagnosis for DTCs of EGR pressure sensor. Refer to EC-1025, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0401	EGR A FLOW INSUFFICIENT (EGR A flow insufficient detected)	ECM detects that the difference between the differential pressure value (between before and behind the EGR volume control valve) calculated based on intake air amount and the estimated EGR pressure sensor output value is equal to or less than the specified lower limit value for 6 seconds.	• EGR cooler clogging • EGR pipe clogging • EGR pipe disconnection
P0402	EGRC-BPT VALVE (EGR A flow excessive detected)	ECM detects that the difference between the differential pressure value (between before and behind the EGR volume control valve) calculated based on intake air amount and the estimated EGR sensor output value is equal to or more than the specified upper limit value for 6 seconds.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle and accelerate from 50 km/h (32 MPH) to 80 km/h (50 MPH) within 15 seconds.
   CAUTION:
   Always drive at safe speed.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-959, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198454

1.CHECK EGR PASSAGE

Check the following for clogging and cracks.

- EGR tube
- EGR hose
- EGR cooler

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK EGR VOLUME CONTROL VALVE VISUALLY

1. Remove the EGR volume control valve.
2. Check if foreign matter is caught between the EGR volume control valve and the housing.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK EGR COOLER VISUALLY

1. Remove the EGR cooler.
2. Check if foreign matter is caught between the EGR cooler and the housing.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P0404 EGR VOLUME CONTROL VALVE

DTC Logic

INFOID:0000000012198455

DTC DETECTION LOGIC

NOTE:
If DTC P0404 is displayed with DTC P044A, or P044E, first perform trouble diagnosis for DTC P044A, or P044E. Refer to EC-993, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0404	EGR A CONTROL (EGR A control circuit range/ performance)	• ECM detects that the current sent to the EGR volume control valve motor is equal to or more than the threshold value for 2 seconds or more under the condition that the target angle of EGR volume control valve is constant. • ECM detects that the difference between the target angle of EGR volume control valve and actual valve angle is equal to or more than the threshold value for 5 seconds or more.	• EGR volume control valve • Foreigh objects interferes with EGR volume control valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine when the following conditions are met.

Intake air temperature	0°C (32°F) or more
Engine coolant temperature	75°C (167°F) or more

2. Drive the vehicle at 50 km/h (32 MPH) or more for at least 5 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-961, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198456

1.CHECK EGR VOLUME CONTROL VALVE

Check the EGR volume control valve. Refer to EC-961, "Component Inspection (EGR Volume Control Valve)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace EGR volume control valve. Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

Component Inspection (EGR Volume Control Valve)

INFOID:0000000012198457

1.CHECK EGR VOLUME CONTROL VALVE-1

With CONSULT
1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “EGR CONTROL VALVE”.
3. Operate “Up” or “Down”, set “EGR VALVE POSITION” to 0 deg, and check value “V1” of “EGR VALVE POSITION SEN”.

Does “V1” become 1.2±0.15 V?

YES >> GO TO 2.
NO >> Replace EGR volume control valve. Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

2.CHECK EGR VOLUME CONTROL VALVE-2

With CONSULT
1. Operate “Up” or “Down”, set “EGR VALVE POSITION” to 70 deg, and check value “V2” of “EGR VALVE POSITION SEN”.

Does “V2” become 4.0±0.15 V?

YES >> GO TO 3.
NO >> Replace EGR volume control valve. Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

3.CHECK EGR VOLUME CONTROL VALVE VISUALLY

1. Turn ignition switch OFF.
2. Check if any foreign objects interferes with EGR volume control valve.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace the error-detected parts.

P0407, P0408 EGR PRESSURE SENSOR

DTC Logic

INFOID:0000000012198458

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0407	EGR SENSOR B (EGR sensor B circuit low)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the EGR pressure sensor is 0.294 V or less.	• Harness or connectors (EGR pressure sensor circuit is open or shorted.) • EGR pressure sensor
P0408	EGR SENSOR B (EGR sensor B circuit high)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the EGR pressure sensor is 4.84 V or more.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more at ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-963, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198459

1.CHECK EGR PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EGR pressure sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EGR pressure sensor harness connector and ground.

+		−	Voltage (Approx.)
EGR pressure sensor			
Connector	Terminal		
F46	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 5.

2.CHECK EGR PRESSURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EGR pressure sensor harness connector and ECM harness connector.

+		–		
EGR pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F46	3	F23	43	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK EGR PRESSURE SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between EGR pressure sensor harness connector and ECM harness connector.

+		–		
EGR pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F46	2	F23	24	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK EGR PRESSURE SENSOR

Check the EGR pressure sensor. Refer to EC-1026, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace EGR pressure sensor.

5.CHECK EGR PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EGR pressure sensor harness connector and ECM harness connector.

+		–		
EGR pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F46	1	F23	30	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

Component Inspection (EGR pressure sensor)

INFOID:0000000012198460

1.CHECK EGR PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EGR pressure sensor hose (intake and exhaust).
3. Install pressure pump to EGR pressure sensor port (intake side).
4. Turn ignition switch ON and check output voltage between ECM connector terminals as follows.

EGR pressure sensor		Condition		Voltage
+	–			
Terminal				
2	3	Applied pressure kPa (kg/cm^2, PSI)	Not applied	1.0 V
			100 (1.02, 14.5)	4.5 V

CAUTION:

Never apply pressure over 150kPa (1.53 kg/cm^2, 21.75 PSI)

Is inspection result normal?

YES >> INSPECTION END

NO >> Replace EGR pressure sensor. Refer to FL-27, "2WD : Exploded View".

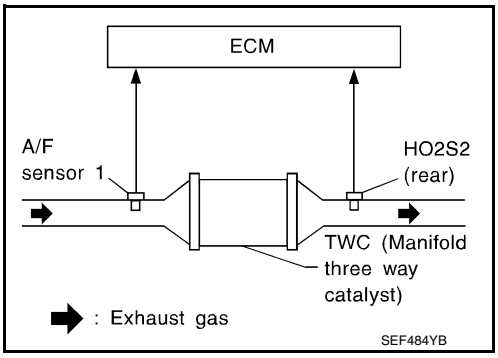
P0420 THREE WAY CATALYST FUNCTION

DTC Logic

INFOID:0000000012198467

DTC DETECTION LOGIC

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2.
A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.
When the frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0420	TW CATALYST SYS-B1 (Catalyst system efficiency below threshold)	• Three way catalyst (manifold) does not operate properly. • Three way catalyst (manifold) does not have enough oxygen storage capacity.	• Three way catalyst (manifold) • Exhaust tube • Intake air leaks • Fuel injector • Fuel injector leaks • Spark plug • Improper ignition timing

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

Will CONSULT be used?

YES >> GO TO 2.
NO >> GO TO 6.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT
TESTING CONDITION:
Do not hold engine speed for more than the specified minutes below.
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
6. Let engine idle for 1 minute.
7. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
8. Check that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).
9. Open engine hood.
10. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode of “ENGINE” using CONSULT.
11. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.

12. Check the indication of “CATALYST”.

Which is displayed on CONSULT screen?

CMPLT >> GO TO 5.
INCMP >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-II

1. Wait 5 seconds at idle.
2. Rev engine up to 2,000 to 3,000 rpm and maintain it until “INCMP” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes).

Does the indication change to “CMPLT”?

YES >> GO TO 5.
NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

1. Stop engine and cool it down to less than 70°C (158°F).
2. Perform DTC confirmation procedure again.

>> GO TO 2.

5. PERFORM DTC CONFIRMATION PROCEDURE-III

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-968, "Diagnosis Procedure".
NO >> INSPECTION END

6. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-967, "Component Function Check".

NOTE:
Use component function check to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-968, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012198468

1. PERFORM COMPONENT FUNCTION CHECK

Without CONSULT

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.
6. Check the voltage between ECM harness connector terminals as per the following condition.

ECM			Condition	Voltage (V)
Connector	+	–		
	Terminal			
F24	84	78	Keeping engine speed at 2500 rpm constant under no load	The voltage fluctuation cycle takes more than 5 seconds. • 1 cycle: 0.6 - 1.0 → 0 - 0.3 → 0.6 - 1.0

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-968, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198469

1.CHECK EXHAUST SYSTEM

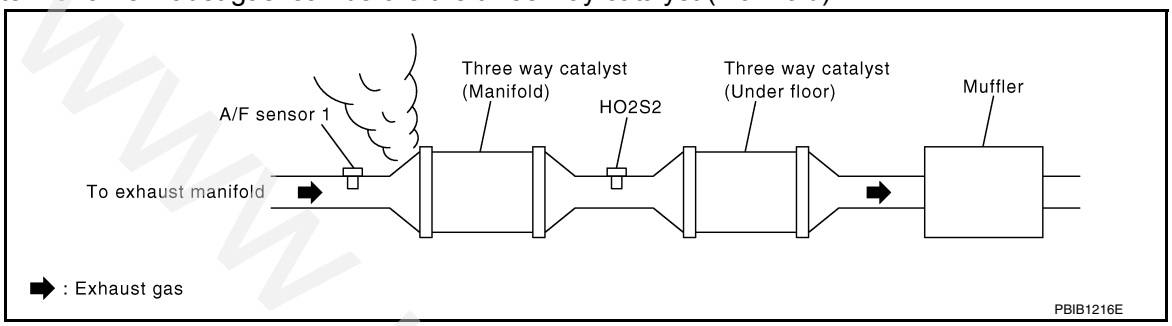
Visually check exhaust tubes and muffler for dent.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (manifold).



Is exhaust gas leak detected?

YES >> Repair or replace error-detected parts.
NO >> GO TO 3.

3.CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

Is intake air leak detected?

YES >> Repair or replace error-detected parts.
NO >> GO TO 4.

4.CHECK IGNITION TIMING AND IDLE SPEED

Check the following items. Refer to EC-765, "Work Procedure".
For specification, refer to EC-1258, "Ignition Timing"
For specification, refer to EC-1258, "Idle Speed".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Follow the EC-765, "Work Procedure".

5.CHECK FUEL INJECTOR

Check the fuel injector. Refer to EC-1204, "Component Function Check".

Is the inspection result normal?

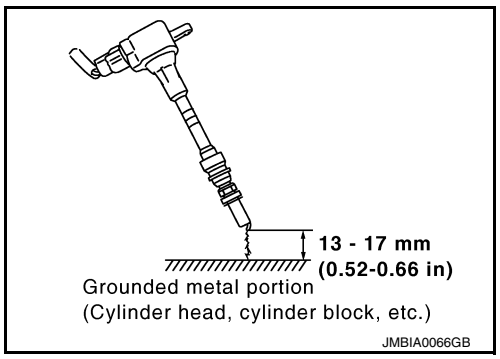
YES >> GO TO 6.
NO >> Perform EC-1204, "Diagnosis Procedure".

6.CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.

8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about 3 seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50 cm (19.7 in). Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.**

NOTE:

When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

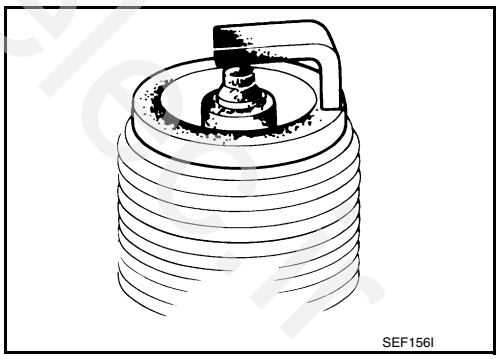
Spark should be generated.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-1229, "Diagnosis Procedure".

8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc. Refer to EM-190, "Inspection".



Is the inspection result normal?

YES >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-190, "Inspection".
NO >> Repair or clean spark plug. Refer to EM-189, "Exploded View". Then GO TO 9.

9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-189, "Removal and Installation".

10. PERFORM DTC CONFIRMATION PROCEDURE

1. Replace three way catalyst assembly. Refer to EX-5, "Exploded View".
2. Perform DTC confirmation procedure. Refer to EC-966, "DTC Logic".

Is DTC P0420 detected again?

YES >> Replace fuel injector. Refer to EM-208, "Exploded View".
NO >> INSPECTION END

P0441 EVAP CONTROL SYSTEM

DTC Logic

INFOID:0000000012198470

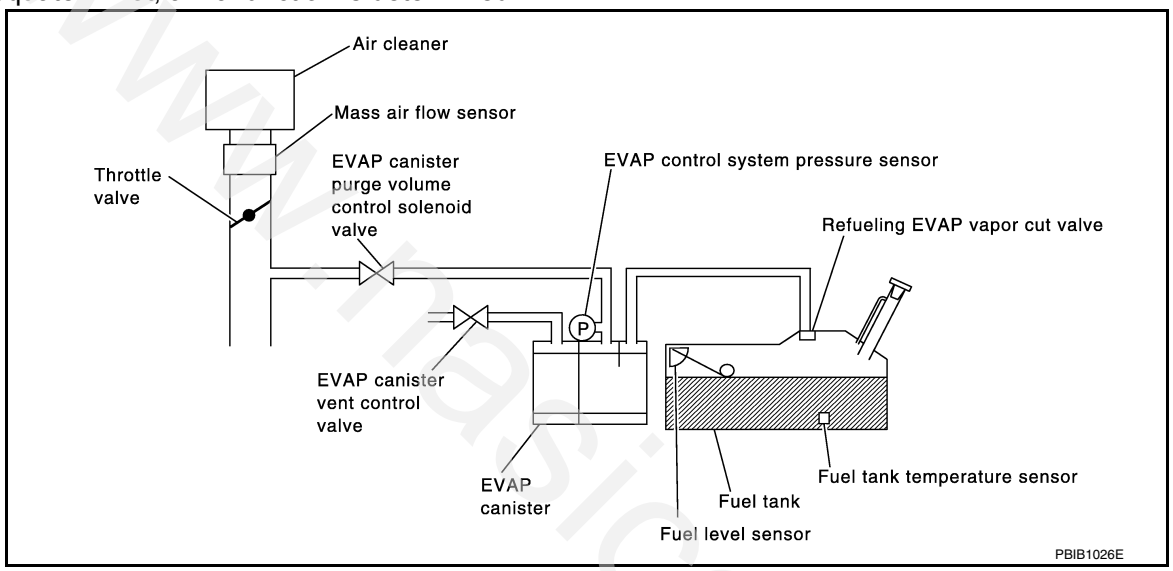
DTC DETECTION LOGIC

NOTE:

If DTC P0441 is displayed with other DTC such as P2122, P2123, P2127, P2128 or P2138, first perform trouble diagnosis for other DTC.

In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a malfunction is determined.



DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0441	EVAP PURG FLOW/MON (Evaporative emission system incorrect purge flow)	EVAP control system does not operate properly, EVAP control system has a leakage between intake manifold and EVAP control system pressure sensor.	• EVAP canister purge volume control solenoid valve stuck closed • EVAP control system pressure sensor and the circuit • Loose, disconnected or improper connection of rubber tube • Blocked rubber tube • Cracked EVAP canister • EVAP canister purge volume control solenoid valve circuit • Accelerator pedal position sensor • Blocked purge port • Blocked purge line • EVAP canister vent control valve • EVAP control system pressure sensor removed

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Will CONSULT be used?

Will CONSULT be used?

YES >> GO TO 2.
NO >> GO TO 6.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and let it idle for at least 70 seconds.
6. Select “PURG FLOW P0441” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT.
7. Touch “START”.

Is “COMPLETED” displayed on CONSULT screen?

YES >> GO TO 5.
NO >> GO TO 4.

4. PERFORM DTC CONFIRMATION PROCEDURE-II

When the following conditions are met, “TESTING” will be displayed on the CONSULT screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 35 seconds.)

Selector lever	Suitable position
VHCL SPEED SE	32 - 120 km/h (20 - 75 mph)
ENG SPEED	500 - 3,000 rpm
B/FUEL SCHDL	1.25 - 6.5 msec
COOLANT TEMP/S	More than 0°C (32°F)

CAUTION:
Always drive vehicle at a safe speed.
If “TESTING” does not change for a long time, retry from step 2.

Is “COMPLETED” displayed on CONSULT screen?

YES >> GO TO 5.
NO >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 3.

5. PERFORM DTC CONFIRMATION PROCEDURE-III

Touch “SELF-DIAG RESULTS”.

Which is displayed on CONSULT screen?

OK >> INSPECTION END
NG >> Proceed to EC-973, "Diagnosis Procedure".

6. PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-973, "Component Function Check".

NOTE:
Use component function check to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-973, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012198471

1.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT

1. Lift up drive wheels.
2. Start engine (VDC switch OFF) and warm it up to normal operating temperature.
3. Turn ignition switch OFF, wait at least 10 seconds.
4. Turn ignition switch ON.
5. Turn ignition switch OFF, wait at least 10 seconds.
6. Start engine and wait at least 70 seconds.
7. Set voltmeter probes to ECM harness connector terminals under the following conditions.

ECM		
Connector	+	–
	Terminal	
E19	121	148

8. Check EVAP control system pressure sensor value at idle speed and note it.
9. Establish and maintain the following conditions for at least 1 minute.

Air conditioner switch	ON
Head lamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Gear position	Any position other than P, N or R

10. Verify that EVAP control system pressure sensor value stays 0.1 V less than the value at idle speed (measured at step 6) for at least 1 second.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-973, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198472

1.CHECK EVAP CANISTER

1. Turn ignition switch OFF.
2. Check EVAP canister for cracks.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 2.
YES-2 >> Without CONSULT: GO TO 3.
NO >> Replace EVAP canister. Refer to FL-27, "2WD : Removal and Installation" (2WD models), FL-30, "AWD : Removal and Installation" (AWD models).

2.CHECK PURGE FLOW

With CONSULT

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to EC-650, "EVAPORATIVE EMISSION SYSTEM : System Description".
2. Start engine and let it idle.
3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT.
4. Touch “Qd” and “Qu” on CONSULT screen to adjust “PURG VOL CONT/V” opening and check vacuum existence.

PURG VOL CONT/V	Vacuum
100%	Existed
0%	Not existed

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 4.

3.CHECK PURGE FLOW

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to EC-650, "EVAPORATIVE EMISSION SYSTEM : System Description".
4. Start engine and let it idle.
   Do not depress accelerator pedal even slightly.
5. Check vacuum gauge indication before 60 seconds pass after starting engine.

   Vacuum should not exist.

6. Rev engine up to 2,000 rpm after 100 seconds pass after starting engine.

   Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 4.

4.CHECK EVAP PURGE LINE

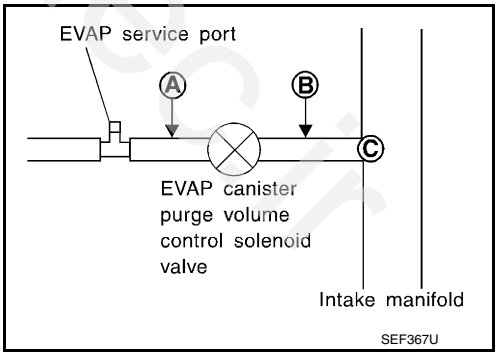
1. Turn ignition switch OFF.
2. Check EVAP purge line for improper connection or disconnection.
   Refer to EC-1252, "Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair EVAP purge line.

5.CHECK EVAP PURGE HOSE AND PURGE PORT

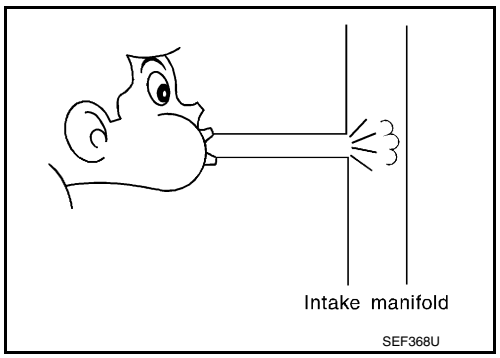
1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B**.
2. Blow air into each hose and EVAP purge port **C**.



3. Check that air flows freely.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 6.
YES-2 >> Without CONSULT: GO TO 7.
NO >> Repair or clean hoses and/or purge port.



6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT

1. Start engine.
2. Perform “PURG VOL C/V” in “ACTIVE TEST” mode with CONSULT. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 8.
NO >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Check EVAP canister purge volume control solenoid valve. Refer to EC-980, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check that water is not inside connectors.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Removal and Installation" (2WD models), FL-30, "AWD : Removal and Installation" (AWD models).

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Check EVAP control system pressure sensor function. Refer to EC-1005, "DTC Logic" for DTC P0452, EC-1008, "DTC Logic" for DTC P0453.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Removal and Installation" (2WD models), FL-30, "AWD : Removal and Installation" (AWD models).

10. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Clean the rubber tube using an air blower.

11. CHECK EVAP CANISTER VENT CONTROL VALVE

Check EVAP canister vent control valve. Refer to EC-986, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Replace EVAP canister vent control valve. Refer to FL-27, "2WD : Removal and Installation" (2WD models), FL-30, "AWD : Removal and Installation" (AWD models).

12. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leakage.
Refer to EC-650, "EVAPORATIVE EMISSION SYSTEM : System Description".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair EVAP purge line.

13. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> Check intermittent incident. Refer to GI-45, "Intermittent Incident".

P0443 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000012198473

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition		Possible cause
P0443	PURG VOLUME CONT/V (Evaporative emission system purge control valve circuit)	A	The canister purge flow is detected during the vehicle is stopped while the engine is running, even when EVAP canister purge volume control solenoid valve is completely closed.	• EVAP control system pressure sensor • EVAP canister purge volume control solenoid valve (The valve is stuck open.) • EVAP canister vent control valve • EVAP canister • Hoses (Hoses are connected incorrectly or clogged.)
		B	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	

DTC CONFIRMATION PROCEDURE

1. PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- **Perform “DTC CONFIRMATION PROCEDURE” when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 5 to 60°C (41 to 140°F).**
- **Cool the vehicle so that engine coolant temperature becomes same level as ambient temperature.**

Do you have CONSULT

YES >> GO TO 2.
NO >> GO TO 4.

2. PERFORM DTC CONFIRMATION PROCEDURE A

With CONSULT

1. Turn ignition switch ON.
2. Check that the following condition are met.
   FUEL T/TMP SE: 0 - 35°C (32 - 95°F)
3. Start engine and wait at least 60 seconds.
4. Check 1st trip DTC.

IS 1st trip DTC detected?

YES >> Proceed to EC-978, "Diagnosis Procedure".
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE B

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “PURG VOL CN/V P1444” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT.
5. Touch “START”.
6. Start engine and let it idle until “TESTING” on CONSULT changes to “COMPLETED”. (It will take approximately 10 seconds.)
   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7. Touch “SELF-DIAG RESULTS”.

Which is displayed on CONSULT screen?

YES >> INSPECTION END
NO >> Proceed to EC-978, "Diagnosis Procedure".

4. PERFORM DTC CONFIRMATION PROCEDURE A

With GST

1. Turn ignition switch ON.
2. Set voltmeter probes to ECM harness connector terminals.

ECM			Voltage (V)
Connector	+	–	
	Terminal		
E19	128	148	3.1 - 4.0

3. Start engine and wait at least 60 seconds.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-978, "Diagnosis Procedure".
NO >> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE B

With GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and let it idle for at least 20 seconds.
6. Check 1st trip DTC.

Is 1st trip DTC displayed?

YES >> Proceed to EC-978, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198474

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

EVAP canister purge volume control solenoid valve		Ground	Voltage
Connector	Terminal		
F106	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform the trouble diagnosis for power supply circuit.

2. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F106	2	F24	115	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check that water is not inside connectors.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Removal and Installation" (2WD models), FL-30, "AWD : Removal and Installation" (AWD models).

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check EVAP control system pressure sensor. Refer to EC-1004, "Component Inspection".

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 5.
YES-2 >> Without CONSULT: GO TO 6.
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Removal and Installation" (2WD models), FL-30, "AWD : Removal and Installation" (AWD models).

5.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Start engine.
4. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> GO TO 7.
NO >> GO TO 6.

6.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Check EVAP canister purge volume control solenoid valve. Refer to EC-980, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

7.CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Clean the rubber tube using an air blower.

8.CHECK EVAP CANISTER VENT CONTROL VALVE

Check EVAP canister vent control valve. Refer to EC-986, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 9.

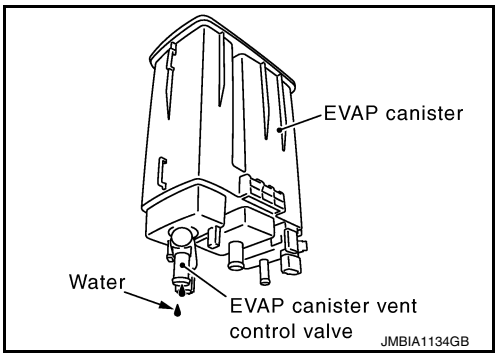
NO >> Replace EVAP canister vent control valve. Refer to FL-27, "2WD : Removal and Installation" (2WD models), FL-30, "AWD : Removal and Installation" (AWD models).

9.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. Refer to FL-27, "2WD : Removal and Installation" (2WD models), FL-30, "AWD : Removal and Installation" (AWD models).

Does water drain from the EVAP canister?

YES >> GO TO 10.
NO >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".



10.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 11.

11.DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-27, "2WD : Removal and Installation" (2WD models), FL-30, "AWD : Removal and Installation" (AWD models).

Component Inspection

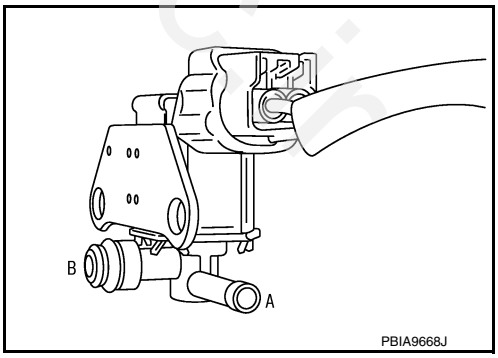
INFOID:0000000012198475

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Start engine.
5. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT.
6. Touch “Qd” and “Qu” on CONSULT screen to adjust “PURG VOL CONT/V” opening and check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition (PURG VOL CONT/V value)	Air passage continuity between Ⓐ and Ⓑ
100%	Existed
0%	Not existed

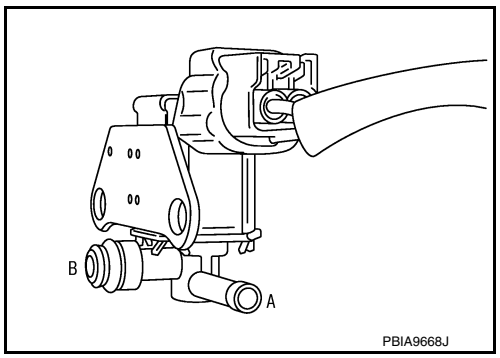


Without CONSULT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.

4. Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between Ⓐ and Ⓑ
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000012198476

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0444	PURG VOLUME CONT/V (EVAP canister purge volume control solenoid valve circuit open)	An excessively low voltage signal is sent to ECM through the EVAP canister purge volume control solenoid valve.	• Harness or connectors (EVAP canister purge volume control solenoid valve circuit is open or shorted.) • EVAP canister purge volume control solenoid valve
P0445	PURG VOLUME CONT/V (Evaporative emission system purge control valve circuit shorted)	An excessively high voltage signal is sent to ECM through the EVAP canister purge volume control solenoid valve.	• Harness or connectors (EVAP canister purge volume control solenoid valve circuit is shorted.) • EVAP canister purge volume control solenoid valve

DTC CONFIRMATION PROCEDURE

1.CONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 13 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-982, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198477

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

+		−	Voltage
EVAP canister purge volume control solenoid valve			
Connector	Terminal		
F106	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.

NO >> GO TO 2.

2. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and IPDM E/R harness connector.

+		–		Continuity
EVAP canister purge volume control solenoid valve		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F106	1	E14	35	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 4.
YES-2 >> Without CONSULT: GO TO 5.
NO >> Repair or replace error-detected parts.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

+		–		Continuity
EVAP canister purge volume control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F106	2	F24	115	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 4.
YES-2 >> Without CONSULT: GO TO 5.
NO >> Repair or replace error-detected parts.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT
1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
4. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 5.

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Check the EVAP canister purge volume control solenoid valve. Refer to EC-984, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

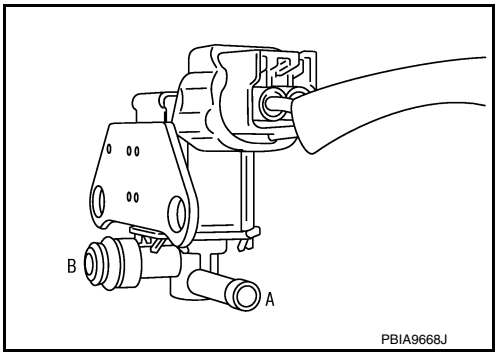
Component Inspection

INFOID:0000000012198478

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT

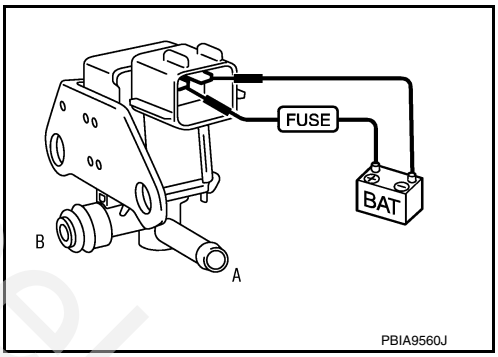
1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Start engine.
5. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
6. Touch “Qd” and “Qu” on CONSULT screen to adjust “PURG VOL C/V” opening and check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.



Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed

Without CONSULT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.



Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

P0447 EVAP CANISTER VENT CONTROL VALVE

DTC Logic

INFOID:0000000012198479

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0447	VENT CONTROL VALVE (Evaporative emission system vent control circuit open)	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	• Harness or connectors (The valve circuit is open or shorted.) • EVAP canister vent control valve • Hoses (Hoses are connected incorrectly or clogged.)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 8 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-985, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198480

1.INSPECTION START

Will CONSULT be used?

Will CONSULT be used?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

With CONSULT

1. Turn ignition switch OFF and then ON.
2. Select “VENT CONTROL/V” in “ACTIVE TEST” mode with CONSULT.
3. Touch “ON/OFF” on CONSULT screen.
4. Check for operating sound of the valve.

Clicking sound should be heard.

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 3.

3.CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EVAP canister vent control valve harness connector.

3. Turn ignition switch ON.
4. Check the voltage between EVAP canister vent control valve harness connector and ground.

EVAP canister vent control valve		Ground	Voltage
Connector	Terminal		
B21	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform the trouble diagnosis for power supply circuit.

4. CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and EVAP canister vent control valve harness connector.
   Refer to Wiring Diagram.

EVAP canister vent control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B21	2	E19	141	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 RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Clean the rubber tube using an air blower.

6. CHECK EVAP CANISTER VENT CONTROL VALVE

Check EVAP canister vent control valve. Refer to EC-986, "Component Inspection".

Is the inspection result normal?

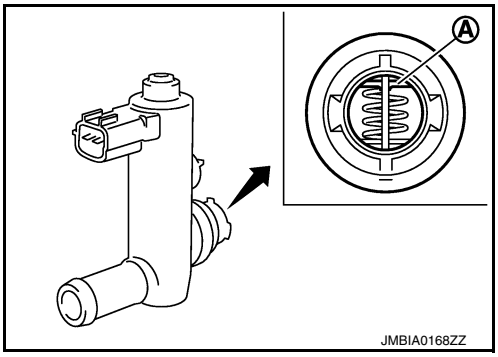
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace EVAP canister vent control valve. Refer to FL-27, "2WD : Removal and Installation" (2WD models), FL-30, "AWD : Removal and Installation" (AWD models).

Component Inspection

INFOID:0000000012198481

1. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister. Refer to FL-27, "2WD : Removal and Installation"(2WD) or FL-30, "AWD : Removal and Installation"(AWD).
2. Check portion Ⓐ of EVAP canister vent control valve for rust.



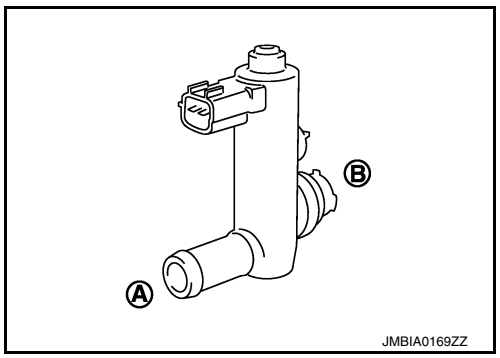
Is it rusted?

YES >> Replace EVAP canister vent control valve. Refer to FL-27, "2WD : Removal and Installation"(2WD) or FL-30, "AWD : Removal and Installation"(AWD).
NO >> GO TO 2.

2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time.
   Check that new O-ring is installed properly.



Condition VENT CONTROL/V	Air passage continuity between Ⓐ and Ⓑ
ON	Not existed
OFF	Existed

Operation takes less than 1 second.

Without CONSULT

1. Disconnect EVAP canister vent control valve harness connector.
2. Check air passage continuity and operation delay time under the following conditions.

Check that new O-ring is installed properly.

Condition	Air passage continuity between Ⓐ and Ⓑ
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

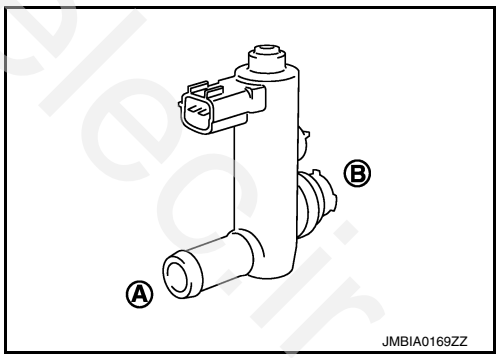
Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3. CHECK EVAP CANISTER VENT CONTROL VALVE-III

With CONSULT

1. Clean the air passage [portion Ⓐ to Ⓑ] of EVAP canister vent control valve using an air blower.
2. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
3. Check air passage continuity and operation delay time.
   Check that new O-ring is installed properly.



Condition VENT CONTROL/V	Air passage continuity between Ⓐ and Ⓑ
ON	No
OFF	Yes

Operation takes less than 1 second.

Without CONSULT

1. Clean the air passage [portion Ⓐ to Ⓑ] of EVAP canister vent control valve using an air blower.
2. Check air passage continuity and operation delay time under the following conditions.
   Check that new O-ring is installed properly.

Condition	Air passage continuity between Ⓐ and Ⓑ
12 V direct current supply between terminals (1) and (2)	No
OFF	Yes

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP canister vent control valve. Refer to FL-27, "2WD : Removal and Installation"(2WD) or FL-30, "AWD : Removal and Installation"(AWD).

P0448 EVAP CANISTER VENT CONTROL VALVE

DTC Logic

INFOID:0000000012198482

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0448	VENT CONTROL VALVE (Evaporative emission system vent control circuit shorted)	EVAP canister vent control valve remains closed under specified driving conditions.	• EVAP canister vent control valve • EVAP control system pressure sensor and the circuit • Blocked rubber tube to EVAP canister vent control valve • EVAP canister is saturated with water

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT.
4. Start engine and let it idle for at least 1 minute.
5. Repeat next procedures 3 times.

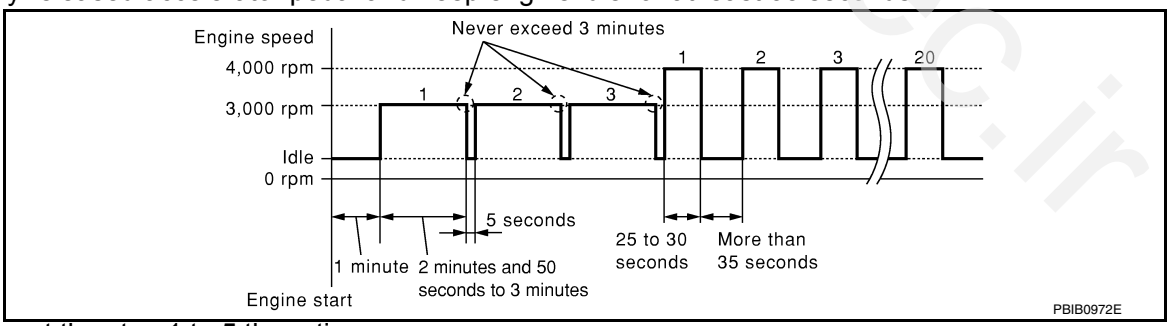
- Increase the engine speed up to 3,000 to 3,500 rpm and keep it for 2 minutes and 50 seconds to 3 minutes.

Never exceed 3 minutes.

- Fully released accelerator pedal and keep engine idle for about 5 seconds.

6. Repeat next procedure 20 times.

- Quickly increase the engine speed up to 4,000 to 4,500 rpm or more and keep it for 25 to 30 seconds.
- Fully released accelerator pedal and keep engine idle for at least 35 seconds.



7. Repeat the step 1 to 5 three times.

NOTE:

Before starting another cycle, relief the fuel tank negative pressure with removing and refitting the fuel filler cap.

8. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-990, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198483

1.CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Disconnect rubber tube connected to EVAP canister vent control valve.
3. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Clean rubber tube using an air blower.

2.CHECK EVAP CANISTER VENT CONTROL VALVE

Check EVAP canister vent control valve. Refer to EC-991, "Component Inspection".

Is he inspection result normal?

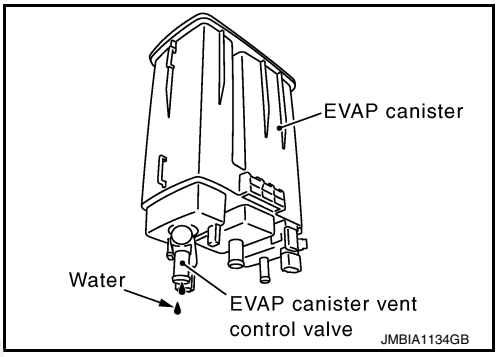
YES >> GO TO 3.
NO >> Replace EVAP canister vent control valve. Refer to FL-27, "2WD : Removal and Installation"(2WD) or FL-30, "AWD : Removal and Installation"(AWD).

3.CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. Refer to FL-27, "2WD : Removal and Installation"(2WD) or FL-30, "AWD : Removal and Installation"(AWD).
2. Check if water will drain from the EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 4.
NO >> GO TO 6.



4.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-27, "2WD : Removal and Installation"(2WD) or FL-30, "AWD : Removal and Installation"(AWD).

6.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check that water is not inside connectors.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Removal and Installation"(2WD) or FL-30, "AWD : Removal and Installation"(AWD).

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check EVAP control system pressure sensor. Refer to EC-1004, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Removal and Installation"(2WD) or FL-30, "AWD : Removal and Installation"(AWD).

Component Inspection

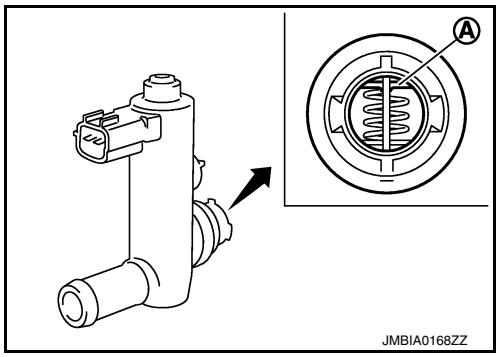
INFOID:0000000012198484

1. CHECK EVAP CANISTER VENT CONTROL VALVE-I

1. Remove EVAP canister vent control valve from EVAP canister. Refer to FL-27, "2WD : Removal and Installation"(2WD) or FL-30, "AWD : Removal and Installation"(AWD).
2. Check portion Ⓐ of EVAP canister vent control valve for rust.

Is it rusted?

YES >> Replace EVAP canister vent control valve. Refer to FL-27, "2WD : Removal and Installation"(2WD) or FL-30, "AWD : Removal and Installation"(AWD).
NO >> GO TO 2.



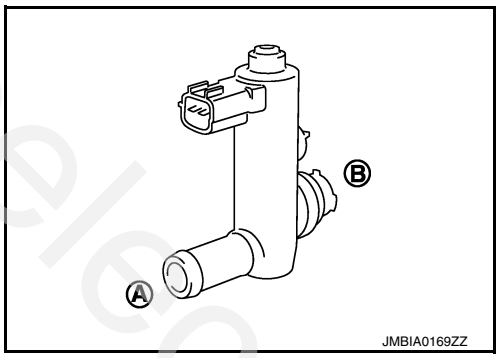
2. CHECK EVAP CANISTER VENT CONTROL VALVE-II

With CONSULT

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time.
   Check that new O-ring is installed properly.

Condition VENT CONTROL/V	Air passage continuity between Ⓐ and Ⓑ
ON	Not existed
OFF	Existed

Operation takes less than 1 second.



Without CONSULT

1. Disconnect EVAP canister vent control valve harness connector.
2. Check air passage continuity and operation delay time under the following conditions.

Check that new O-ring is installed properly.

Condition	Air passage continuity between Ⓐ and Ⓑ
12 V direct current supply between terminals 1 and 2	Not existed
OFF	Existed

Operation takes less than 1 second.

Is the inspection result normal?

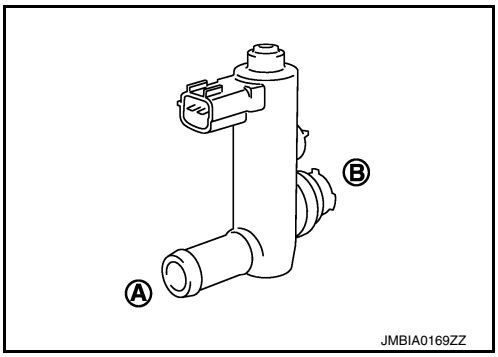
YES >> INSPECTION END
NO >> GO TO 3.

3. CHECK EVAP CANISTER VENT CONTROL VALVE-III

With CONSULT

1. Clean the air passage [portion Ⓐ to Ⓑ] of EVAP canister vent control valve using an air blower.

2. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
3. Check air passage continuity and operation delay time.
Check that new O-ring is installed properly.



Condition VENT CONTROL/V	Air passage continuity between Ⓐ and Ⓑ
ON	No
OFF	Yes

Operation takes less than 1 second.

Without CONSULT

1. Clean the air passage [portion Ⓐ to Ⓑ] of EVAP canister vent control valve using an air blower.
2. Check air passage continuity and operation delay time under the following conditions.
Check that new O-ring is installed properly.

Condition	Air passage continuity between Ⓐ and Ⓑ
12 V direct current supply between terminals (1) and (2)	No
OFF	Yes

Operation takes less than 1 second.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP canister vent control valve. Refer to FL-27, "2WD : Removal and Installation"(2WD) or FL-30, "AWD : Removal and Installation"(AWD).

P044A, P044E EGR VOLUME CONTROL VALVE POSITION SENSOR

DTC Logic

INFOID:0000000012198485

DTC DETECTION LOGIC

NOTE:
If DTC P044A, or P044E is displayed with DTC P0643, first perform trouble diagnosis for DTC P0643. Refer to EC-1060, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P044A	EGR SENSOR C (EGR sensor C circuit low)	ECM detects that a voltage signal from EGR volume control valve position sensor is less than 4.81 V for 5 consecutive seconds.	• Harness or connectors (EGR volume control valve position sensor circuit is open or shorted.) • EGR volume control valve
P044E	EGR SENSOR C (EGR sensor C circuit high)	ECM detects that a voltage signal from EGR volume control valve position sensor is less than 0.275 V for 5 consecutive seconds.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-993, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198486

1.CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Turn ignition switch ON.
4. Check voltage between EGR volume control valve harness connector and ground.

+		–	Voltage (Approx.)
EGR volume control valve			
Connector	Terminal		
F74	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EGR volume control valve harness connector and ECM harness connector.

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F74	5	F23	43	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check harness continuity between EGR volume control valve harness connector and ECM harness connector.

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F74	4	F24	68	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK EGR VOLUME CONTROL VALVE

Check the EGR volume control valve. Refer to EC-961, "Component Inspection (EGR Volume Control Valve)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace EGR volume control valve. Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

Component Inspection (EGR Volume Control Valve)

INFOID:0000000012198487

1.CHECK EGR VOLUME CONTROL VALVE-1

With CONSULT
1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “EGR CONTROL VALVE”.
3. Operate “Up” or “Down”, set “EGR VALVE POSITION” to 0 deg, and check value “V1” of “EGR VALVE POSITION SEN”.

Does “V1” become 1.2±0.15 V?

YES >> GO TO 2.
NO >> Replace EGR volume control valve. Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

2.CHECK EGR VOLUME CONTROL VALVE-2

With CONSULT
1. Operate “Up” or “Down”, set “EGR VALVE POSITION” to 70 deg, and check value “V2” of “EGR VALVE POSITION SEN”.

Does “V2” become 4.0±0.15 V?

YES >> GO TO 3.
NO >> Replace EGR volume control valve. Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

3.CHECK EGR VOLUME CONTROL VALVE VISUALLY

1. Turn ignition switch OFF.
2. Check if any foreign objects interferes with EGR volume control valve.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Repair or replace the error-detected parts.

P044B EXHAUST GAS RECIRCULATION SYSTEM

DTC Logic

INFOID:0000000012198488

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P044B	EGR SENSOR C (EGR sensor C circuit range/ performance)	ECM detects the following status continuously for 0.5 seconds or more: A voltage signal transmitted from the EGR volume control valve position sensor is between 0.32 V and 1.08 V under the following conditions: • After the ignition switch is turned OFF and the engine is stopped by “Self Shut-OFF”. This diagnosis works only when the ignition switch is turned OFF and the engine is stopped by “Self Shut-OFF”. • Engine coolant temperature: 65°C (149°F) or more • Intake air temperature: 5°C (41°F) or more	• EGR volume control valve is stuck • EGR volume control valve is jammed with foreign objects • Improper specification of EGR volume control valve position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more at ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT.
3. Check that “COOLANT TEMP/S” indicates 65°C (149°F) or more.
4. Check that “INT/A TEMP SE” indicates 5°C (41°F) or more.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-996, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198489

1.CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Turn ignition switch ON.
4. Check voltage between EGR volume control valve harness connector and ground.

+		−	Voltage (Approx.)
EGR volume control valve			
Connector	Terminal		
F74	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 5.

2. CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EGR volume control valve harness connector and ECM harness connector.

+		–		Continuity
EGR volume control valve		ECM		
Connector	Terminal	Connector	Terminal	
F74	5	F23	43	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3. CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check harness continuity between EGR volume control valve harness connector and ECM harness connector.

+		–		Continuity
EGR volume control valve		ECM		
Connector	Terminal	Connector	Terminal	
F74	4	F24	68	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK EGR VOLUME CONTROL VALVE

Check the EGR volume control valve. Refer to EC-961, "Component Inspection (EGR Volume Control Valve)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace EGR volume control valve. Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

5. CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

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.

+		–		Continuity
EGR volume control valve		ECM		
Connector	Terminal	Connector	Terminal	
F74	3	F23	30	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to EC-792, "Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

Component Inspection (EGR Volume Control Valve)

INFOID:0000000012198490

1. CHECK EGR VOLUME CONTROL VALVE-1

With CONSULT

1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “EGR CONTROL VALVE”.
3. Operate “Up” or “Down”, set “EGR VALVE POSITION” to 0 deg, and check value of “EGR VALVE POSITION SEN”.

Does value become 1.2±0.15 V?

YES >> GO TO 2.
NO >> Replace EGR volume control valve. Refer to EM-239, "Removal and Installation".

2. CHECK EGR VOLUME CONTROL VALVE-2

With CONSULT

1. Operate “Up” or “Down”, set “EGR VALVE POSITION” to 70 deg, and check value of “EGR VALVE POSITION SEN”.

Does value become 4.0±0.15 V?

YES >> INSPECTION END
NO >> Replace EGR volume control valve. Refer to EM-239, "Removal and Installation".

P044C, P044D EGR VOLUME CONTROL VALVE POSITION SENSOR

DTC Logic

INFOID:0000000012198491

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P044C	EGR SENSOR C (EGR sensor C circuit low)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the EGR volume control valve position sensor is 0.32 V or less.	• Harness or connectors (EGR volume control valve position sensor circuit is open or shorted.) • EGR volume control valve
P044D	EGR SENSOR C (EGR sensor C circuit high)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the EGR volume control valve position sensor is 4.67 V or more.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-999, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198492

1.CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Turn ignition switch ON.
4. Check voltage between EGR volume control valve harness connector and ground.

+		−	Voltage (Approx.)
EGR volume control valve			
Connector	Terminal		
F74	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 5.

2.CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

3. Check harness continuity between EGR volume control valve harness connector and ECM harness connector.

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F74	5	F23	43	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check harness continuity between EGR volume control valve harness connector and ECM harness connector.

EGR volume control valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F74	4	F24	68	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK EGR VOLUME CONTROL VALVE

Check the EGR volume control valve. Refer to EC-961, "Component Inspection (EGR Volume Control Valve)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace EGR volume control valve. Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

5.CHECK EGR VOLUME CONTROL VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

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	
F74	3	F23	30	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to EC-792, "Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

Component Inspection (EGR Volume Control Valve)

INFOID:0000000012198493

1.CHECK EGR VOLUME CONTROL VALVE-1

With CONSULT

1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “EGR CONTROL VALVE”.
3. Operate “Up” or “Down”, set “EGR VALVE POSITION” to 0 deg, and check value of “EGR VALVE POSITION SEN”.

Does value become 1.2±0.15 V?

YES >> GO TO 2.
NO >> Replace EGR volume control valve. Refer to EM-239, "Removal and Installation".

2.CHECK EGR VOLUME CONTROL VALVE-2

With CONSULT
1. Operate “Up” or “Down”, set “EGR VALVE POSITION” to 70 deg, and check value of “EGR VALVE POSITION SEN”.

Does value become 4.0±0.15 V?

YES >> INSPECTION END
NO >> Replace EGR volume control valve. Refer to EM-239, "Removal and Installation".

P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

INFOID:0000000012198494

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0451	EVAP SYS PRES SEN (Evaporative emission system pressure sensor/switch range/performance)	ECM detects a sloshing signal from the EVAP control system pressure sensor	• Harness or connectors (EVAP control system pressure sensor circuit is shorted.) • EVAP control system pressure sensor

DTC CONFIRMATION PROCEDURE

NOTE:

Never remove fuel filler cap during DTC confirmation procedure.

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

With CONSULT>>GO TO 2.
Without CONSULT>>GO TO 5.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

1. Start engine and let it idle for least 40 seconds.
   NOTE:
   Do not depress accelerator pedal even slightly.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1003, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

1. Select “EVAP DIAG READY” in “DATA MONITOR” mode of “ENGINE”.
2. Let it idle until “OFF” of “EVAP DIAG READY” changes to “ON”.
   NOTE:
   It will take at most 2 hours until “OFF” of “EVAP DIAG READY” changes to “ON”.
3. Turn ignition switch OFF and wait at least 90 minutes.
   NOTE:
   Never turn ignition switch ON during 90 minutes.
4. Turn ignition switch ON.
5. Select “EVAP LEAK DIAG” in “DATA MONITOR” mode of “ENGINE”.
6. Check that “EVAP LEAK DIAG” indication.

Which is displayed on CONSULT?

CMPLT >> GO TO 4.
YET >> 1. Perform DTC CONFIRMATION PROCEDURE again.
2. GO TO 1.

4.PERFORM DTC CONFIRMATION PROCEDURE-3

With CONSULT
Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1003, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM DTC CONFIRMATION PROCEDURE-4

With GST
1. Start engine and let it idle for least 40 seconds.
   NOTE:
   Do not depress accelerator pedal even slightly.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1003, "Diagnosis Procedure".
NO >> GO TO 6.

6.PERFORM DTC CONFIRMATION PROCEDURE-5

With GST
1. Let it idle for at least 2 hours.
2. Turn ignition switch OFF and wait at least 90 minutes.
   NOTE:
   Never turn ignition switch ON during 90 minutes.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1003, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198495

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check that water is not inside connectors.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

+		–	Voltage (V)
EVAP control system pressure sensor			
Connector	Terminal		
B22	3	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B22	3	E19	125	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B22	1	E19	148	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check EVAP control system pressure sensor. Refer to EC-1004, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Removal and Installation" (2WD), FL-30, "AWD : Removal and Installation" (AWD).

Component Inspection

INFOID:0000000012198496

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EVAP control system pressure sensor with its harness connector. Refer to FL-27, "2WD : Removal and Installation" (2WD), FL-30, "AWD : Removal and Installation" (AWD).
   Always replace O-ring with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM terminals under the following conditions.

ECM			Applied vacuum kPa (kg/cm^2, psi)	Voltage
Connector	+	–		
	Terminal	Terminal		
E19	121	148	Not applied	1.8 - 4.8 V
			-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Never apply below -93.3 kPa (-0.952 kg/cm^2, -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm^2, 14.69 psi).**

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Removal and Installation" (2WD), FL-30, "AWD : Removal and Installation" (AWD).

P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

INFOID:0000000012198497

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0452	EVAP SYS PRES SEN (Evaporative emission system pressure sensor/switch low)	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) • EVAP control system pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON.
6. Select “DATA MONITOR” mode with CONSULT.
7. Check that “FUEL T/TMP SE” is more than 0°C (32°F).
8. Start engine and wait at least 20 seconds.
9. Check 1st trip DTC.

With GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes to ECM harness connector terminals under the following conditions.

ECM		
Connector	+	–
	Terminal	
E19	128	148

3. Check that the voltage is less than 4.2 V.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON.
6. Turn ignition switch OFF and wait at least 10 seconds.
7. Start engine and wait at least 20 seconds.
8. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1006, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198498

1.CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check that water is not inside connector.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness connector.

2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

+		−	Voltage (V)
EVAP control system pressure sensor			
Connector	Terminal		
B22	3	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B22	3	E19	125	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace harness connector.

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B22	1	E19	148	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 EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B22	2	E19	121	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check EVAP control system pressure sensor. Refer to EC-1007, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Removal and Installation" (2WD), FL-30, "AWD : Removal and Installation" (AWD).

Component Inspection

INFOID:0000000012198499

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EVAP control system pressure sensor with its harness connector. Refer to FL-27, "2WD : Removal and Installation" (2WD), FL-30, "AWD : Removal and Installation" (AWD).
   Always replace O-ring with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM terminals under the following conditions.

ECM			Applied vacuum kPa (kg/cm^2, psi)	Voltage
Connector	+	–		
	Terminal	Terminal		
E19	121	148	Not applied	1.8 - 4.8 V
			-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Never apply below -93.3 kPa (-0.952 kg/cm^2, -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm^2, 14.69 psi).**

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Removal and Installation" (2WD), FL-30, "AWD : Removal and Installation" (AWD).

P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

DTC Logic

INFOID:0000000012198500

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0453	EVAP SYS PRES SEN (Evaporative emission system pressure sensor/switch high)	An excessively high voltage from the sensor is sent to ECM.	• Harness or connectors (EVAP control system pressure sensor circuit is open or shorted.) • EVAP control system pressure sensor • EVAP canister vent control valve • EVAP canister • Rubber hose from EVAP canister vent control valve to vehicle frame

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Always perform test at a temperature of 5°C (41°F) or more.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON.
6. Select “DATA MONITOR” mode with CONSULT.
7. Check that “FUEL T/TMP SE” is more than 0°C (32°F).
8. Start engine and wait at least 20 seconds.
9. Check 1st trip DTC.

With GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes to ECM harness connector terminals.

ECM		
Connector	+	–
	Terminal	
E19	128	148

3. Check that the voltage is less than 4.2 V.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON.
6. Turn ignition switch OFF and wait at least 10 seconds.
7. Start engine and wait at least 20 seconds.
8. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1009, "Diagnosis Procedure".

NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198501

1.CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check that water is not inside connectors.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace harness connector.

2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between EVAP control system pressure sensor harness connector and ground.

+		–	Voltage (V)
EVAP control system pressure sensor			
Connector	Terminal		
B22	3	Ground	Approx. 5

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B22	3	E19	125	Existed

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair open circuit.

4.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B22	1	E19	148	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 EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between EVAP control system pressure sensor harness connector and ECM harness connector.

EVAP control system pressure sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B22	2	E19	121	Existed

2. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

6.CHECK RUBBER TUBE

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Clean the rubber tube using an air blower, repair or replace rubber tube.

7.CHECK EVAP CANISTER VENT CONTROL VALVE

Check EVAP canister vent control valve. Refer to EC-1011, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace EVAP canister vent control valve. Refer to FL-27, "2WD : Removal and Installation" (2WD), FL-30, "AWD : Removal and Installation" (AWD).

8.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check EVAP control system pressure sensor. Refer to EC-1011, "Component Inspection".

Is the inspection result normal?

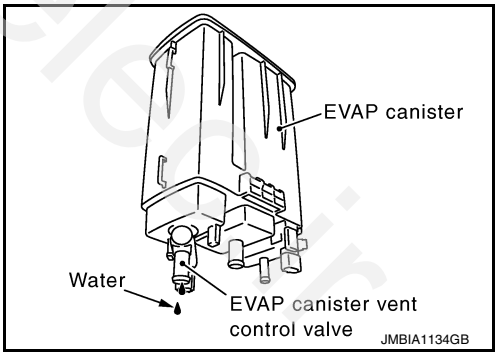
YES >> GO TO 9.
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Removal and Installation" (2WD), FL-30, "AWD : Removal and Installation" (AWD).

9.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached. Refer to FL-27, "2WD : Removal and Installation" (2WD), FL-30, "AWD : Removal and Installation" (AWD).
2. Check if water will drain from the EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 10.
NO >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".



10.CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 11.

11.DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage

• EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister. Refer to FL-27, "2WD : Removal and Installation" (2WD), FL-30, "AWD : Removal and Installation" (AWD).

Component Inspection

INFOID:0000000012198502

1. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EVAP control system pressure sensor with its harness connector. Refer to FL-27, "2WD : Removal and Installation" (2WD), FL-30, "AWD : Removal and Installation" (AWD).
   Always replace O-ring with a new one.
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM terminals under the following conditions.

ECM			Applied vacuum kPa (kg/cm^2, psi)	Voltage
Connector	+	–		
	Terminal	Terminal		
E19	121	148	Not applied	1.8 - 4.8 V
			-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Never apply below -93.3 kPa (-0.952 kg/cm^2, -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm^2, 14.69 psi).**

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Removal and Installation" (2WD), FL-30, "AWD : Removal and Installation" (AWD).

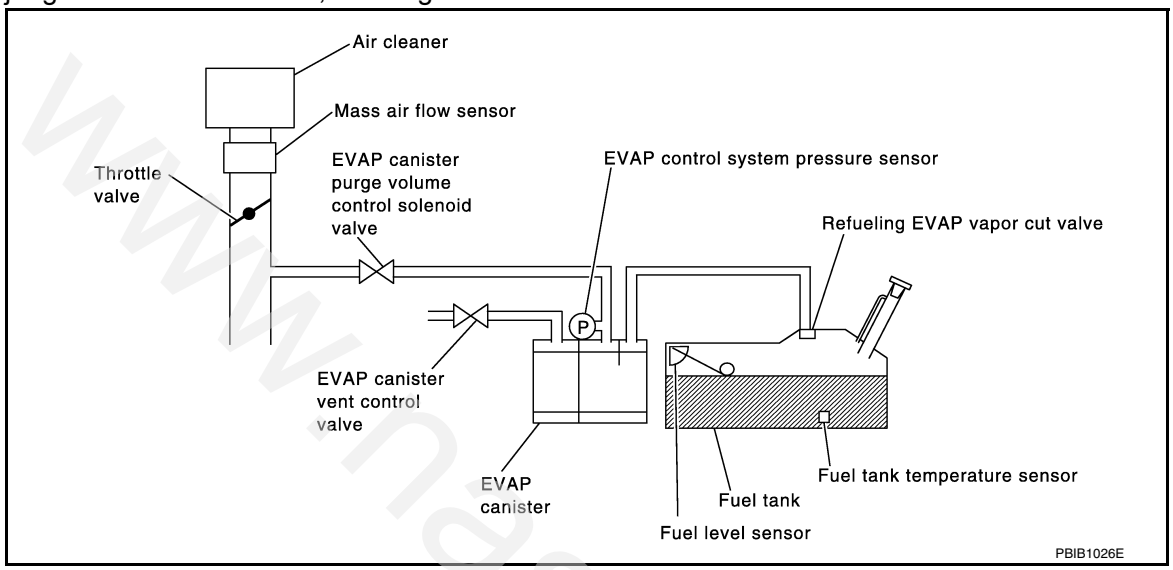
P0456 EVAP CONTROL SYSTEM

DTC Logic

INFOID:0000000012198503

DTC DETECTION LOGIC

This diagnosis detects leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the negative pressure caused by decrease of fuel temperature in the fuel tank after turning ignition switch OFF.
If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0456	EVAP VERY SML LEAK [Evaporative emission system leak detected (very small leak)]	• EVAP system has a leak. • EVAP system does not operate properly.	• Incorrect fuel tank vacuum relief valve • Incorrect fuel filler cap used • Fuel filler cap remains open or fails to close. • Foreign matter caught in fuel filler cap. • Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. • Foreign matter caught in EVAP canister vent control valve. • EVAP canister or fuel tank leaks • EVAP purge line (pipe and rubber tube) leaks • EVAP purge line rubber tube bent • Loose or disconnected rubber tube • EVAP canister vent control valve and the circuit • EVAP canister purge volume control solenoid valve and the circuit • Fuel tank temperature sensor • O-ring of EVAP canister vent control valve is missing or damaged • EVAP canister is saturated with water • EVAP control system pressure sensor • Refueling EVAP vapor cut valve • ORVR system leaks • Fuel level sensor and the circuit • Foreign matter caught in EVAP canister purge volume control solenoid valve

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 4.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

With CONSULT

1. Turn ignition switch ON and select “EVAP DIAG READY” in “DATA MONITOR” mode with CONSULT.
2. Start engine and wait at idle until “OFF” of “EVAP DIAG READY” changes to “ON”.
   NOTE:
   It will take at most 2 hours until “OFF” of “EVAP DIAG READY” changes to “ON”.
3. Turn ignition switch OFF and wait at least 90 minutes.
   NOTE:
   Never turn ignition switch ON during 90 minutes.
4. Turn ignition switch ON and select “EVAP LEAK DIAG” in “DATA MONITOR” mode with CONSULT.
5. Check that “EVAP LEAK DIAG” indication.

Which is displayed on CONSULT?

CMPLT >> GO TO 3.
YET >> Perform DTC CONFIRMATION PROCEDURE again. GO TO 1.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1013, "Diagnosis Procedure".
NO >> INSPECTION END.

4.PERFORM DTC CONFIRMATION PROCEDURE

With GST

1. Start engine and wait engine idle for at least 2 hours.
2. Turn ignition switch OFF and wait at least 90 minutes.
   NOTE:
   Never turn ignition switch ON during 90 minutes.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Go to EC-1013, "Diagnosis Procedure".
NO >> INSPECTION END.

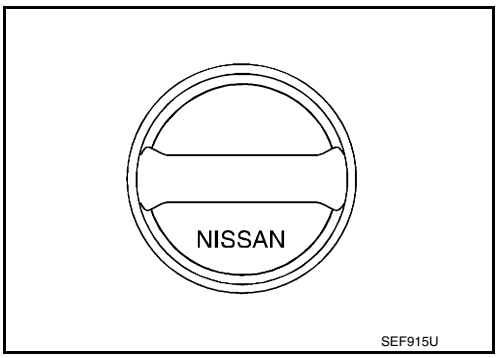
Diagnosis Procedure

INFOID:0000000012198504

1.CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.

2. Check for genuine NISSAN fuel filler cap design.



Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace with genuine NISSAN fuel filler cap.

2.CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Open fuel filler cap, then clean cap and fuel filler neck threads using air blower. Then retighten until ratcheting sound is heard.

3.CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-1017, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace fuel filler cap with a genuine one.

5.CHECK FOR EVAP LEAK

Refer to EC-1253, "Inspection".

Is there any leak in EVAP line?

YES >> Repair or replace.
NO >> GO TO 6.

6.CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.
- EVAP canister vent control valve is installed properly.
  Refer to FL-27, "2WD : Removal and Installation"(2WD) or FL-30, "AWD : Removal and Installation"(AWD).
- EVAP canister vent control valve.
  Refer to EC-986, "Component Inspection".

Is the inspection result normal?

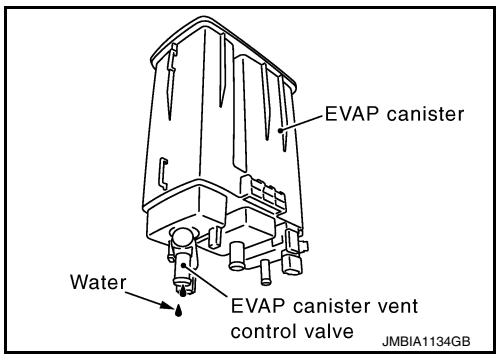
YES >> GO TO 7.
NO >> Repair or replace EVAP canister vent control valve and O-ring.

7.CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from the EVAP canister.

Does water drain from EVAP canister?

YES >> GO TO 8.
NO-1 >> With CONSULT: GO TO 10.
NO-2 >> Without CONSULT: GO TO 11.



8. CHECK EVAP CANISTER

Weigh the EVAP canister assembly with the EVAP canister vent control valve and EVAP control system pressure sensor attached.
The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 10.
YES-2 >> Without CONSULT: GO TO 11.
NO >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.
- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

10. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT
1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine and let it idle.
3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 12.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT
1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

Is the inspection result normal?

YES >> GO TO 13.
NO >> GO TO 12.

12. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to FL-27, "2WD : Exploded View"(2WD) or FL-30, "AWD : Exploded View"(AWD).

Is the inspection result normal?

YES >> GO TO 13.
NO >> Repair or reconnect the hose.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-980, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Replace EVAP canister purge volume control solenoid valve.

14. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-916, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace fuel level sensor unit.

15. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1004, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace EVAP control system pressure sensor.

16. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to FL-26, "2WD : Hydraulic Layout"(2WD) or FL-28, "AWD : Hydraulic Layout"(AWD).

Is the inspection result normal?

YES >> GO TO 17.
NO >> Repair or reconnect the hose.

17. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 18.

18. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to FL-26, "2WD : Hydraulic Layout"(2WD) or FL-28, "AWD : Hydraulic Layout"(AWD).

Is the inspection result normal?

YES >> GO TO 19.
NO >> Repair or replace hoses and tubes.

19. CHECK RECIRCULATION LINE

Check recirculation line between fuel filler tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 20.
NO >> Repair or replace hose, tube or fuel filler tube.

20. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to FL-28, "2WD : Inspection"(2WD) or FL-31, "AWD : Inspection"(AWD).

Is the inspection result normal?

YES >> GO TO 21.
NO >> Replace refueling EVAP vapor cut valve with fuel tank.

21. CHECK FUEL LEVEL SENSOR

Refer to EC-1017, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 22.
NO >> Replace fuel level sensor unit.

22.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

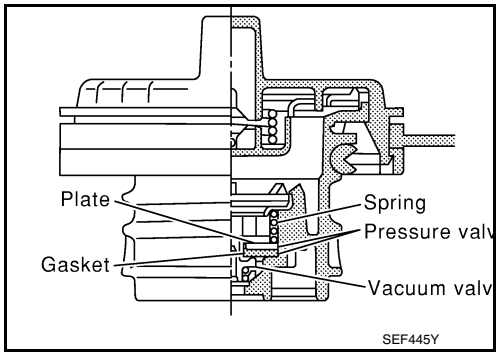
>> INSPECTION END

Component Inspection

INFOID:0000000012198505

1.CHECK FUEL FILLER CAP

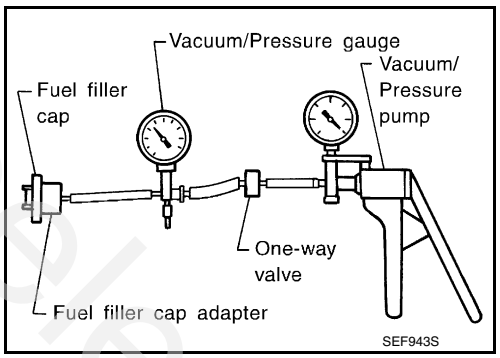
1. Turn ignition switch OFF.
2. Remove fuel filler cap.
3. Wipe clean valve housing.



4. Install fuel filler cap adapter (commercial service tool) to fuel filler cap.
5. Check valve opening pressure and vacuum.

Pressure: **15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2, 2.22 - 2.90 psi)**

Vacuum: **−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2, −0.87 to −0.48 psi)**



Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE FUEL FILLER CAP

Replace fuel filler cap.

CAUTION:

Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may illuminate.

>> INSPECTION END

P0460 FUEL LEVEL SENSOR

DTC Logic

INFOID:0000000012198506

DTC DETECTION LOGIC

NOTE:

- **If DTC P0460 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P0460 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1054, "DTC Logic".**

When the vehicle is parked, the fuel level in the fuel tank is naturally stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0460	FUEL LEV SEN SLOSH (Fuel level sensor "A" circuit)	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The sensor circuit is open or shorted) • Combination meter • Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait maximum of 2 consecutive minutes.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1018, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198507

1.CHECK COMBINATION METER FUNCTION

Check combination meter function. Refer to MWI-22, "CONSULT Function".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Proceed to MWI-55, "Diagnosis Procedure".

P0461 FUEL LEVEL SENSOR

DTC Logic

INFOID:0000000012198508

DTC DETECTION LOGIC

NOTE:

- **If DTC P0461 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P0461 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1054, "DTC Logic".**

Driving long distances naturally affect fuel gauge level.
This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0461	FUEL LEVEL SENSOR (Fuel level sensor "A" circuit range/performance)	The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The sensor circuit is open or shorted) • Combination meter • Fuel level sensor

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-1019, "Component Function Check".
Use component function check to check the overall function of the fuel level sensor. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1020, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012198509

1.PRECONDITIONING

WARNING:
When performing the following procedure, always observe the handling of the fuel. Refer to FL-2, "General Precautions".
TESTING CONDITION:
Before starting component function check, preparation of draining fuel and refilling fuel is required.

Will CONSULT be used?

YES >> GO TO 2.
NO >> GO TO 3.

2.PERFORM COMPONENT FUNCTION CHECK

With CONSULT
NOTE:
Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-771, "Work Procedure".
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.
6. Select "FUEL LEVEL SE" in "DATA MONITOR" mode with CONSULT.
7. Check "FUEL LEVEL SE" output voltage and note it.
8. Select "FUEL PUMP RELAY" in "ACTIVE TEST" mode with CONSULT.

9. Touch “ON” and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10. Check “FUEL LEVEL SE” output voltage and note it.
11. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
12. Check “FUEL LEVEL SE” output voltage and note it.
13. Confirm whether the voltage changes more than 0.03 V during step 7 to 10 and 10 to 12.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1020, "Diagnosis Procedure".

3.PERFORM COMPONENT FUNCTION CHECK

Without CONSULT
NOTE:
Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line. Refer to EC-771, "Work Procedure".
3. Remove the fuel feed hose on the fuel level sensor unit. Refer to FL-7, "2WD : Removal and Installation".
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch ON.
6. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
7. Confirm that the fuel gauge indication varies.
8. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
9. Confirm that the fuel gauge indication varies.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1020, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198510

1.CHECK COMBINATION METER FUNCTION

Check combination meter function. Refer to MWI-22, "CONSULT Function".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Proceed to MWI-54, "Component Function Check".

P0462, P0463 FUEL LEVEL SENSOR

DTC Logic

INFOID:0000000012198511

DTC DETECTION LOGIC

NOTE:

- **If DTC P0462 or P0463 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P0462 or P0463 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607.Refer to EC-1054, "DTC Logic".**

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0462	FUEL LEVL SEN/CIRC (Fuel level sensor “A” circuit low)	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (The CAN communication line is open or shorted) • Harness or connectors (The sensor circuit is open or shorted) • Combination meter • Fuel level sensor
P0463	FUEL LEVL SEN/CIRC (Fuel level sensor “A” circuit high)	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1021, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198512

1.CHECK COMBINATION METER FUNCTION

Check combination meter function. Refer to MWI-22, "CONSULT Function".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Proceed to MWI-55, "Diagnosis Procedure".

P046E EGR PRESSURE SENSOR

DTC Logic

INFOID:0000000012198513

DTC DETECTION LOGIC

NOTE:
If DTC P046E is displayed with DTC related to the EGR volume control valve, first perform the trouble diagnosis for DTC related to the EGR volume control valve. Refer to EC-706, "DTC Index".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P046E	EGR SENSOR B (EGR sensor B circuit range/ performance)	ECM detects the following status continuously for 5 seconds or more: A difference between the output level of EGR pressure sensor and the differential pressure before and after EGR volume control valve calculated by ECM based on "target working factor of EGR" is bigger than specified value.	• Harness or connectors (EGR pressure sensor circuit is open or shorted.) • EGR pressure sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more at ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Turn ignition switch ON.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1022, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Start the engine and warm it up to the normal operating temperature.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1022, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198514

1.CHECK EGR PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EGR pressure sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EGR pressure sensor harness connector and ground.

+		–	Voltage (Approx.)
EGR pressure sensor			
Connector	Terminal		
F46	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 5.

2.CHECK EGR PRESSURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EGR pressure sensor harness connector and ECM harness connector.

+		–		Continuity
EGR pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
F46	3	F23	43	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK EGR PRESSURE SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between EGR pressure sensor harness connector and ECM harness connector.

+		–		Continuity
EGR pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
F46	2	F23	24	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK EGR PRESSURE SENSOR

Check the EGR pressure sensor. Refer to EC-1026, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace EGR pressure sensor.

5.CHECK EGR PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EGR pressure sensor harness connector and ECM harness connector.

+		–		Continuity
EGR pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
F46	1	F23	30	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

Component Inspection (EGR pressure sensor)

INFOID:0000000012198515

1.CHECK EGR PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EGR pressure sensor hose (intake and exhaust).
3. Install pressure pump to EGR pressure sensor port (intake side).
4. Turn ignition switch ON and check output voltage between ECM connector terminals as follows.

EGR pressure sensor		Condition		Voltage
+	–			
Terminal				
2	3	Applied pressure kPa (kg/cm^2, PSI)	Not applied	1.0 V
			100 (1.02, 14.5)	4.5 V

CAUTION:

Never apply pressure over 150kPa (1.53 kg/cm^2, 21.75 PSI)

Is inspection result normal?

YES >> INSPECTION END
NO >> Replace EGR pressure sensor. Refer to FL-27, "2WD : Exploded View".

P046F, P0486 EGR PRESSURE SENSOR

DTC Logic

INFOID:0000000012198516

DTC DETECTION LOGIC

NOTE:
If DTC P046F, or P0486 is displayed with DTC P0643, first perform trouble diagnosis for DTC P0643. Refer to EC-1060, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P046F	EGR SENSOR B (EGR sensor B circuit intermittent/erratic)	ECM detects that a voltage signal from EGR pressure sensor is less than 4.8 V for 5 consecutive seconds.	• Harness or connectors (EGR pressure sensor circuit is open or shorted.) • EGR pressure sensor
P0486	EGR SENSOR B (EGR sensor B circuit)	ECM detects that a voltage signal from EGR pressure sensor is less than 0.5 V for 5 consecutive seconds.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:
Before performing the following procedure, confirm that battery voltage is 10 V or more at ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1025, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198517

1.CHECK EGR PRESSURE SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EGR pressure sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EGR pressure sensor harness connector and ground.

+		–	Voltage (Approx.)
EGR pressure sensor			
Connector	Terminal		
F46	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK EGR PRESSURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

3. Check the continuity between EGR pressure sensor harness connector and ECM harness connector.

+		–		Continuity
EGR pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
F46	3	F23	43	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK EGR PRESSURE SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between EGR pressure sensor harness connector and ECM harness connector.

+		–		Continuity
EGR pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
F46	2	F23	24	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK EGR PRESSURE SENSOR

Check the EGR pressure sensor. Refer to EC-1026, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace EGR pressure sensor. Refer to EC-1256, "Removal and Installation".

Component Inspection

INFOID:0000000012198518

1.CHECK EGR PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EGR pressure sensor tube (intake and exhaust).
3. Install pressure pump to EGR pressure sensor hose connector (intake side)
4. Turn ignition switch ON and check output voltage between ECM connector terminals as follows.

EGR pressure sensor		Condition		Voltage
+	–			
Terminal				
2	3	Applied pressure kPa (mbar, mmHg, inHg)	Not applied	1.0 V
			100 (1,000, 750, 29.53)	4.5 V

CAUTION:
Never apply pressure over 150kPa (1,500 mbar, 1,125 mmHg, 44.29 inHg)

Is inspection result normal?

YES >> INSPECTION END
NO >> Replace EGR pressure sensor. Refer to EM-238, "Exploded View".

P0500 VSS

EXCEPT FOR M/T MODELS

EXCEPT FOR M/T MODELS : Description

INFOID:0000000012198519

ECM receives vehicle speed signals from two different paths via CAN communication line: One is from the ABS actuator and electric unit (control unit) via the combination unit and the other is from TCM.

EXCEPT FOR M/T MODELS : DTC Logic

INFOID:0000000012198520

DTC DETECTION LOGIC

NOTE:

- If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.
- If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1054, "DTC Logic".

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0500	VEH SPEED SEN/CIRC (Vehicle speed sensor)	At 20 km/h (13 MPH), ECM detects the following status continuously for 5 seconds or more: The difference between a vehicle speed calculated by a output speed sensor transmitted from TCM to ECM via CAN communication and the vehicle speed indicated on the combination meter exceeds 15km/h (10 MPH).	• Harness or connector (CAN communication line is open or shorted.) • Combination meter • ABS actuator and electric unit (control unit) • Wheel sensor • TCM • Output speed sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. Shift the selector lever to D range and wait at least for 2 seconds.
3. Drive the vehicle at least 5 seconds at 20 km/h (13 MPH) or more.

   CAUTION:

   Always drive vehicle at a safe speed.

   NOTE:

   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1027, "EXCEPT FOR M/T MODELS : Diagnosis Procedure"

NO >> INSPECTION END

EXCEPT FOR M/T MODELS : Diagnosis Procedure

INFOID:0000000012198521

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-414, "DTC Index".

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-50, "DTC Index".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble shooting relevant to DTC indicated.

3.CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to MWI-33, "DTC Index".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform trouble shooting relevant to DTC indicated.

4.CHECK OUTPUT SPEED SENSOR

Check output speed sensor. Refer to TM-523, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace or replace error-detected parts.

5.CHECK WHEEL SENSOR

Check wheel sensor. Refer to BRC-88, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace or replace error-detected parts.

M/T MODELS

M/T MODELS : Description

INFOID:0000000012198522

The vehicle speed signal is sent to the combination meter from the “ABS actuator and electric unit (control unit)” via the CAN communication line. The combination meter then sends a signal to the ECM via the CAN communication line.

M/T MODELS : DTC Logic

INFOID:0000000012198523

DTC DETECTION LOGIC

NOTE:

- **If DTC P0500 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P0500 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1054, "DTC Logic".**

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0500	VEH SPEED SEN/CIRC (Vehicle speed sensor)	The vehicle speed signal sent to ECM is almost 0 km/h (0 MPH) even when vehicle is being driven.	• Harness or connectors (CAN communication line is open or shorted) • Harness or connectors (Vehicle speed signal circuit is open or shorted) • Wheel sensor • Combination meter • ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 3.

3.CHECK VEHICLE SPEED SIGNAL

NOTE:
This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

With CONSULT

1. Start engine.
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode of “ENGINE” using CONSULT. The vehicle speed on CONSULT should exceed 10 km/h (6 mph) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Proceed to EC-1030, "M/T MODELS : Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Warm engine up to normal operating temperature.
3. Maintain the following conditions for at least 50 consecutive seconds.
   CAUTION:
   Always drive vehicle at a safe speed.

ENG SPEED	1,800 - 6,000 rpm
COOLAN TEMP/S	More than 65°C (149°F)
B/FUEL SCHDL	4.7 - 31.8 msec
Selector lever	Except Neutral position
PW/ST SIGNAL	OFF

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1030, "M/T MODELS : Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-1029, "M/T MODELS : Component Function Check".
Use component function check to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1030, "M/T MODELS : Diagnosis Procedure".

M/T MODELS : Component Function Check

INFOID:0000000012198524

1.PERFORM COMPONENT FUNCTION CHECK

With GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed signal in Service $01 with GST.
   The vehicle speed signal on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1030, "M/T MODELS : Diagnosis Procedure".

M/T MODELS : Diagnosis Procedure

INFOID:0000000012198525

1.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-50, "DTC Index".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH COMBINATION METER

Check DTC with combination meter. Refer to MWI-33, "DTC Index".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Perform trouble shooting relevant to DTC indicated.

P0501, P2159 VEHICLE SPEED SENSOR

Description

INFOID:0000000012198526

ECM receives a rear wheel sensor signal from ABS actuator and electric unit (control unit) via CAN communication to switch combustion for the direct injection gasoline system. For the direct injection gasoline system, refer to EC-630, "DIRECT INJECTION GASOLINE SYSTEM : System Description".

DTC Logic

INFOID:0000000012198527

DTC DETECTION LOGIC

NOTE:
If DTC P0501 or P2159 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to EC-706, "DTC Index".

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0501	VEHICLE SPEED SEN A (Vehicle speed sensor A range/ performance)	ECM detects a rear LH wheel sensor malfunction signal transmitted from the ABS actuator and electric unit (control unit) via CAN communication at least for 5 seconds in a row.	• Harness or connectors (The CAN communication line is open or shorted) • Rear LH wheel sensor • ABS actuator and electric unit (control unit)
P2159	Vehicle speed sensor B (Vehicle speed sensor B range/ performance)	ECM detects a rear RH wheel sensor malfunction signal transmitted from the ABS actuator and electric unit (control unit) via CAN communication at least for 5 seconds in a row.	• Harness or connectors (The CAN communication line is open or shorted) • Rear RH wheel sensor • ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 9 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1031, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198528

1.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

With CONSULT
Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-50, "DTC Index".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Perform Diagnosis Procedure corresponding to DTC indicated.

P0506 ISC SYSTEM

Description

INFOID:0000000012198529

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

INFOID:0000000012198530

DTC DETECTION LOGIC

NOTE:
If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0506	ISC SYSTEM (Idle air control system RPM lower than expected)	The idle speed is less than the target idle speed by 100 rpm or more.	• Electric throttle control actuator • Intake air leakage

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

If the target idle speed is out of the specified value, perform EC-758, "Description", before conducting DTC CONFIRMATION PROCEDURE.
TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.**
- **Always perform the test at a temperature above −10°C(14°F).**

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and run it for at least 1 minute at idle speed.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1032, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198531

1.CHECK INTAKE AIR LEAKAGE

1. Start engine and let it idle.
2. Listen for an intake air leakage after the mass air flow sensor.

Is intake air leakage detected?

YES >> Discover air leakage location and repair.

NO >> Replace ECM. Refer to EC-1256, "Removal and Installation".

P0507 ISC SYSTEM

Description

INFOID:0000000012198532

The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration and engine load (air conditioner, power steering and cooling fan operation, etc.).

DTC Logic

INFOID:0000000012198533

DTC DETECTION LOGIC

NOTE:
If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0507	ISC SYSTEM (Idle air control system RPM higher than expected)	The idle speed is more than the target idle speed by 200 rpm or more.	• Electric throttle control actuator • Intake air leakage • PCV system

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

If the target idle speed is out of the specified value, perform EC-758, "Description", before conducting DTC Confirmation Procedure.
TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.**
- **Always perform the test at a temperature above −10°C(14°F).**

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and run it for at least 1 minute at idle speed.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1034, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198534

1.CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace malfunctioning part.

2.CHECK INTAKE AIR LEAKAGE

1. Start engine and let it idle.
2. Listen for an intake air leakage after the mass air flow sensor.

Is intake air leakage detected?

YES >> Discover air leakage location and repair.
NO >> Replace ECM. Refer to EC-1256, "Removal and Installation".

P050A, P050B, P050E COLD START CONTROL

Description

INFOID:0000000012198535

ECM controls ignition timing and engine idle speed when engine is started with pre-warming up condition. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

DTC Logic

INFOID:0000000012198536

DTC DETECTION LOGIC

NOTE:
If DTC P050A, P050B or P050E is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P050A	Cold start idle air control system performance	ECM does not control engine idle speed properly when engine is started with pre-warming up condition.	• Lack of intake air volume • Fuel injection system • ECM
P050B	Cold start ignition timing performance	ECM does not control engine timing properly when engine is started with pre-warming up condition.	
P050E	Cold start engine exhaust temperature too low	The temperature of the catalyst inlet does not rise to the proper temperature when the engine is started with pre-warming up condition.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

WITH CONSULT

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Select “DATA MONITOR” mode with CONSULT.
4. Check the indication of “COOLAN TEMP/S”.

WITH GST

Follow the procedure “With CONSULT” above.

Is the value of “COOLAN TEMP/S” between 5°C (41°F) and 36°C (97°F)?

YES >> GO TO 3.
NO-1 [If it is below 5°C (41°F)]>>Warm up the engine until the value of “COOLAN TEMP/S” reaches 5°C (41°F) or more. Retry from step 1.
NO-2 [If it is above 36°C (97°F)]>>Cool engine down to less than 36°C (97°F). Retry from step 1.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

WITH CONSULT

1. Set the select lever in N range.
2. Start the engine and warm up in idle with the value of “COOLAN TEMP/S” between 5°C (41°F) and 40°C (104°F) for more than 15 seconds.
3. Check 1st trip DTC.

WITH GST
Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-1037, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198537

1.PERFORM IDLE AIR VOLUME LEARNING

Perform EC-758, "Description".

Is Idle Air Volume Learning carried out successfully?

YES >> GO TO 2.
NO >> Follow the instruction of Idle Air Volume Learning.

2.CHECK INTAKE SYSTEM

Check for the cause of intake air volume lacking. Refer to the following.
- Crushed intake air passage
- Intake air passage clogging
- Clogging of throttle body

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace malfunctioning part

3.CHECK FUEL INJECTION SYSTEM FUNCTION

Perform DTC Confirmation Procedure for DTC P0171. Refer to EC-905, "DTC Logic".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Proceed to EC-906, "Diagnosis Procedure" for DTC P0171.

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC Confirmation Procedure.
   See EC-1036, "DTC Logic".

Is the 1st trip DTC P050A, P050B or P050E displayed again?

YES >> GO TO 5.
NO >> INSPECTION END

5.REPLACE ECM

Replace ECM. Refer to EC-1256, "Removal and Installation"

>> INSPECTION END

P0520 EOP SENSOR

DTC Logic

INFOID:0000000012198538

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (Trouble diagnosis content)	Detecting condition	Possible cause
P0520	EOP SENSOR/SWITCH [Engine oil pressure (EOP) sensor circuit]	ECM detects the following status continuously for 5 seconds or more: • A voltage signal transmitted from the engine oil pressure sensor is lower than 0.3 V. • A voltage signal transmitted from the engine oil pressure sensor is higher than 5.02 V.	• Harness or connectors (EOP sensor circuit is open or shorted.) • Engine oil level abnormality • EOP sensor • Sensor power supply 2 circuit

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1038, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198539

1.CHECK EOP SENSOR POWER SUPPLY-I

1. Turn ignition switch OFF.
2. Disconnect EOP sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EOP sensor harness connector terminals.

EOP sensor			Voltage (Approx.)
Connector	+	–	
	terminal		
F43	3	1	5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 4.

2.CHECK EOP SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors.
3. Check the continuity between EOP sensor harness connector and ECM harness connector.

+		–		Continuity
EOP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F43	2	F23	23	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK EOP SENSOR

Check EOP sensor. Refer to EC-1040, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

4.CHECK EOP SENSOR POWER SUPPLY-II

Check the voltage between EOP sensor harness connector terminal and ground.

+		–	Voltage (Approx.)
EOP sensor			
Connector	Terminal		
F43	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.CHECK EOP SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors.
3. Check the continuity between EOP sensor harness connector and ECM harness connector.

+		–		Continuity
EOP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F43	3	F23	29	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Check sensor power supply 2 circuit. Refer to EC-1240, "Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

6.CHECK EOP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EOP sensor harness connector and ECM harness connector.

+		–		Continuity
EOP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F43	1	F23	13	Existed

Is the inspection result normal?

YES >> GO TO 7.

NO >> Repair or replace error-detected parts.

7.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
F23	9	Ground	Existed
	10		
	50		
F24	60		
	110		
E19	147		
	149		
	152		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

Component Inspection

INFOID:0000000012198540

1.CHECK EOP SENSOR

1. Turn ignition switch OFF.
2. Disconnect EOP sensor harness connector.
3. Check resistance between EOP sensor connector terminals.

EOP sensor		Condition	Resistance (kΩ)
+	–		
Terminal			
1	2	None	4 kΩ – 10 kΩ
	3		2 kΩ – 8 kΩ
2	1		4 kΩ – 10 kΩ
	3		1 kΩ – 3 kΩ
3	1		2 kΩ – 8 kΩ
	2		1 kΩ – 3 kΩ

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Replace EOP sensor. Refer to EM-286, "Exploded View".

P0524 ENGINE OIL PRESSURE

DTC Logic

INFOID:0000000012198541

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0524	ENGINE OIL PRESSURE (Engine oil pressure too low)	An EOP sensor signal voltage applied to ECM remains lower than the specified value continuously for 10 seconds or more when the engine speed is 1,000 rpm or more.	• Decrease in engine oil pressure • Decrease in engine oil level • Engine oil condition • EOP sensor • Engine body

DTC CONFIRMATION PROCEDURE

CAUTION:

If "EC-1042, "Diagnosis Procedure"" is unfinished, be sure to perform Step 3 and 4.

1. PRECONDITIONING-1

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 2.

2. PRECONDITIONING-2

Is "Diagnosis Procedure" of DTC P0524 finished?

YES >> GO TO 3.
NO >> GO TO 4.

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Maintain the following conditions for about 10 consecutive seconds.

Selector lever	• P or N position (CVT) • N position (M/T)
Engine coolant temperature	70°C (158°F) or more
Engine speed	1,000 rpm or more

NOTE:

With engine speed set around 4,000 rpm, the phenomenon can be reproduced more easily.

3. Check DTC.

Is DTC detected?

YES >> Proceed to EC-1042, "Diagnosis Procedure".
NO >> INSPECTION END

4. CHECK ENGINE OIL LEVEL

Check engine oil level. Refer to LU-28, "Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Proceed to EC-1042, "Diagnosis Procedure".

5. CHECK ENGINE OIL PRESSURE

With CONSULT
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Start the engine and check that “EOP SENSOR” changes, according to engine speeds.

Monitor item	Condition		Value (Approx.)
EOP SENSOR	• Engine oil temperature: 80°C (176°F) • Selector lever: P or N position (CVT) • Selector lever: N position (M/T) • Air conditioner switch: OFF • No load	Engine speed: Idle	1,250 - 1,400 mV
		Engine speed: 2,000 rpm	1,400 - 2,200 mV

Without CONSULT
Check engine oil pressure. Refer to LU-28, "Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Proceed to EC-1042, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198542

1.CHECK ENGINE OIL LEVEL

1. Turn ignition switch OFF.
2. Check engine oil level. Refer to LU-28, "Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 4.

2.CHECK ENGINE OIL PRESSURE

With CONSULT
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Start the engine and check that “EOP SENSOR” changes, according to engine speeds.

Monitor item	Condition		Value (Approx.)
EOP SENSOR	• Engine oil temperature: 80°C (176°F) • Selector lever: P or N position (CVT) • Selector lever: N position (M/T) • Air conditioner switch: OFF • No load	Engine speed: Idle	1,250 - 1,400 mV
		Engine speed: 2,000 rpm	1,400 - 2,200 mV

Without CONSULT
Check engine oil pressure. Refer to LU-28, "Inspection".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Check oil pump. Refer to LU-36, "Inspection".

3.CHECK EOP SENSOR

Check EOP sensor. Refer to EC-1040, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

4.CHECK ENGINE OIL LEAKAGE

Check engine oil leakage. Refer to LU-25, "Engine Lubrication System".

Is the inspection result normal?

YES >> GO TO 5.

NO >> Repair or replace error-detected parts.

5. CHECK CAUSE OF ENGINE OIL CONSUMPTION

Check the following item.

Step	Inspection item	Equipment	Standard	Reference
1	PCV valve	EC-1255, "Inspection"		
2	Turbocharger	EM-244, "Inspection"		
3	Exhaust front tube	Visual	• No blocking • No abnormal sounds	—
4	Oil pump	Visual	• No blocking • No abnormal sounds	—
4	Oil pump	LU-36, "Inspection"		
5	• Piston • Piston pin • Piston ring	• Piston to piston pin oil clearance • Piston ring side clearance • Piston ring end gap		EM-304
6	Cylinder block	• Cylinder block top surface distortion • Piston to cylinder bore clearance		EM-294

>> Repair or replace error-detected parts.

P052A, P052B INTAKE VALVE TIMING CONTROL

DTC Logic

INFOID:0000000012198543

DTC DETECTION LOGIC

NOTE:
If DTC P052A or P052B is displayed with DTC P0075, perform the trouble diagnosis for DTC P0075. Refer to EC-813, "DTC Logic".

DTC No.	Trouble diagnosis (Trouble diagnosis content)	Detecting condition	Possible cause
P052A	CAMSHAFT POSITION TIMING B1 (Cold start “A” camshaft position timing over-advanced bank 1)	There is a gap between angle of target and phase-control angle degree when the engine is in a cold condition.	• Crankshaft position sensor • Camshaft position sensor • Intake valve timing control solenoid valve • Intake valve timing intermediate lock control solenoid valve • Accumulation of debris to the signal pick-up portion of the camshaft • Timing chain installation • Foreign matter caught in the oil groove for intake valve timing control
P052B	CAMSHAFT POSITION TIMING B1 (Cold start “A” camshaft position timing over-retarded bank 1)		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 10 V or more at idle.

With CONSULT
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. On the CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “COOLAN TEMP/S”.
6. Check “COOLAN TEMP/S” indication value.

With GST
Follow the procedure “With CONSULT” above.

Is the value of “COOLAN TEMP/S” –5°C (23°F) and 45°C (113°F)?

YES >> GO TO 2.
NO-1 [if it is below – 5°C (23°F)]>>Warm up the engine until the value of “COOLAN TEMP/S” indicates –5°C (23°F) and 45°C (113°F). And then GO TO 2.
NO-2 [if it is above 45°C (113°F)]>>Cool the engine down to the value of “COOLAN TEMP/S” indicates –5°C (23°F) and 45°C (113°F). And then GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch OFF and wait at 10 seconds.
2. Turn ignition switch ON.
3. Set the selector lever in N range.
4. Start the engine and let it idle for 20 seconds or more.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1044, "Diagnosis Procedure"
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198544

1.INSPECTION START

With CONSULT>>GO TO 2.
Without CONSULT>>GO TO 3.

2.CHECK VTC POSITION

With CONSULT
1. Turn ignition switch ON.
2. On the CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “COOLAN TEMP/S”.
3. Check that the “COOLAN TEMP/S” indication value is between –5°C (23°F) and 45°C (113°F).
4. Start engine and wait at least 5 seconds.
5. On the CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “INT/V TIM(B1)”.
6. Check that the data monitor item indicates as follows:

Item	Value (°CA)
INT/V TIM(B1)	10 ± 2

Is the inspection result normal?

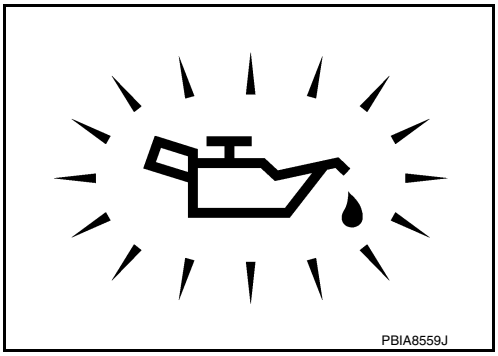
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 3.

3.CHECK OIL PRESSURE WARNING LAMP

1. Start engine.
2. Check that oil pressure warning lamp is not illuminated.

Is oil pressure warning lamp illuminated?

YES >> Refer to LU-28, "Inspection".
NO >> GO TO 4.


PBIA8559J

4.CHECK INTAKE VALVE TIMING INTERMEDIATE LOCK CONTROL SOLENOID VALVE

Perform Component Inspection of the intake valve timing intermediate lock control solenoid valve. Refer to EC-1047, "Component Inspection (Intake Valve Timing Intermediate Lock Control Solenoid Valve)".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Perform Component Inspection of the intake valve timing control solenoid valve. Refer to EC-1046, "Component Inspection (Intake Valve Timing Control Solenoid Valve)".

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK CRANKSHAFT POSITION SENSOR

Perform Component Inspection of the crankshaft position sensor. Refer to EC-1047, "Component Inspection (Crankshaft Position sensor)".

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK CAMSHAFT POSITION SENSOR

Perform Component Inspection of the camshaft position sensor. Refer to EC-1048, "Component Inspection (Camshaft position sensor)".

Is the inspection result normal?

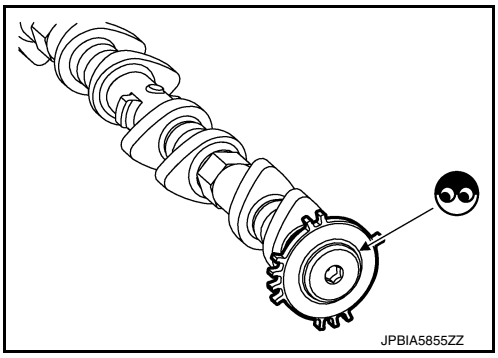
YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8.CHECK CAMSHAFT (INTAKE)

Check the following.
1. Accumulation of debris on the signal plate of camshaft front end
2. Chipping signal plate of camshaft front end

Is the inspection result normal?

YES >> GO TO 9.
NO >> Remove debris and clean the signal plate of camshaft front end or replace camshaft. Refer to EM-261, "Removal and Installation".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9.CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misalignment.

Are there any service records that may cause timing chain misalignment?

YES >> Check timing chain installation. Refer to EM-249, "Removal and Installation".
NO >> GO TO 10.

10.CHECK LUBRICATION CIRCUIT

Perform “Inspection of Camshaft Sprocket (INT) Oil Groove”. Refer to EM-264, "Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Clean lubrication line.

Component Inspection (Intake Valve Timing Control Solenoid Valve)

INFOID:0000000012198545

1.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Check resistance between intake valve timing control solenoid valve terminals as per the following.

Terminals	Resistance
1 and 2	7.0 - 7.7 Ω [at 20°C (68°F)]
1 or 2 and ground	∞ Ω (Continuity should not exist)

Is the inspection result normal?

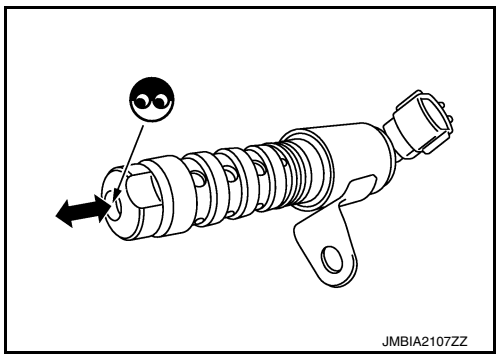
YES >> GO TO 2.
NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-248, "Exploded View".

2.CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE-II

1. Remove intake valve timing control solenoid valve. Refer to EM-248, "Exploded View".

2. Provide 12 V DC between intake valve timing control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.

CAUTION:
Never apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.
NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.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Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning intake valve timing control solenoid valve. Refer to EM-248, "Exploded View".

Component Inspection (Intake Valve Timing Intermediate Lock Control Solenoid Valve)

INFOID:0000000012198546

1. CHECK INTAKE VALVE TIMING INTERMEDIATE LOCK CONTROL SOLENOID VALVE-I

1. Turn ignition switch OFF.
2. Disconnect intake valve timing intermediate lock control solenoid valve harness connector.
3. Check resistance between intake valve timing intermediate lock control solenoid valve terminals as per the following.

Terminals	Resistance
1 and 2	7.0 - 7.7 Ω [at 20°C (68°F)]
1 or 2 and ground	∞ Ω (Continuity should not exist)

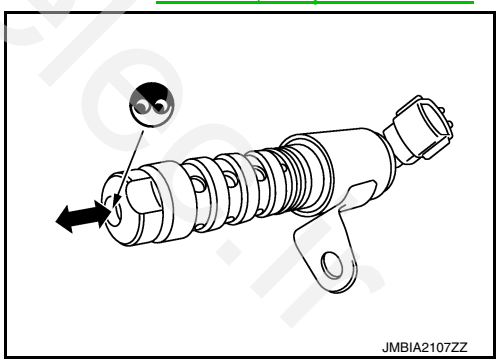
Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace malfunctioning intake valve timing intermediate lock control solenoid valve. Refer to EM-248, "Exploded View".

2. CHECK INTAKE VALVE TIMING INTERMEDIATE LOCK CONTROL SOLENOID VALVE-II

1. Remove intake valve timing intermediate lock control solenoid valve. Refer to EM-248, "Exploded View".
2. Provide 12 V DC between intake valve timing intermediate lock control solenoid valve terminals 1 and 2, and then interrupt it. Check that the plunger moves as shown in the figure.

CAUTION:
Never apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing intermediate lock control solenoid valve.
NOTE:
Always replace O-ring when intake valve timing intermediate lock control solenoid valve is removed.


JMBIA2107ZZ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning intake valve timing intermediate lock control solenoid valve. Refer to EM-248, "Exploded View".

Component Inspection (Crankshaft Position sensor)

INFOID:0000000012198547

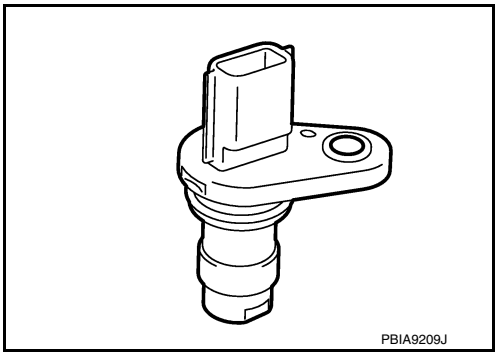
1. CHECK CRANKSHAFT POSITION SENSOR (POS)-1

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect crankshaft position sensor (POS) harness connector.
4. Remove the sensor.

5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace crankshaft position sensor (POS). Refer to EM-282, "Exploded View".



2.CHECK CRANKSHAFT POSITION SENSOR (POS)-2

Check the resistance between crankshaft position sensor (POS) terminals as per the following.

Crankshaft position sensor (POS)		Resistance [at 25°C (77°F)]
+	–	
Terminal (Polarity)		
1	2	Except 0 or ∞ Ω
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace crankshaft position sensor (POS). Refer to EM-282, "Exploded View".

Component Inspection (Camshaft position sensor)

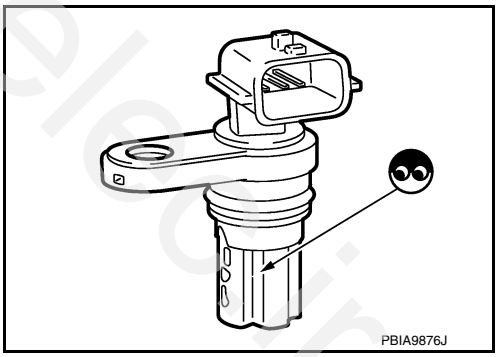
INFOID:0000000012198548

1.CHECK CAMSHAFT POSITION SENSOR (PHASE)-1

1. Turn ignition switch OFF.
2. Loosen the fixing bolt of the sensor.
3. Disconnect camshaft position sensor (PHASE) harness connector.
4. Remove the sensor.
5. Visually check the sensor for chipping.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace camshaft position sensor (PHASE).



2.CHECK CAMSHAFT POSITION SENSOR (PHASE)-2

Check the resistance camshaft position sensor (PHASE) terminals as per the following.

Camshaft position sensor (PHASE)		Resistance [Ω at 25°C (77°F)]
+	–	
Terminals (Polarity)		
1	2	Except 0 or ∞
	3	
2	3	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace camshaft position sensor (PHASE). Refer to EM-260, "Exploded View".

P0603 ECM

DTC Logic

INFOID:0000000012198553

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0603	ECM BACK UP CIRCUIT [Internal control module keep alive memory (KAM) error]	• Malfunction in the internal back up RAM of ECM. • Malfunction in the internal EEP-ROM system of ECM.	• ECM power supply • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Repeat step 1 and 2 for 10 times.
4. Turn ignition switch ON.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1050, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198554

1.CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Perform trouble diagnosis for ECM power supply and ground circuit. Refer to EC-792, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to EC-1050, "DTC Logic".

Is the 1st trip DTC P0603 displayed again?

YES >> Replace ECM. Refer to EC-1256, "Removal and Installation".
NO >> INSPECTION END

P0604 ECM

DTC Logic

INFOID:0000000012198555

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0604	ECM [Internal control module random access memory (RAM) error]	Malfunction in the internal RAM of ECM.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON (engine stopped) and wait least 20 minutes.
   CAUTION:
   Never start engine during this procedure.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1051, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198556

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to EC-1051, "DTC Logic".

Is the 1st trip DTC P0604 displayed again?

YES >> Replace ECM. Refer to EC-1256, "Removal and Installation".
NO >> INSPECTION END

P0605 ECM

DTC Logic

INFOID:0000000012198557

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0605	ECM [Internal control module read only memory (ROM) error]	Malfunction in the internal ROM of ECM.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON (engine stopped) and wait least 20 minutes.
   CAUTION:
   Never start engine during this procedure.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1052, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198558

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to EC-1052, "DTC Logic".

Is the 1st trip DTC P0605 displayed again?

YES >> Replace ECM. Refer to EC-1256, "Removal and Installation".
NO >> INSPECTION END

P0606 ECM

DTC Logic

INFOID:0000000012198559

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0606	CONTROL MODULE (Control module processor)	Malfunction in ECM processor.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

1. Turn ignition switch ON (engine stopped) and wait at least 10 seconds.
   CAUTION:
   Never start engine during this procedure.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1053, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Start engine.
2. Rev up the engine quickly to approximately 3,000 rpm under unloaded condition and completely release the accelerator pedal.
3. Let the engine idle and wait at least 10 seconds.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON.
6. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1053, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198560

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure for 3 times. Refer to EC-1053, "DTC Logic".

Is the 1st trip DTC P0606 displayed again?

YES >> Replace ECM. Refer to EC-1256, "Removal and Installation".
NO >> INSPECTION END

P0607 ECM

DTC Logic

INFOID:0000000012198561

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0607	ECM (Control module performance)	ECM internal communication system is malfunctioning.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON (engine stopped) and wait least 10 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1054, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198562

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to EC-1054, "DTC Logic".

Is the 1st trip DTC P0607 displayed again?

YES >> Replace ECM. Refer to EC-1256, "Removal and Installation".
NO >> INSPECTION END

P060A ECM

DTC Logic

INFOID:0000000012198563

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P060A	CONTROL MODULE (Internal control module monitoring processor performance)	ECM internal monitoring processor is malfunctioning.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 10 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Repeat step 1 and 2 for 5 times.
4. Turn ignition switch ON.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1055, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198564

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to EC-1055, "DTC Logic".

Is the 1st trip DTC P060A displayed again?

YES >> Replace ECM. Refer to EC-1256, "Removal and Installation".
NO >> INSPECTION END

P060B ECM

DTC Logic

INFOID:0000000012198565

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P060B	CONTROL MODULE (Internal control module A/D processing performance)	ECM internal analog/digital conversion processing system is malfunctioning.	ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more with ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON (engine stopped) and wait least 10 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1056, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198566

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to EC-1056, "DTC Logic".

Is the 1st trip DTC P060B displayed again?

YES >> Replace ECM. Refer to EC-1256, "Removal and Installation".
NO >> INSPECTION END

P0611 ECM PROTECTION

Description

INFOID:0000000012198567

This DTC is detected when the ECM protective function is activated due to an extreme temperature increase in ECM, resulting from severe conditions such as heavy load driving.

DTC Logic

INFOID:0000000012198568

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0611	FIC MODULE (ECM protection)	ECM overheat protection control is activated.	ECM overheated

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

This DTC is displayed as protection function history. If no malfunction is detected after the diagnosis, the customer must be informed of the activation of the protection function.

>> Proceed to EC-1057, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198569

1.INSPECTION START

1. Perform DTC confirmation procedure. Refer to EC-1052, "DTC Logic".
2. Check 1st trip DTC.

Is DTC P0605 detected?

YES >> Proceed to EC-1052, "Diagnosis Procedure".
NO >> Explain the customer about the activation of the protection function.

P062B ECM

Description

INFOID:0000000012198570

This DTC is detected when the ECM-integrated injector driver unit has a malfunction. For injector driver unit, refer to EC-606, "ECM".

DTC Logic

INFOID:0000000012198571

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P062B	ECM (Internal control module fuel injector control performance)	Injector driver unit is malfunctioning.	• Harness and connectors (Injector circuit is open or shorted) • Battery power supply • ECM (injector driver unit)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and keep the engine speed at idle for 30 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1058, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198572

1.CHECK FUEL INJECTOR

Check fuel injector. Refer to EC-1204, "Component Function Check".

Is inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure again. Refer to EC-1058, "DTC Logic".
4. Check 1st trip DTC.

Is the DTC P062B displayed again?

YES >> Replace ECM. Refer to EC-1256, "Removal and Installation".
NO >> INSPECTION END

P062F CONTROL MODULE

DTC Logic

INFOID:0000000012198573

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P062F	CONTROL MODULE (Internal control module EEPROM error)	ECM calculation is function 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. Check the DTC.

Is the DTC detected?

YES >> INSPECTION END
NO >> Proceed to EC-1059, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198574

1.INSPECTION START

1. Perform DTC Confirmation Procedure. Refer to EC-1058, "DTC Logic".
2. Erase DTC.

Is DTC erased?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE ECM

1. Replace ECM. Refer to EC-1256, "Removal and Installation".
2. Perform EC-749, "Description".

>> INSPECTION END

P0643 SENSOR POWER SUPPLY

Description

INFOID:0000000012198575

ECM supplies a voltage of 5 V to some of the sensors systematically divided into 2 groups, respectively. Accordingly, when a short circuit develops in a sensor power source, a malfunction may occur simultaneously in the sensors belonging to the same group as the short-circuited sensor.

Sensor power supply 1

- Crankshaft position sensor
- Battery current sensor
- EGR pressure sensor
- Intake manifold runner control valve position sensor
- Manifold absolute pressure sensor
- EGR volume control valve
- Electric wastegate position sensor
- Multi-way control valve position sensor
- Exhaust valve timing control position sensor
- Throttle position sensor
- Accelerator pedal position sensor 1

NOTE:
If sensor power supply 1 circuit is malfunctioning, DTC P0643 is displayed.

Sensor power supply 2

- Mass air flow sensor
- G sensor
- Refrigerant pressure sensor
- Fuel rail pressure sensor
- Engine oil pressure sensor
- Turbocharger boost sensor
- Camshaft position sensor
- Accelerator pedal position sensor 2

DTC Logic

INFOID:0000000012198576

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0643	SENSOR POWER/ CIRC (Sensor power supply 1 circuit short)	ECM detects a voltage of power source for sensor is excessively low or high.	Sensor power supply 1 circuit

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-1061, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198577

1.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position (APP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between APP sensor harness connector and ground.

+		−	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E101	4	Ground	5 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT-2

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		−		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
E101	4	E19	146	Existed

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit.

3.CHECK SENSOR POWER SUPPLY 1 CIRCUIT

1. Disconnect following sensors harness connector.
2. Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E19	146	APP sensor 1	E101	4
F23	30	Battery current sensor	F52	1
	27	Crankshaft position sensor	F107	3
	30	EGR pressure sensor	F46	1
	30	Intake manifold runner control valve position sensor	F73	1
	30	Manifold absolute pressure sensor	F76	1
		EGR volume control valve	F74	3
F24	61	Electric wastegate position sensor	F61	3
		Multi-way control valve position sensor	F60	5
	73	Exhaust valve timing control position sensor	F111	1
	83	Throttle position sensor	F29	5

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair short to ground or short to power in harness or connectors.

4. CHECK COMPONENTS

Check the following.
- APP sensor 1 (Refer to EC-1155, "Component Inspection".)
- Battery current sensor (Refer to EC-1026, "Component Inspection".)
- EGR pressure sensor (Refer to EC-1026, "Component Inspection".)
- Crankshaft position sensor (Refer to EC-951, "Component Inspection".)
- Intake manifold runner control valve position sensor (Refer to EC-1127, "Component Inspection (Intake Manifold Runner Control Valve)".)
- Manifold absolute pressure sensor (Refer to EC-845, "Component Inspection".)
- EGR volume control valve (Refer to EC-994, "Component Inspection (EGR Volume Control Valve)".)
- Electric wastegate position sensor (Refer to EC-1169, "Component Inspection (Electric Wastegate Control Actuator)".)
- Multi-way control valve position sensor (Refer to EC-1183, "Component Inspection (Multi-way Control Valve)".)
- Exhaust valve timing control position sensor (Refer to EC-958, "Component Inspection".)
- Throttle position sensor (Refer to EC-1151, "Component Inspection".)

Is the inspection result normal?

YES >> Perform GI-45, "Intermittent Incident".
NO >> Replace malfunctioning component.

P06DA, P06DB ENGINE OIL PRESSURE CONTROL SOLENOID VALVE

DTC Logic

INFOID:0000000012198578

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P06DA	ENGINE OIL PRESSURE CONTROL (Engine oil pressure control circuit/open)	ECM detects the following status continuously for 5 seconds or more: A voltage signal from engine oil pressure control solenoid valve is around 0V or more and less than normal operating voltage	• Harness or connectors (Engine oil pressure control solenoid valve circuit is open or shorted.) • Engine oil pressure control solenoid valve
P06DB	ENGINE OIL PRESSURE CONTROL (Engine oil pressure control circuit low)	ECM detects the following status continuously for 5 seconds or more: A voltage signal from engine oil pressure control solenoid valve is around 0V	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine.
2. Maintain engine speed at 4,500 rpm or more for at least 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EC-1063, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198579

1.CHECK ENGINE OIL PRESSURE CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect engine oil pressure control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between engine oil pressure control solenoid valve harness connector and ground.

+		−	Voltage
Engine oil pressure control solenoid valve			
Connector	Terminal		
F45	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK ENGINE OIL PRESSURE CONTROL SOLENOID VALVE INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

3. Check the continuity between engine oil pressure control solenoid valve harness connector and ECM harness connector.

+		–		Continuity
Engine oil pressure control solenoid valve		ECM		
Connector	Terminal	Connector	Terminal	
F45	2	F24	98	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK ENGINE OIL PRESSURE CONTROL SOLENOID VALVE

Check the engine oil pressure control solenoid valve. Refer to EC-1064, "Component Inspection (Engine Oil Pressure Control Solenoid Valve)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace engine oil pressure control solenoid valve. Refer to EM-200, "Exploded View".

Component Inspection (Engine Oil Pressure Control Solenoid Valve)

INFOID:0000000012198580

1.CHECK ENGINE OIL PRESSURE CONTROL SOLENOID VALVE-1

1. Turn ignition switch OFF.
2. Disconnect engine oil pressure control solenoid valve harness connector.
3. Check resistance between engine oil pressure control solenoid valve terminals as follows.

Engine oil pressure control solenoid valve		Condition		Resistance
+	–			
Terminal				
1	2	Temperature	20°C (68°F)	19.8 - 24.2 Ω
1	Ground			∞ Ω (Continuity should not exist)
2				

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine oil pressure control solenoid valve. Refer to EM-200, "Exploded View".

2.CHECK ENGINE OIL PRESSURE CONTROL SOLENOID VALVE-2

1. Remove engine oil pressure control solenoid valve. Refer to EM-200, "Exploded View".
2. Provide 12 V DC between engine oil pressure control solenoid valve terminals 1 and 2, and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:
Do not apply 12 V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in engine oil pressure control solenoid valve.
NOTE:
Always replace O-ring when engine oil pressure control solenoid valve is removed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace engine oil pressure control solenoid valve. Refer to EM-200, "Exploded View".

P0850 PNP SWITCH

Description

INFOID:0000000012198581

For CVT models, transmission range switch is turn ON when the selector lever is P or N.
For M/T models, park/neutral position (PNP) range switch is ON when the selector lever is Neutral position.
ECM detects the position because the continuity of the line (the ON) exists.

DTC Logic

INFOID:0000000012198582

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P0850	P-N POS SW/CIRCUIT (Park/neutral position switch)	• For CVT models, the signal of transmission range switch is not changed in the process of engine starting and driving. • For M/T models, the signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	• Harness or connectors [The transmission range switch circuit is open or shorted.(CVT models)] [The park/neutral position (PNP) switch circuit is open or shorted.(M/T models)] • Transmission range switch (CVT models) • Park/neutral position (PNP) switch (M/T models)

DTC CONFIRMATION PROCEDURE

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 5.

2.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 3.

3.CHECK PNP SIGNAL FUNCTION

With CONSULT

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode of “ENGINE” using CONSULT. Then check the “P/N POSI SW” signal as per the following conditions.

Selector lever position	Known-good signal
N or P position (CVT) Neutral position (M/T)	ON
Except above position	OFF

Is the inspection result normal?

YES >> GO TO 4.
NO >> Proceed to EC-1066, "Diagnosis Procedure".

4.PERFORM DTC CONFIRMATION PROCEDURE

1. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Start engine and warm it up to normal operating temperature.

3. Maintain the following conditions for at least 60 consecutive seconds.
CAUTION:
Always drive vehicle at a safe speed.

ENG SPEED	1,125 - 6,375 rpm (CVT) 1,820 - 6,375 rpm (M/T)
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.3 - 31.8 msec (CVT) 1.2 - 31.8 msec (M/T)
VHCL SPEED SE	More than 64 km/h (40 mph)
Selector lever	Suitable position

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1066, "Diagnosis Procedure".
NO >> INSPECTION END

5.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-1066, "Component Function Check".
NOTE:
Use component function check the overall function of the transmission range switch circuit (CVT models) or the park/neutral position (PNP) switch circuit (M/T models). During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1066, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012198583

1.PERFORM COMPONENT FUNCTION CHECK

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground as per the following conditions.

ECM				Condition		Voltage (Approx.)
Connector	+ Terminal	Connector	– Terminal			
F24	103	E19	152	Selector lever	P or N (CVT) Neutral (M/T)	0 V
					Except above	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1066, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198584

1.INSPECTION START

Check which type of transmission the vehicle is equipped with.

Which type of transmission?

CVT >> GO TO 2.
M/T >> GO TO 6.

2.CHECK TRANSMISSION RANGE SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect transmission range switch harness connector.
3. Turn ignition switch ON.

4. Check the voltage between transmission range switch harness connector and ground.

+		–	Voltage
Transmission range switch			
Connector	Terminal		
F30	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 3.

3. CHECK TRANSMISSION RANGE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between transmission range switch harness connector and IPDM E/R harness connector.

+		–		Continuity
Transmission range switch		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F30	1	E15	58	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4. CHECK TRANSMISSION RANGE SWITCH SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between transmission range switch harness connector and ECM harness connector.

+		–		Continuity
Transmission range switch		ECM		
Connector	Terminal	Connector	Terminal	
F30	2	F24	103	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK TRANSMISSION RANGE SWITCH

Check the transmission range switch. Refer to TM-458, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace transmission range switch. Refer to TM-577, "Removal and Installation".

6. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect PNP switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between PNP switch harness connector and ground.

+		–	Voltage
PNP switch			
Connector	Terminal		
F49	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 7.
NO >> Perform the trouble diagnosis for power supply circuit.

7. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between PNP switch harness connector and ECM harness connector.

+		–		Continuity
PNP switch		ECM		
Connector	Terminal	Connector	Terminal	
F49	3	F24	103	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8. CHECK PNP SWITCH

Check the PNP switch. Refer to TM-20, "PARK/NEUTRAL POSITION (PNP) SWITCH : Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace PNP switch. Refer to TM-24, "Removal and Installation".

P100C VALVE TIMING OFFSET DATA

Description

INFOID:0000000012198585

Valve timing offset data is measured per engine and written in ECM at the factory. ECM controls VTC according to the information written in ECM to correct the variation in valve timing which depends on engine. After ECM or engine assembly is replaced, the 2D code affixed to the VTC cover must be written in ECM. If valve timing offset data writing is not completed, ECM detects DTC.

DTC Logic

INFOID:0000000012198586

DTC DETECTION LOGIC

DTC	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P100C	V/T OFFSET DATA NOT WRITTEN (Valve timing offset data not written)	ECM detects the initial value of valve timing offset data.	Valve timing offset data writing is not yet implemented.

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 5 seconds.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-1069, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198587

1.PERFORM VALVE TIMING OFFSET DATA WRITING

Perform “VALVE TIMING OFFSET DATA WRITING”. Refer to EC-757, "Description".

>> INSPECTION END

P1148 CLOSED LOOP CONTROL

DTC Logic

INFOID:0000000012198588

DTC DETECTION LOGIC

NOTE:
DTC P1148 is displayed with another DTC for A/F sensor 1.
Perform the trouble diagnosis for the corresponding DTC.

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1148	CLOSED LOOP-B1 (Closed loop bank 1)	The closed loop control function for bank 1 does not operate even when vehicle is being driven in the specified condition.	• Harness or connectors (The A/F sensor 1 circuit is open or shorted.) • A/F sensor 1 • A/F sensor 1 heater

P1197 OUT OF GAS

Description

INFOID:0000000012198589

This diagnosis result is detected when the fuel level of the fuel tank is extremely low and the engine does not run normally.

DTC Logic

INFOID:0000000012198590

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1197	FUEL RUN OUT (Out of gas)	• Fuel rail pressure remains at 1.1 MPa (11 bar, 11.2 kg/cm^2, 159.5 psi) or less for 5 seconds or more with the fuel level too low. • Fuel rail pressure remains 2.7 MPa (27 bar, 27.5 kg/cm^2, 392 psi) lower than a target fuel pressure for 5 seconds or more with the fuel level too low.	• Out of gas • Harness or connectors (Low pressure fuel pump circuit is open or shorted.) • Low pressure fuel pump • Fuel pressure regulator • Low pressure fuel system • Harness or connectors (High pressure fuel pump circuit is shorted.) • High pressure fuel pump • High pressure fuel system • Fuel rail pressure sensor • Disconnection of the fuel hose

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-I

Start the engine.

Does the engine start?

YES >> GO TO 3.
NO >> Proceed to EC-1071, "Diagnosis Procedure".

3.PERFORM DTC CONFIRMATION PROCEDURE-II

1. Warm up the engine to the normal operating temperature.
   NOTE:
   For best results, warm up the engine until “COOLAN TEMP/S” on “DATA MONITOR” mode of “ENGINE” using CONSULT reaches at least 70°C (158°F).
2. Keep the engine speed at 3,500 rpm for 5 seconds and let it idle at least 60 seconds.
3. Check the 1st trip DTC.
   NOTE:
   If the fuel tank has sufficient fuel, this diagnosis result may not be detected.

Is 1st trip DTC detected?

YES >> Proceed to EC-1071, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198591

1.REFUEL THE VEHICLE

1. Refuel 10 liter (10 US qt, 8 imp qt).
   CAUTION:
   Never refuel more than 10 liter.
2. Start the engine and keep the engine speed at 3,000 rpm for 30 seconds.
   NOTE:
   For best results, warm up the engine until “COOLAN TEMP/S” on “DATA MONITOR” mode of “ENGINE” using CONSULT reaches at least 70°C (158°F).
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Turn ignition switch ON.
7. Erase the DTC.
8. Start the engine and let it idle at least 60 seconds.
9. Perform DTC confirmation procedure again. Refer to EC-1071, "DTC Logic".

Is 1st trip DTC detected?

YES >> GO TO 2.
NO >> INSPECTION END

2.CHECK LOW PRESSURE FUEL PUMP

Refer to EC-1234, "Component Function Check".

Is inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK HIGH PRESSURE FUEL PUMP

Refer to EC-1212, "Component Function Check".

Is inspection result normal?

YES >> Check the fuel hose for disconnection and looseness.
NO >> Repair or replace error-detected parts.

P119A, P119B FUEL RAIL PRESSURE SENSOR

DTC Logic

INFOID:0000000012198592

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P119A	FUEL PRESSURE SENSOR (Fuel pressure sensor)	All of the following conditions are satisfied: • Battery voltage: 8 V or more • Under engine start condition • Engine coolant temperature at previous ignition switch OFF: 65°C (149°F) or more • Engine coolant temperature: 35°C (65°F) or less • Temperature difference between engine coolant and intake air: Less than 6°C (42°F) • Fuel rail pressure: Less than 1.0 MPa (10.2 kg/cm^2, 145 psi) (calculated by ECM) • Fuel system monitor: Excessively RICH	• Harness or connectors (Fuel rail pressure sensor circuit is open or shorted.) • Fuel rail pressure sensor • Sensor power supply 2
P119B	FUEL PRESSURE SENSOR (Fuel pressure sensor)	All of the following conditions are satisfied: • Battery voltage: 8 V or more • Ignition switch: ON (engine stopped) • Engine coolant temperature at previous ignition switch OFF: 65°C (149°F) or more • Engine coolant temperature: 35°C (65°F) or less • Temperature difference between engine coolant and intake air: Less than 6°C (42°F) • Fuel rail pressure: More than 1.5 MPa (15.3 kg/cm^2, 217 psi) (calculated by ECM) • Fuel system monitor: Excessively LEAN	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING-1

If DTC Confirmation Procedure is previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, check that battery voltage is 9 V or more with ignition switch ON.

>> GO TO 2.

2.PRECONDITIONING-2

NOTE:

- When it is certain that the previous driving is performed with the engine warmed up, the next steps can be performed.
- When it is difficult to satisfy the conditions, performing Component Function Check can identify the presence or absence of malfunction in the part/system that may result in a possible cause of this DTC. (Perform DTC Confirmation Procedure as much as possible.)

1. Start the engine and warm it up until engine coolant temperature reaches 70°C (158°F) or more.
2. Stop the engine and leave the vehicle in a cool place (soak the engine) until the engine coolant temperature reaches 35°C (95°F) or less.

CAUTION:

- **The difference between air temperature and engine coolant temperature must be 5°C (9°F) or less.**
- **Never turn ignition switch ON during soak the engine.**

Are the conditions satisfied?

YES >> GO TO 4.
NO >> GO TO 3.

3. COMPONENT FUNCTION CHECK

With CONSULT

1. Turn ignition switch OFF.
2. Start the engine.
3. On CONSULT screen, select “DATA MONITOR” mode of “ENGINE”.
4. Check the value of “FUEL PRES SEN V” under the following conditions.

Monitor Item	Condition	Values/Status
FUEL PRES SEN V	Engine speed: Idle	1,140 – 1,460 mV
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,300 – 2,900 mV

Without CONSULT

1. Turn ignition switch OFF.
2. Start the engine.
3. Check fuel rail pressure sensor signal voltage.

ECM			Condition	Value (Approx.)
Connector	+	–		
	Terminal			
F7	2	3	[Engine is running] • Warm-up condition • Idle speed	1.14 – 1.46 V
			[Engine is running] • Warm-up condition • Revving engine from idle to 4,000 rpm quickly	1.3 – 2.9 V

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Proceed to EC-1074, "Diagnosis Procedure".

4. PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

1. Turn ignition switch ON (engine stopped).
2. On CONSULT screen, select “ENGINE” >> “DATA MONITOR” >> “COOLAN TEMP/S” and “INT/A TEMP SE”.
3. Check that the indicated value of “COOLAN TEMP/S” is less than 35°C (95°F).
4. Check that the difference between “INT/A TEMP SE” and “COOLAN TEMP/S” is 5°C (41°F) or less.
5. Check “Self-diagnostic result” of “ENGINE”.

Is the DTC detected?

YES >> Proceed to EC-1074, "Diagnosis Procedure".
NO-1 (Conditions satisfied)>>GO TO 5.
NO-2 (Conditions not satisfied)>>GO TO 2.

5. PERFORM DTC CONFIRMATION PROCEDURE-2

1. Start the engine (or cranking) at least 1 second.
2. Check “Self-diagnostic result” of “ENGINE”.

Is the DTC detected?

YES >> Proceed to EC-1074, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-45, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000012198593

NOTE:

Turning the ignition switch ON with FRP sensor harness connector disconnected causes ECM to detect DTC P0190. Be sure to erase the DTC when the diagnosis procedure.

1.CHECK FUEL RAIL PRESSURE (FRP) SENSOR POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect FRP sensor connector.
3. Turn ignition switch ON.
4. Check the voltage between FRP sensor harness connector terminals.

FRP sensor			Voltage (Approx.)
Connector	+ terminal	–	
F7	1	3	5 V

Inspection result normal?

YES >> GO TO 7.
NO >> GO TO 2.

2.CHECK FRP SENSOR POWER SUPPLY-2

Check the voltage between FRP sensor harness connector and the ground.

+		–	Voltage (Approx.)
FRP sensor			
Connector	Terminal		
F7	1	Ground	5 V

Is inspection result normal?

YES >> GO TO 5.
NO >> GO TO 3.

3.CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness connector for short to power and short to ground, between the following terminals.

+		–		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F7	1	F23	29	Existed

4. Also check harness for short to power and short to ground.

Is inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform EC-1240, "Diagnosis Procedure".

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected part.

5.CHECK FRP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between FRP sensor harness connector and ECM harness connector.

+		–		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F7	3	F23	13	Existed

4. Also check harness for short to power.

Is inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and the ground.

ECM		Ground	Continuity
Connector	Terminal		
F23	9	Ground	Existed
	10		
	50		
F24	60		
	110		
E19	147		
	149		
	152		

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

7.CHECK FRP SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between FRP sensor harness connector and ECM harness connector.

+		–		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F7	2	F23	25	Existed

4. Also check harness for short to ground and to power.

Is inspection result normal?

YES >> Replace fuel rail pressure sensor. Refer to EM-208, "Exploded View".
NO >> Repair or replace error-detected parts.

P119C FUEL RAIL PRESSURE SENSOR

DTC Logic

INFOID:0000000012198594

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P119C	FUEL PRESSURE SENSOR (Fuel pressure sensor)	All of the following conditions are satisfied: • Battery voltage: 8 V or more • Engine speed: 50 rpm or more • Engine coolant temperature: With a background of 65°C (149°F) or more during the trip • Remaining fuel amount: 15% or more • Fuel cut: No	• Harness or connectors (Fuel rail pressure sensor circuit is open or shorted.) • Fuel rail pressure sensor • Sensor power supply 2

DTC CONFIRMATION PROCEDURE

1.CHECK DTC PRIORITY

If DTC P119C is displayed with DTC P0190, first perform the confirmation procedure (trouble diagnosis) for DTC P0190.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to EC-919, "DTC Logic".
NO >> GO TO 2.

2.PRECONDITIONING-1

If DTC Confirmation Procedure is previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

- **Before performing the following procedure, check that battery voltage is 9 V or more with ignition switch ON.**
- **Remaining fuel amount must be 15% or more.**

>> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and warm it up until the engine coolant temperature reaches 70°C (158°F) or more.
2. Drive the vehicle and accelerate 3 consecutive seconds or more with the engine speed 1,500 rpm or more.
3. Check “Self-diagnostic result” of “ENGINE”.

Is the DTC detected?

YES >> Proceed to EC-1077, "Diagnosis Procedure".
NO-1 >> To check malfunction symptom before repair: Refer to GI-45, "Intermittent Incident".
NO-2 >> Confirmation after repair: INSPECTION END

Diagnosis Procedure

INFOID:0000000012198595

NOTE:
Turning the ignition switch ON with FRP sensor harness connector disconnected causes ECM to detect DTC P119C. Be sure to erase the DTC when the diagnosis procedure.

1.CHECK DTC PRIORITY

If DTC P119C is displayed with DTC P0190, first perform the confirmation procedure (trouble diagnosis) for DTC P0190.

Is applicable DTC detected?

YES >> Perform diagnosis of applicable. Refer to EC-1077, "DTC Logic".
NO >> GO TO 2.

2.CHECK FUEL RAIL PRESSURE (FRP) SENSOR POWER SUPPLY-1

1. Turn ignition switch OFF.
2. Disconnect FRP sensor connector.
3. Turn ignition switch ON.
4. Check the voltage between FRP sensor harness connector terminals.

FRP sensor			Voltage (Approx.)
Connector	+ terminal	–	
F7	1	3	5 V

Inspection result normal?

YES >> GO TO 8.
NO >> GO TO 3.

3.CHECK FRP SENSOR POWER SUPPLY-2

Check the voltage between FRP sensor harness connector and the ground.

+		–	Voltage (Approx.)
FRP sensor			
Connector	Terminal		
F7	1	Ground	5 V

Is inspection result normal?

YES >> GO TO 6.
NO >> GO TO 4.

4.CHECK SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness connector for short to power and short to ground, between the following terminals.

+		–		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F7	1	F23	29	Existed

4. Also check harness for short to power and short to ground.

Is inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform EC-1240, "Diagnosis Procedure".

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected part.

6.CHECK FRP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between FRP sensor harness connector and ECM harness connector.

+		–		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F7	3	F23	13	Existed

4. Also check harness for short to power.

Is inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and the ground.

ECM		Ground	Continuity
Connector	Terminal		
F23	9	Ground	Existed
	10		
	50		
F24	60		
	110		
E19	147		
	149		
	152		

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

8. CHECK FRP SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between FRP sensor harness connector and ECM harness connector.

+		–		Continuity
FRP sensor		ECM		
Connector	Terminal	Connector	Terminal	
F7	2	F23	25	Existed

4. Also check harness for short to ground and to power.

Is inspection result normal?

YES >> Replace fuel rail pressure sensor. Refer to EM-208, "Exploded View".
NO >> Repair or replace error-detected parts.

P1212 TCS COMMUNICATION LINE

Description

INFOID:0000000012198596

This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and “ABS actuator and electric unit (control unit)”.
Be sure to erase the malfunction information such as DTC not only for “ABS actuator and electric unit (control unit)” but also for ECM after TCS related repair.

DTC Logic

INFOID:0000000012198597

DTC DETECTION LOGIC

NOTE:
- **If DTC P1212 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-798, "DTC Logic".**
- **If DTC P1212 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1054, "DTC Logic".**

Freeze frame data is not stored in the ECM for this self-diagnosis.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1212	TCS/CIRC (TCS communication line)	ECM can not receive the information from “ABS actuator and electric unit (control unit)” continuously.	• Harness or connectors (CAN communication line is open or shorted.) • ABS actuator and electric unit (control unit) • Dead (Weak) battery

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1080, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198598

Perform the trouble diagnosis for TCS. Refer to BRC-59, "Work Flow".
NOTE:
If DTC P1212 is displayed with DTC UXXXX and/or P0607, perform the following trouble diagnosis.
- Trouble diagnosis for DTC UXXXX Refer to EC-706, "DTC Index".
- Trouble diagnosis for DTC P0607 Refer to EC-1054, "DTC Logic".

P1217 ENGINE OVER TEMPERATURE

DTC Logic

INFOID:0000000012198599

DTC DETECTION LOGIC

NOTE:

- **If DTC P1217 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX.**
- **If DTC P1217 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1054, "DTC Logic".**

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.

When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1217	ENG OVER TEMP [Engine over temperature (Overheat)]	• Cooling fan does not operate properly (Overheat). • Cooling fan system does not operate properly (Overheat). • Engine coolant was not added to the system using the proper filling method. • Engine coolant is not within the specified range.	• Harness or connectors (Cooling fan circuit is open or shorted.) • IPDM E/R • Cooling fan control module • Cooling fan motor • Radiator hose • Radiator • Radiator cap • Reservoir tank • Water pump • Thermostat • Water control valve

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to CO-40, "Draining and Filling". Also, replace the engine oil. Refer to CO-40, "Draining and Filling".

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-13, "Anti-Freeze Coolant Mixture Ratio".**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-1081, "Component Function Check".

NOTE:

Use component function check to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END

NO >> Proceed to EC-1082, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012198600

1.PERFORM COMPONENT FUNCTION CHECK-I

WARNING:

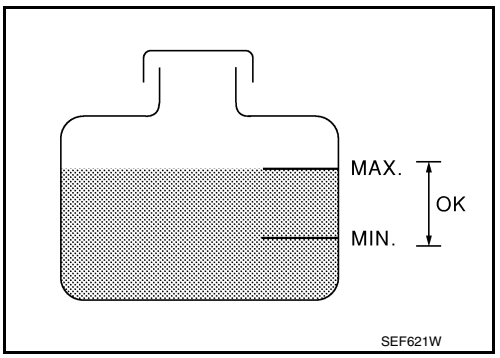
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

Check the coolant level in the reservoir tank and radiator.
Allow engine to cool before checking coolant level.

Is the coolant level in the reservoir tank and/or radiator below the proper range?

YES >> Proceed to EC-1082, "Diagnosis Procedure".
NO >> GO TO 2.



2.PERFORM COMPONENT FUNCTION CHECK-II

Confirm whether customer filled the coolant or not.

Did customer fill the coolant?

YES >> Proceed to EC-1082, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

With CONSULT
1. Turn ignition switch ON.
2. Perform “FAN DUTY CONTROL” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Check that cooling fan speed varies according to the percentage.

Without CONSULT
1. Activate IPDM E/R auto active test and check cooling fan motors operation. Refer to PCS-12, "Diagnosis Description".
2. Check that cooling fan operates.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1082, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198601

1.CHECK COOLING FAN OPERATION

With CONSULT
1. Turn ignition switch ON.
2. Perform “FAN DUTY CONTROL” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Check that cooling fan speed varies according to the percentage.

Without CONSULT
1. Activate IPDM E/R auto active test and check cooling fan motors operation. Refer to PCS-12, "Diagnosis Description".
2. Check that cooling fan operates.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Proceed to EC-1196, "Diagnosis Procedure".

2.CHECK COOLING SYSTEM FOR LEAK-I

Check cooling system for leak. Refer to CO-40, "Inspection".

Is leakage detected?

YES >> GO TO 3.
NO >> GO TO 4.

3.CHECK COOLING SYSTEM FOR LEAK-II

Check the following for leak.
- Hose (Refer to CO-40, "Inspection".)
- Radiator (Refer to CO-49, "Inspection".)
- Water pump (Refer to CO-53, "Inspection".)

>> Repair or replace malfunctioning part.

4. CHECK RADIATOR CAP

Check radiator cap. Refer to CO-45, "Radiator Cap Inspection".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace radiator cap. Refer to CO-46, "Exploded View".

5. CHECK THERMOSTAT

Check thermostat.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Replace thermostat.

6. CHECK WATER CONTROL VALVE

Check water control valve.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Replace water control valve.

7. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-861, "Component Inspection (Engine Coolant Temperature Sensor 1)".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace engine coolant temperature sensor.

8. OVERHEATING CAUSE ANALYSIS

If the cause cannot be isolated, check the CO-38, "Diagnosis Chart by Symptom".

>> INSPECTION END

P1225 TP SENSOR

DTC Logic

INFOID:0000000012198602

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1225	CTP LEARNING-B1 [Closed throttle position learning performance]	Closed throttle position learning value is excessively low.	Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1084, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198603

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct. Refer to EM-192, "Exploded View".
3. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

YES >> Replace electric throttle control actuator. Refer to EM-197, "Exploded View".
NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to EC-754, "Description".

P1226 TP SENSOR

DTC Logic

INFOID:0000000012198604

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1226	CTP LEARNING-B1 (Closed throttle position learning performance)	Closed throttle position learning is not performed successfully, repeatedly.	Electric throttle control actuator (TP sensor 1 and 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Turn ignition switch OFF, wait at least 10 seconds.
3. Turn ignition switch ON.
4. Repeat steps 2 and 3 for 32 times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1085, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198605

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct. Refer to EM-192, "Exploded View".
3. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

YES >> Replace electric throttle control actuator. Refer to EM-197, "Exploded View".
NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to EC-754, "Description".

P1423, P1424 COLD START CONTROL

Description

INFOID:0000000012198606

ECM controls fuel injection timing and fuel injection quantity when engine is started with the engine cold. This control promotes the activation of three way catalyst by heating the catalyst and reduces emissions.

DTC Logic

INFOID:0000000012198607

DTC DETECTION LOGIC

NOTE:

- **If DTC P1423 or P1424 is displayed with other DTC, first perform the trouble diagnosis for other DTC.**

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1423	COLD START CONTROL (Cold start emission reduction strategy monitoring)	ECM does not control fuel injection timing properly when engine is started with the engine cold.	ECM
P1424	COLD START CONTROL (Cold start emission reduction strategy monitoring)	ECM does not control fuel injection quantity properly when engine is started with the engine cold.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

WITH CONSULT

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
4. Check that “COOLAN TEMP/S”.

- If it is between 5°C (41°F) and 40°C (104°F) go to the following steps.
- If it is below 5°C (41°F) warm engine up to more than 5°C (41°F) and retry from step 1.
- If it is above 40°C (104°F) cool engine down to less than 40°C (104°F) and retry from step 1.

5. Start engine and let it idle for 5 minutes.
6. Check 1st trip DTC.

WITH GST

Follow the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-1086, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198608

1.INSPECTION START

1. Turn ignition switch ON.
2. Erase DTC.
3. Perform DTC confirmation procedure. Refer to EC-1086, "DTC Logic".
4. Check 1st trip DTC.

Is the 1st trip DTC P1423 or P1424 displayed again?

YES >> Replace ECM. Refer to EC-1256, "Removal and Installation".
NO >> INSPECTION END

P1451 PRESSURE SENSOR

DTC Logic

INFOID:0000000012198609

DTC DETECTION LOGIC

NOTE:
If DTC P1451 is displayed with DTC P0452 or P0453, first perform the trouble diagnosis for DTC P0452 or P0453. Refer to EC-1005, "DTC Logic" or EC-1008, "DTC Logic".

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1451	TC/SC PRES-EVAP PRES (EVAP control system pressure sensor/turbocharger boost sensor correlation)	ECM detects a state that the pressure difference remains −13.0 kPa (−98 mmHg, −3.83 inHg) or less/13.5 kPa (102 mmHg, 3.99 inHg) or more for continuously for 5 seconds or more under the condition that the pressure of the EVAP control system pressure sensor and that of the turbocharger boost sensor are equal.	• EVAP control system pressure sensor • Turbocharger boost sensor • Clogging, crushing, or damage in hose or piping

DTC CONFIRMATION PROCEDURE

NOTE:
Never refuel before and during the following procedure.

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and warm it up to normal operating temperature
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start the engine. Wait at least for 15 seconds after the start of idle running.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1088, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198610

1.CHECK HOSE AND PIPING

1. Turn ignition switch OFF.
2. Check the following.

- Blockage, crush, or damage in the hose and the piping of EVAP purge line between fuel tank and intake manifold.
- Blockage, crush, or damage in the hose and the piping of intake air passage between inlet air duct and intake manifold.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts

2.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Check EVAP control system pressure sensor. Refer to EC-1089, "Component Inspection (EVAP Control System Pressure Sensor)".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Exploded View".

3.CHECK TURBOCHARGER BOOST SENSOR

Check turbocharger boost sensor. Refer to EC-1089, "Component Inspection (Turbocharger Boost Sensor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace turbocharger boost sensor. Refer to EM-194, "Exploded View".

Component Inspection (EVAP Control System Pressure Sensor)

INFOID:0000000012198611

1.CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Always replace O-ring with a new one.**
3. Install a vacuum pump to EVAP control system pressure sensor.
4. Turn ignition switch ON and check output voltage between ECM harness connector and ground under the following conditions.

ECM			Condition [Applied vacuum kPa (kg/cm^2, psi)]	Voltage
Connector	+	–		
	Terminal			
E19	121	148	Not applied	0.5 - 4.6 V
			-26.7 (-0.272, -3.87)	2.1 to 2.5 V lower than above value

CAUTION:
- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-0.952 kg/cm^2, -13.53 psi) or pressure over 101.3 kPa (1.033 kg/cm^2, 14.69 psi).**

Is the inspection result normal?

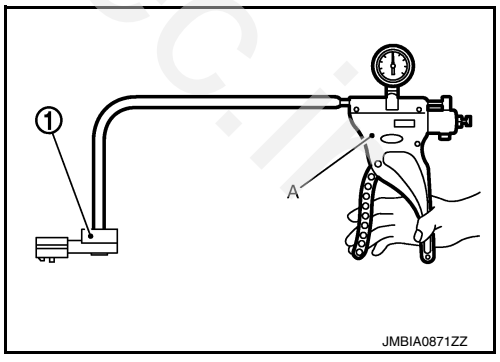
YES >> INSPECTION END
NO >> Replace EVAP control system pressure sensor. Refer to FL-27, "2WD : Exploded View".

Component Inspection (Turbocharger Boost Sensor)

INFOID:0000000012198612

1.CHECK TURBOCHARGER BOOST SENSOR

1. Turn ignition switch OFF.
2. Remove turbocharger boost sensor with its harness connector.
3. Install pressure pump (A) to turbocharger boost sensor (1).
   CAUTION:
   When insert a pressure pump hose to the sensor, be careful to the damage of the sensor housing.
4. Turn ignition switch ON.
5. Check the voltage between ECM harness connector terminals as per the following conditions.



NOTE:
- Always calibrate the pressure pump gauge when using it.
- Inspection should be done at room temperature [10 - 30°C (50 - 86°F)].

ECM			Condition [Pressure (Relative to atmospheric pressure)]	Voltage (Approx.)
Connector	+	–		
	Terminal			
F23	11	13	0 kPa (0 mbar, 0 mmHg, 0 inHg)	2.03 V
			40 kPa (400 mbar, 300 mmHg, 11.81 inHg)	2.67 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace turbocharger boost sensor. Refer to EM-242, "Exploded View".

P1550 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000012198613

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1550	BAT CURRENT SENSOR (Battery current sensor circuit range/performance)	The output voltage of the battery current sensor remains within the specified range while engine is running.	• Harness or connectors (Battery current sensor circuit is open or shorted.) • Battery current sensor • Camshaft position sensor • Camshaft (Intake) • Starter motor • Starting system circuit • Dead (Weak) battery • Sensor power supply 2 circuit

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1091, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198614

1.CHECK BATTERY CURRENT SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect battery current sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between battery current sensor harness connector and ground.

+		-	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
F52	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform EC-1240, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		–		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	3	F23	43	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		–		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	4	F23	38	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts

5.CHECK BATTERY CURRENT SENSOR

Check the battery current sensor. Refer to EC-1092, "Component Inspection".

Is the inspection result normal?

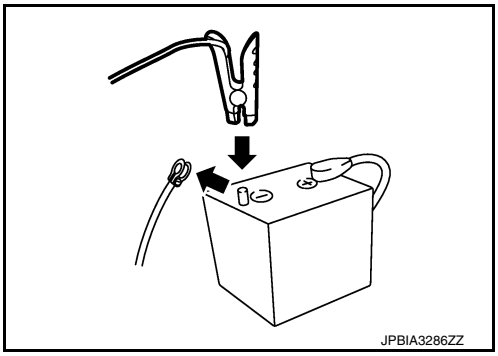
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace battery negative cable assembly.

Component Inspection

INFOID:0000000012198615

1.CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between ECM harness connector and ground.



ECM			Voltage (Approx.)
Connector	+	-	
	Terminal		
F23	38	43	2.5 V*

*: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-97, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly.

P1551, P1552 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000012198616

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1551	BAT CURRENT SENSOR (Battery current sensor circuit low input)	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (Battery current sensor circuit is open or shorted.) • Battery current sensor • Camshaft position sensor • Camshaft (Intake) • Starter motor • Starting system circuit • Dead (Weak) battery • Sensor power supply 2 circuit
P1552	BAT CURRENT SENSOR (Battery current sensor circuit high input)	An excessively high voltage from the sensor is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V with ignition switch ON

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1094, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198617

1.CHECK BATTERY CURRENT SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect battery current sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between battery current sensor harness connector and ground.

+		-	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
F52	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform EC-1240, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		−		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	3	F23	43	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		−		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	4	F23	38	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts

5.CHECK BATTERY CURRENT SENSOR

Check the battery current sensor. Refer to EC-1092, "Component Inspection".

Is the inspection result normal?

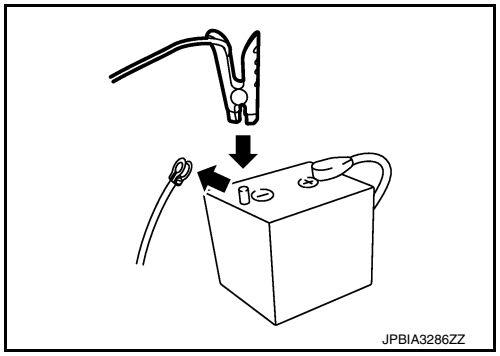
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace battery negative cable assembly.

Component Inspection

INFOID:0000000012198618

1.CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between ECM harness connector and ground.



ECM			Voltage (Approx.)
Connector	+	-	
	Terminal		
F23	38	43	2.5 V*

*: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-97, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly.

P1553 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000012198619

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1553	BAT CURRENT SENSOR (Battery current sensor performance)	The signal voltage transmitted from the sensor to ECM is higher than the amount of the maximum power generation.	• Harness or connectors (Battery current sensor circuit is open or shorted.) • Battery current sensor • Camshaft position sensor • Camshaft (Intake) • Starter motor • Starting system circuit • Dead (Weak) battery • Sensor power supply 2 circuit

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1097, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198620

1.CHECK BATTERY CURRENT SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect battery current sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between battery current sensor harness connector and ground.

+		-	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
F52	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform EC-1240, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		–		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	3	F23	43	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		–		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	4	F23	38	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts

5.CHECK BATTERY CURRENT SENSOR

Check the battery current sensor. Refer to EC-1092, "Component Inspection".

Is the inspection result normal?

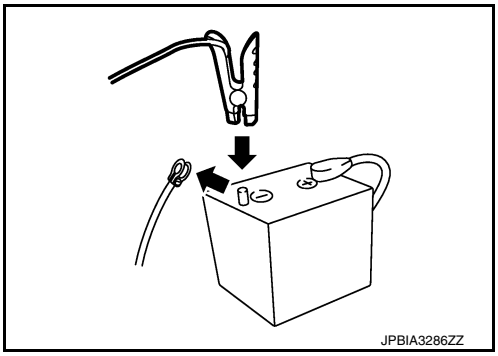
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace battery negative cable assembly.

Component Inspection

INFOID:0000000012198621

1.CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between ECM harness connector and ground.



ECM			Voltage (Approx.)
Connector	+	-	
	Terminal		
F23	38	43	2.5 V

*: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-97, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly.

P1554 BATTERY CURRENT SENSOR

DTC Logic

INFOID:0000000012198622

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1554	BAT CURRENT SENSOR (Battery current sensor performance)	The output voltage of the battery current sensor is lower than the specified value while the battery voltage is high enough.	• Harness or connectors (Battery current sensor circuit is open or shorted.) • Battery current sensor • Camshaft position sensor • Camshaft (Intake) • Starter motor • Starting system circuit • Dead (Weak) battery • Sensor power supply 2 circuit

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-1100, "Component Function Check".

NOTE:

Use component function check to check the overall function of the battery current sensor circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1101, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012198623

1.PRECONDITIONING

TESTING CONDITION:

- **Before performing the following procedure, confirm that battery voltage is more than 12.8 V at idle.**
- **Before performing the following procedure, confirm that all load switches and A/C switch are turned OFF.**

>> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK

With CONSULT

1. Start engine and let it idle.
2. Select “BAT CUR SEN” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check “BAT CUR SEN” indication for 10 seconds.
   “BAT CUR SEN” should be above 2,300 mV at least once.

Without CONSULT

1. Start engine and let it idle.
2. Check the voltage between ECM harness connector and ground.

ECM			Voltage
Connector	+	-	
	Terminal		
F23	38	43	Above 2.3 V at least once

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1101, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198624

1.CHECK BATTERY CURRENT SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect battery current sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between battery current sensor harness connector and ground.

+		-	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
F52	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform EC-1240, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		–		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	3	F23	43	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		–		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	4	F23	38	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts

5.CHECK BATTERY CURRENT SENSOR

Check the battery current sensor. Refer to EC-1092, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".

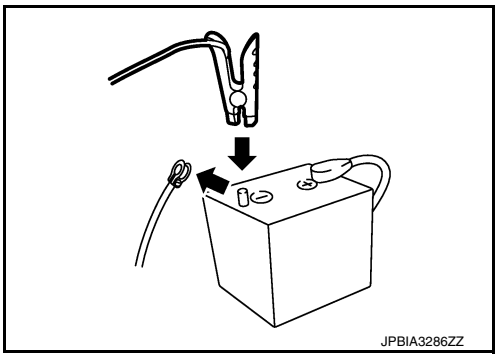
NO >> Replace battery negative cable assembly.

Component Inspection

INFOID:0000000012198625

1. CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between ECM harness connector and ground.



ECM			Voltage (Approx.)
Connector	+	-	
	Terminal		
F23	38	43	2.5 V*

*: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-97, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly.

P1556, P1557 BATTERY TEMPERATURE SENSOR

DTC Logic

INFOID:0000000012198626

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1556	BAT TMP SEN/CIRC (Battery temperature sensor circuit low input)	Signal voltage from Battery temperature sensor remains 0.16V or less for 5 seconds or more.	• Harness or connectors [Battery current sensor (Battery temperature sensor) circuit is shorted.] • Battery current sensor (Battery temperature sensor)
P1557	BAT TMP SEN/CIRC (Battery temperature sensor circuit high input)	Signal voltage from Battery temperature sensor remains 4.84V or more for 5 seconds or more.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 10 V or more at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1103, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198627

1.CHECK BATTERY TEMPERATURE SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect battery current sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between battery current sensor harness connector and ground.

+		−	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
F52	2	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK BATTERY TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		–		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	2	F23	32	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK BATTERY TEMPERATURE SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		–		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	3	F23	43	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK BATTERY TEMPERATURE SENSOR

Check the battery temperature sensor. Refer to EC-1104, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace battery negative cable assembly.

Component Inspection

INFOID:0000000012198628

1.CHECK BATTERY TEMPERATURE SENSOR

1. Turn ignition switch OFF.
2. Disconnect battery current sensor.
3. Check the resistance between battery current sensor connector terminals.

Battery current sensor		Resistance
+	–	
Terminal		
2	3	Continuity with the resistance value 100 Ω or more

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly.

P1564 ASCD STEERING SWITCH

DTC Logic

INFOID:0000000012198629

DTC DETECTION LOGIC

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1052, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1564	ASCD SW (ASCD steering switch)	• An excessively high voltage signal from the ASCD steering switch is sent to ECM. • ECM detects that input signal from the ASCD steering switch is out of the specified range. • ECM detects that the ASCD steering switch is stuck ON.	• Harness or connectors (ASCD steering switch circuit is open or shorted.) • ASCD steering switch • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Wait at least 10 seconds.
3. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press ACCEL/RES switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press COAST/SET switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Check DTC.

Is DTC detected?

YES >> Proceed to EC-1105, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198630

1.CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT

1. Turn ignition switch ON.
2. Select “CANCEL SW”, “RESUME/ACC SW” and “SET SW” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check each item indication as per the following conditions.

Monitor item	Condition		Indication
MAIN SW	MAIN switch	Pressed	ON
		Released	OFF
CANCEL SW	CANCEL switch	Pressed	ON
		Released	OFF

Monitor item	Condition		Indication
RESUME/ACC SW	ACCEL/RES switch	Pressed	ON
		Released	OFF
SET SW	COAST/SET switch	Pressed	ON
		Released	OFF

⊗Without CONSULT
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals.

ECM			Condition	Voltage (Approx.)
Connector	+	-		
	Terminal			
E19	134	135	MAIN switch: Pressed	0 V
			CANCEL switch: Pressed	1 V
			COAST/SET switch: Pressed	2 V
			ACCEL/RES switch: Pressed	3 V
			All ASCD steering switches: Released	4 V

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 2.

2.CHECK ASCD STEERING SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect combination switch (spiral cable) harness connector.
4. Check the continuity between combination switch (spiral cable) and ECM harness connector.

+		–		Continuity
Combination switch (Spiral cable)		ECM		
Connector	Terminal	Connector	Terminal	
M33	32	E19	135	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT

1. Check the continuity between ECM harness connector and combination switch.

+		–		Continuity
Combination switch (Spiral cable)		ECM		
Connector	Terminal	Connector	Terminal	
M33	25	E19	134	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK ASCD STEERING SWITCH

Refer to EC-1107, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace ASCD steering switch. Refer to SR-12, "Exploded View".

Component Inspection

INFOID:0000000012198631

1.CHECK ASCD STEERING SWITCH

1. Disconnect combination switch (spiral cable) harness connector.
2. Check the resistance between combination switch harness connector terminals as per the following conditions.

Combination switch (Spiral cable)			Condition	Resistance (Approx.)
Connector	+	–		
	Terminals			
M302	13	16	MAIN switch: Pressed	0 Ω
			CANCEL switch: Pressed	250 Ω
			COAST/SET switch: Pressed	660 Ω
			ACCEL/RES switch: Pressed	1,480 Ω
			All ASCD steering switches: Released	4,000 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace ASCD steering switch. Refer to SR-12, "Exploded View".

P1572 ASCD BRAKE SWITCH

DTC Logic

INFOID:0000000012198632

DTC DETECTION LOGIC

NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1052, "DTC Logic".**
- **This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.**

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition		Possible cause
P1572	ASCD BRAKE SW (ASCD brake switch)	A)	When the vehicle speed is above 30 km/h (19 MPH), ON signals from the stop lamp switch and the brake pedal position switch are sent to the ECM at the same time.	• Harness or connectors (Stop lamp switch circuit is shorted.) (Brake pedal position switch circuit is shorted.) • Stop lamp switch • Brake pedal position switch • Incorrect stop lamp switch installation • Incorrect brake pedal position switch installation • ECM
		B)	Brake pedal position switch signal is not sent to ECM for extremely long time while the vehicle is driving.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

NOTE:

Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A

1. Start engine.
2. Press MAIN switch and make sure that CRUISE indicator is displayed in combination meter.
3. Drive the vehicle for at least 5 consecutive seconds as per the following conditions.

   CAUTION:

   Always drive vehicle at a safe speed.

   NOTE:

   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position

4. Check DTC.

Is DTC detected?

YES >> Proceed to EC-1113, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION B

1. Drive the vehicle for at least 5 consecutive seconds as per the following conditions.
CAUTION:
Always drive vehicle at a safe speed.
NOTE:
This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

Vehicle speed	More than 30 km/h (19 mph)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-1113, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198633

1.CHECK OVERALL FUNCTION-I

With CONSULT
1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check “BRAKE SW1” indication as per the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as per the following.

ECM			Condition		Voltage (Approx.)
Connector	+	–			
	Terminal				
E19	140	152	Brake pedal	Slightly depressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK OVERALL FUNCTION-II

With CONSULT
Select “BRAKE SW2” and check indication as per the following conditions.

Monitor item	Condition		Indication
BRAKE SW2	Brake pedal	Slightly depressed	ON
		Fully released	OFF

Without CONSULT
Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition		Voltage (Approx.)
Connector	+	–			
	Terminal				
E19	139	152	Brake pedal	Slightly depressed	Battery voltage
				Fully released	0 V

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 6.

3.CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect brake pedal position switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between brake pedal position switch harness connector and ground.

+		–	Voltage
Brake pedal position switch			
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform the trouble diagnosis for power supply circuit.

4.CHECK BRAKE PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between brake pedal position switch harness connector and ECM harness connector.

+		–		Continuity
Brake pedal position switch		ECM		
Connector	Terminal	Connector	Terminal	
E112	2	E19	140	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK BRAKE PEDAL POSITION SWITCH

Check the brake pedal position switch. Refer to EC-1111, "Component Inspection (Brake Pedal Position Switch)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace brake pedal position switch. Refer to BR-20, "Exploded View".

6.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

+		–	Voltage
Stop lamp switch			
Connector	Terminal		
E102*1 E118*2	1	Ground	Battery voltage

*1: CVT models
*2: M/T models

Is the inspection result normal?

YES >> GO TO 7.
NO >> Perform the trouble diagnosis for power supply circuit.

7.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between stop lamp switch harness connector and ECM harness connector.

+		–		Continuity
Stop lamp switch		ECM		
Connector	Terminal	Connector	Terminal	
E102*1 E118*2	2	E19	139	Existed

*1: CVT models
*2: M/T models

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8.CHECK STOP LAMP SWITCH

Check the stop lamp switch. Refer to EC-1112, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace stop lamp switch. Refer to BR-20, "Exploded View".

Component Inspection (Brake Pedal Position Switch)

INFOID:0000000012198634

1.CHECK BRAKE PEDAL POSITION SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect brake pedal position harness connector.
3. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition		Continuity
+	-			
Terminals				
1	2	Brake pedal	Fully released	Existed
			Slightly de-pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK BRAKE PEDAL POSITION SWITCH-II

1. Adjust brake pedal position switch installation. Refer to BR-9, "Inspection and Adjustment".
2. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition		Continuity
+	-			
Terminals				
1	2	Brake pedal	Fully released	Existed
			Slightly de-pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace brake pedal position switch. Refer to BR-20, "Exploded View".

Component Inspection (Stop Lamp Switch)

INFOID:0000000012198635

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Condition		Continuity
+	-			
Terminals				
1	2	Brake pedal	Fully released	Not existed
			Slightly de-pressed	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-9, "Inspection and Adjustment".
2. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Condition		Continuity
+	-			
Terminals				
1	2	Brake pedal	Fully released	Not existed
			Slightly de-pressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch. Refer to BR-20, "Exploded View".

P1574 ASCD VEHICLE SPEED SENSOR

Description

INFOID:0000000012198636

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-653, "AUTOMATIC SPEED CONTROL DEVICE (ASCD) : System Description" for ASCD functions.

DTC Logic

INFOID:0000000012198637

DTC DETECTION LOGIC

NOTE:

- **If DTC P1574 is displayed with DTC U1001, first perform the trouble diagnosis for DTC U1001. Refer to EC-798, "DTC Logic".**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-1027, "EXCEPT FOR M/T MODELS : DTC Logic"**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1052, "DTC Logic"**
- **If DTC P1574 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1054, "DTC Logic".**

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1574	ASCD VHL SPD SEN (ASCD vehicle speed sensor)	ECM detects a difference between two vehicle speed signals is out of the specified range.	• Harness or connectors (CAN communication line is open or shorted.) • ABS actuator and electric unit (control unit) • TCM • ECM

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. Drive the vehicle at more than 40 km/h (25 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
   NOTE:
   This procedure may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EC-1113, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198638

1.CHECK DTC WITH TCM

Check DTC with TCM. Refer to TM-397, "CONSULT Function".

Is DTC detected?

NO >> GO TO 2.
YES >> Perform trouble shooting relevant to DTC indicated.

2.CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)”

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-39, "CONSULT Function".

Is DTC detected?

NO >> INSPECTION END
YES >> Perform trouble shooting relevant to DTC indicated.

P158A G SENSOR

DTC Logic

INFOID:0000000012198639

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause*
P158A	G SENSOR (G sensor calibration is incomplete)	ECM detects a state that calibration of the G sensor is incomplete.	G sensor calibration is incomplete

*: Since this DTC is detected when G sensor calibration is incomplete, there is not replacement parts.

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-1115, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198640

1.PERFORM CALIBRATION OF G SENSOR

Perform calibration of G sensor. Refer to EC-763, "Description".

>> INSPECTION END

P159B G SENSOR

DTC Logic

INFOID:0000000012198641

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P159B	G SENSOR (G sensor circuit range/performance)	Every time when the vehicle is stopped, ECM detects the following status 13 times in a row: A voltage signal transmitted from the G sensor is less than 2.275V or more than 2.725 V continuously for 5 seconds or more.	• Harness or connectors (G sensor circuit is open or shorted.) (Intake air temperature sensor 2 circuit is open or shorted.) • G sensor • Sensor power supply 2

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine.
2. Drive the vehicle for at least 5 seconds at 35 km/h (22 MPH) or more.
3. Stop the vehicle and let it idle for at least 5 seconds.
   NOTE:
   • Depress the brake pedal to bring the vehicle to a full stop.
   • Never depress the accelerator pedal while the vehicle is stopped.
4. Repeat Step 2 and Step 3 thirteen times.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1116, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198642

1.PERFORM CALIBRATION OF G SENSOR

Perform calibration of G sensor. Refer to EC-763, "Description".

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC Confirmation Procedure. Refer to EC-1116, "DTC Logic".

Is 1st trip DTC detected?

YES >> GO TO 3.
NO >> INSPECTION END

3.CHECK G SENSOR FITTING CONDITION

Check G sensor fitting condition.

Is the inspection result normal?

YES >> GO TO 4.

NO >> 1. Adjust parts fitting condition.
2. Perform calibration of G sensor. Refer to EC-763, "Description".

4. CHECK G SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect G sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between G sensor harness connector terminals.

G sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
B32	3	2	5 V

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 7.

5. CHECK G SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between G sensor harness connector and ECM harness connector.

G sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B32	1	F23	34	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK G SENSOR

Check G sensor. Refer to EC-1118, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> 1. Replace G sensor.
2. Perform calibration of G sensor. Refer to EC-763, "Description".

7. CHECK G SENSOR POWER SUPPLY CIRCUIT-II

Check the voltage between G sensor harness connector terminal and ground.

+		–	Voltage (Approx.)
G sensor			
Connector	Terminal		
B32	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 10.

8. CHECK G SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between G sensor harness connector and ECM harness connector.

G sensor		ECM		Continuity
Connector	Terminal	Connector	Terminal	
B32	2	F23	13	Existed

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
F23	9	Ground	Existed
	10		
	50		
F24	60		
	110		
E19	147		
	149		
	152		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

10.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform EC-1240, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

Component Inspection

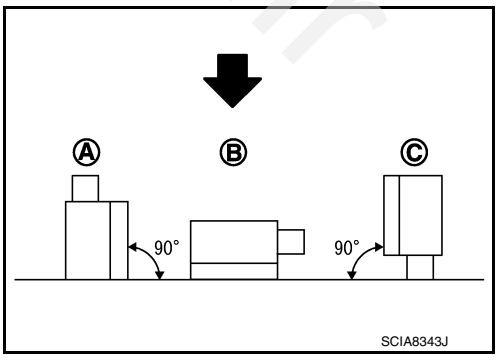
INFOID:0000000012198643

1.CHECK G SENSOR

With CONSULT

1. Remove G sensor.
2. Reconnect all harness connectors disconnected.
3. Place the G sensor on a flat table.
4. Turn ignition switch ON.
5. Select “G SENSOR” in “DATA MONITOR” mode of “ENGINE” using CONSULT to check indications according to the following conditions:

⬅ : Direction of gravitational force



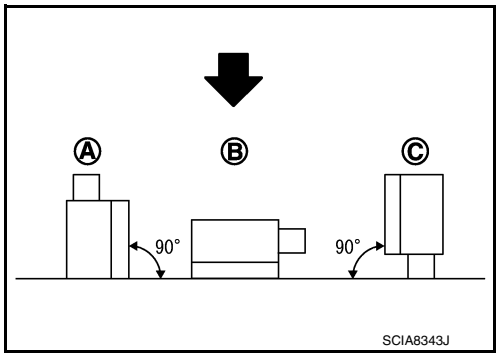
Monitor item	Condition	Value (V)
G SENSOR	Parallel with the table (0G) (B)	2.18 – 2.82
	Vertical to the table (–1G) (A) ↓ Parallel with the table (0G) (B) ↓ Vertical to the table (1G) (C)	0.85 – 1.49* ↓ 2.18 – 2.82* ↓ 3.51 – 4.15*

*: Check that voltage rises as the G sensor measurement condition changes in the order of (A), (B), and (C).

Without CONSULT

1. Remove G sensor.
2. Reconnect all harness connectors disconnected.
3. Place the G sensor on a flat table.
4. Turn ignition switch ON.
5. Check the voltage between ECM harness connector terminal and ground.

⬅ : Direction of gravitational force



+ ECM Connector	+ ECM Terminal	−	Condition	Voltage (V)
F23	34	Ground	Parallel with the table (0G) (B)	2.18 – 2.82
			Vertical to the table (−1G) (A) ↓ Parallel with the table (0G) (B) ↓ Vertical to the table (1G) (C)	0.85 – 1.49* ↓ 2.18 – 2.82* ↓ 3.51 – 4.15*

*: Check that voltage rises as the G sensor measurement condition changes in the order of (A), (B), and (C).

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace G sensor.

P159C, P159D G SENSOR

DTC Logic

INFOID:0000000012198644

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis (Trouble diagnosis content)	DTC detecting condition	Possible cause
P159A	G SENSOR (G sensor circuit)	When ECM detects the following status: A voltage signal transmitted from the G sensor is less than 0.5 V or more than 5.02 V continuously for 5 seconds or more.	• Harness or connectors (G sensor circuit is open or shorted.) • G sensor • Sensor power supply 2 circuit
P159C	G SENSOR (G sensor circuit low input)	When ECM detects the following status: A voltage signal transmitted from the G sensor is less than 0.5 V continuously for 5 seconds or more.	
P159D	G SENSOR (G sensor circuit high input)	When ECM detects the following status: A voltage signal transmitted from the G sensor is more than 4.5 V continuously for 5 seconds or more.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 5 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1120, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198645

1.CHECK G SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect G sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between G sensor harness connector terminals.

G sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
B32	3	2	5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 4.

2.CHECK G SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between G sensor harness connector and ECM harness connector.

+		–		Continuity
G sensor		ECM		
Connector	Terminal	Connector	Terminal	
B32	1	F23	34	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK G SENSOR

Check G sensor. Refer to EC-1122, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> 1. Replace G sensor.
2. Perform calibration of G sensor. Refer to EC-763, "Description".

4.CHECK G SENSOR POWER SUPPLY CIRCUIT-II

Check the voltage between G sensor harness connector terminal and ground.

+		–	Voltage (Approx.)
G sensor			
Connector	Terminal		
B32	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 7.

5.CHECK G SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between G sensor harness connector and ECM harness connector.

+		–		Continuity
G sensor		ECM		
Connector	Terminal	Connector	Terminal	
B32	3	F23	29	Existed

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
F23	9	Ground	Existed
	10		
	50		
F24	60		
	110		
E19	147		
	149		
	152		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

7.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform EC-1240, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

Component Inspection

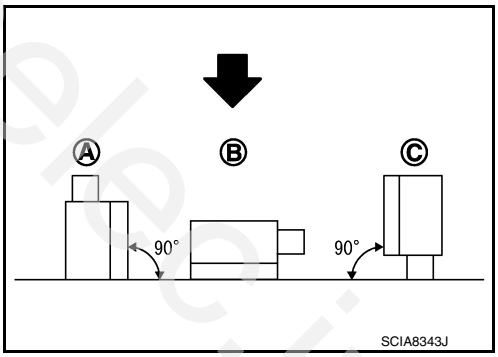
INFOID:0000000012198646

1.CHECK G SENSOR

With CONSULT

1. Remove G sensor.
2. Reconnect all harness connectors disconnected.
3. Place the G sensor on a flat table.
4. Turn ignition switch ON.
5. Select “G SENSOR” in “DATA MONITOR” mode of “ENGINE” using CONSULT to check indications according to the following conditions:

⬅ : Direction of gravitational force



Monitor item	Condition	Value (V)
G SENSOR	Parallel with the table (0G) (B)	2.18 – 2.82
	Vertical to the table (–1G) (A) ↓ Parallel with the table (0G) (B) ↓ Vertical to the table (1G) (C)	0.85 – 1.49* ↓ 2.18 – 2.82* ↓ 3.51 – 4.15*

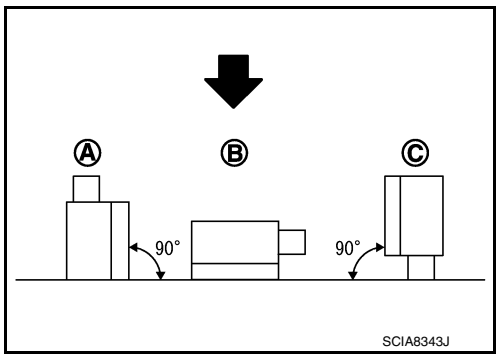
*: Check that voltage rises as the G sensor measurement condition changes in the order of (A), (B), and (C).

Without CONSULT

1. Remove G sensor.
2. Reconnect all harness connectors disconnected.
3. Place the G sensor on a flat table.
4. Turn ignition switch ON.

5. Check the voltage between ECM harness connector terminal and ground.

⬅ : Direction of gravitational force



+ ECM		−	Condition	Voltage (V)
Connector	Terminal			
F23	34	Ground	Parallel with the table (0G) (B)	2.18 – 2.82
			Vertical to the table (−1G) (A) ↓ Parallel with the table (0G) (B) ↓ Vertical to the table (1G) (C)	0.85 – 1.49* ↓ 2.18 – 2.82* ↓ 3.51 – 4.15*

*: Check that voltage rises as the G sensor measurement condition changes in the order of (A), (B), and (C).

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace G sensor.

P1805 BRAKE SWITCH

DTC Logic

INFOID:0000000012198647

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P1805	BRAKE SW/CIRCUIT (Brake switch)	A stop lamp switch signal is not sent to ECM for extremely long time while the vehicle is driving.	• Harness or connectors (Stop lamp switch circuit is open or shorted.) • Stop lamp switch

DTC CONFIRMATION PROCEDURE

1.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC.
4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1124, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198648

1.CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the voltage between stop lamp switch harness connector and ground.

+		−	Voltage
Stop lamp switch			
Connector	Terminal		
E102*1 E118*2	1	Ground	Battery voltage

*1: CVT models
*2: M/T models

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between stop lamp switch harness connector and ECM harness connector.

+		−		Continuity
Stop lamp switch		ECM		
Connector	Terminal	Connector	Terminal	
E102*1 E118*2	2	E19	139	Existed

*1: CVT models
*2: M/T models

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK STOP LAMP SWITCH

Check the stop lamp switch. Refer to EC-1125, "Component Inspection (Stop Lamp Switch)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace stop lamp switch. Refer to BR-20, "Exploded View".

Component Inspection (Stop Lamp Switch)

INFOID:0000000012198649

1.CHECK STOP LAMP SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Condition		Continuity
+	-			
Terminals				
1	2	Brake pedal	Fully released	Not existed
			Slightly de-pressed	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-9, "Inspection and Adjustment".
2. Check the continuity between stop lamp switch terminals as per the following conditions.

Stop lamp switch		Condition		Continuity
+	-			
Terminals				
1	2	Brake pedal	Fully released	Not existed
			Slightly de-pressed	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace stop lamp switch. Refer to BR-20, "Exploded View".

P2004 INTAKE MANIFOLD RUNNER CONTROL VALVE

DTC Logic

INFOID:0000000012198650

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2004	TUMBLE CONT/V (Intake manifold runner control stuck open bank 1)	The target angle of intake manifold runner control valve controlled by ECM and the input signal from intake manifold runner control valve position sensor is not in the normal range.	• Harness or connectors (Intake manifold runner control valve circuit is open or shorted.) • Intake manifold runner control valve • Intake manifold runner control valve is stuck

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
- Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.
- Always perform the test at a temperature above −12°C (10°F)

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode using CONSULT.
3. Make sure that “COOLANT TEMP/S” indicates 5°C (41°F) or more.
   If not, cool engine down or warm engine up until “COOLANT TEMP/S” indicates 5°C (41°F) or more. Then go to the following steps.
4. Fully release accelerator pedal and wait at least 10 seconds.
5. Depress accelerator pedal and wait at least 10 seconds.
6. Check 1st trip DTC.

With GST
Following the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Proceed to EC-1126, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198651

1.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector.

ECM				Voltage
+		-		
Connector	Terminal	Connector	Terminal	
F23	53	E19	152	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		–		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F23	53	E14	36	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE OUTPUT SIGNAL CIRCUIT

1. Disconnect intake manifold runner control valve harness connector.
2. Check the continuity between intake manifold runner control valve harness connector and ECM harness connector.

+		–		Continuity
Intake manifold runner control valve		ECM		
Connector	Terminal	Connector	Terminal	
F59	1	F23	54	Existed
			55	Not existed
	2		54	Not existed
			55	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE

Check the intake manifold runner control valve. Refer to EC-1127, "Component Inspection (Intake Manifold Runner Control Valve)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace intake manifold assembly. Refer to EM-197, "Removal and Installation".

Component Inspection (Intake Manifold Runner Control Valve)

INFOID:0000000012198652

1.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE

With CONSULT

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT.
3. Make sure that “COOLAN TEMP/S” indicates between –12°C (10°F) to 59°C (138°F).
   If not, cool engine down or warm engine up until “COOLAN TEMP/S” indicates between –12°C (10°F) to 59°C (138°F). Then go to the following steps.
4. Fully release accelerator pedal and make sure that “TUMBLE POS SEN” indicates between 2.8 V to 4.1 V.
5. Depress accelerator pedal and make sure that “TUMBLE POS SEN” indicates between 0.2 V to 1.4 V.
6. Check 1st trip DTC.

With GST

Following the procedure “With CONSULT” above.

Is 1st trip DTC detected?

YES >> Replace intake manifold assembly. Refer to EM-197, "Removal and Installation".
NO >> GO TO 2.

2.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE

1. Turn ignition switch OFF.
2. Disconnect intake manifold runner control valve harness connector.
3. Check the resistance between intake manifold runner control valve terminals as per the following.

Intake manifold runner control valve		Resistance (Approx.)
+	–	
Terminals		
1	2	3 - 8 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace intake manifold assembly. Refer to EM-197, "Removal and Installation".

P2014, P2016, P2017, P2018 INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR

DTC Logic

INFOID:0000000012198653

DTC DETECTION LOGIC

NOTE:
If DTC P2014, P2016, P2017 or P2018 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-1060, "DTC Logic".

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2014	IN/MANIFOLD RUNNER POS SEN B1 (Intake manifold runner position sensor/switch circuit bank 1)	An excessively low voltage from the sensor is sent to ECM.	• Harness or connectors (Intake manifold runner control position sensor circuit is shorted.) • Intake manifold runner control position sensor
P2016	IN/MANIFOLD RUNNER POS SEN B1 (Intake manifold runner position sensor/switch circuit low bank 1)		
P2017	IN/MANIFOLD RUNNER POS SEN B1 (Intake manifold runner position sensor/switch circuit high bank 1)	An excessively high voltage from the sensor is sent to ECM.	
P2018	IN/MANIFOLD RUNNER POS SEN B1 (Intake manifold runner position sensor/switch circuit intermittent bank 1)		

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1129, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198654

1.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect intake valve manifold runner control valve position sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between intake valve manifold runner control valve position sensor harness connector.

Intake manifold runner control valve position sensor			Voltage (Approx.)
Connector	+	-	
	Terminal		
F73	1	3	5 V

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

Check the voltage between intake valve manifold runner control valve position sensor harness connector and ground.

+		-	Voltage (Approx.)
Intake manifold runner control valve position sensor			
Connector	Terminal		
F73	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform the trouble diagnosis for power supply circuit.

3.CHECK ECM GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between ECM harness connector and ground.

+		-	Continuity
ECM			
Connector	Terminal		
F23	9	Ground	Existed
	10		
	50		
F24	60		
	110		
E19	147		
	149		
	152		

4. Also check harness for short to power.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

4.CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between intake manifold runner control valve position sensor harness connector and ECM harness connector.

+		-		Continuity
Intake manifold runner control valve position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F73	3	F23	43	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5. CHECK INTAKE MANIFOLD RUNNER CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between intake manifold runner control valve position sensor harness connector and ECM harness connector.

+		-		Continuity
Intake manifold runner control valve position sensor		ECM		
Connector	Terminal	Connector	Terminal	
F73	2	F23	39	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK INTERMITTENT INCIDENT

Perform intermittent incident. Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace intake manifold assembly. Refer to EM-197, "Removal and Installation".
NO >> Repair or replace error-detected parts.

P2096, P2097 A/F SENSOR 1

DTC Logic

INFOID:0000000012198657

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P2096	POST CAT FUEL TRIM SYS B1 (Post catalyst fuel trim system too lean bank 1)	The output voltage computed by ECM from the A/F sensor 1 signal is shifts to the lean side for a specified period.	• A/F sensor 1 • A/F sensor 1 heater • Heated oxygen sensor 2 • Fuel pressure • Fuel injector • Intake air leaks • Exhaust gas leaks
P2097	POST CAT FUEL TRIM SYS B1 (Post catalyst fuel trim system too rich bank 1)	The A/F signal computed by ECM from the A/F sensor 1 signal is shifts to the rich side for a specified period.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Clear the mixture ratio self-learning value. Refer to EC-762, "Description".
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
6. Let engine idle for 1 minute.
7. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
8. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1132, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198658

1.RETIGHTEN A/F SENSOR 1 AND HEATED OXYGEN SENSOR 2

Loosen and retighten the A/F sensor 1 and heated oxygen sensor 2. Refer to EM-242, "Exploded View" (A/F sensor 1), EX-5, "Exploded View" (Heated oxygen sensor 2).

>> GO TO 2.

2.CHECK FOR EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (under floor).

Is exhaust gas leak detected?

YES >> Repair or replace.
NO >> GO TO 3.

3.CHECK FOR INTAKE AIR LEAKAGE

1. Start engine and run it at idle.
2. Listen for an intake air leakage after the mass air flow sensor.

Is intake air leakage detected?

YES >> GO TO 4.
NO >> Repair or replace malfunctioning part.

4.CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

1. Clear the mixture ratio self-learning value. Refer to EC-762, "Description".
2. Run engine for at least 10 minutes at idle speed.

Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

YES >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-905, "DTC Logic" (P0171) or EC-909, "DTC Logic" (P0172).
NO >> GO TO 5.

5.CHECK HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Check harness connector for water.

Water should not exit.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace harness connector.

6.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.
3. Check the voltage between A/F sensor 1 harness connector and ground.

A/F sensor		Ground	Voltage (V)
Connector	Terminal		
F72	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7.CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between A/F sensor 1 harness connector and IPDM E/R harness connector.

A/F sensor 1		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F72	4	E14	36	Existed

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

8.CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between A/F sensor 1 harness connector and ECM harness connector.

A/F sensor 1		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F72	1	F24	79	Existed
	2		74	

4. Check the continuity between A/F sensor 1 harness connector and ground, or ECM harness connector and ground.

A/F sensor 1		Ground	Continuity
Connector	Terminal		
F72	1	Ground	Not existed
	2		

ECM		Ground	Continuity
Connector	Terminal		
F24	74	Ground	Not existed
	79		

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair open circuit, short to ground or short to power in harness or connectors.

9.CHECK A/F SENSOR 1 HEATER

Check A/F sensor 1 heater. Refer to EC-806, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 10.
NO >> GO TO 12.

10.CHECK HEATED OXYGEN SENSOR 2

Check heated oxygen sensor 2. Refer to EC-884, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 11.
NO >> Replace malfunctioning heated oxygen sensor 2.

11.CHECK INTERMITTENT INCIDENT

Check intermittent incident. Perform GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair or replace malfunctioning part.

12.REPLACE AIR FUEL RATIO (A/F) SENSOR 1

Replace malfunctioning air fuel ratio (A/F) sensor 1. Refer to EM-242, "Exploded View".

Do you have CONSULT?

YES >> GO TO 13.
NO >> GO TO 14.

13.CONFIRM A/F ADJUSTMENT DATA

With CONSULT

1. Turn ignition switch ON.
2. Select “A/F ADJ-B1” in “DATA MONITOR” mode with CONSULT.
3. Make sure that “0.000” is displayed on CONSULT screen.

Is “0.000” displayed?

YES >> INSPECTION END

NO >> GO TO 14.

14. CLEAR THE MIXTURE RATIO SELF-LEARNING VALUE

Clear the mixture ratio self-learning value. Refer to EC-762, "Description".

Do you have CONSULT?

YES >> GO TO 15.
NO >> INSPECTION END

15. CONFIRM A/F ADJUSTMENT DATA

With CONSULT

1. Turn ignition switch ON.
2. Select “A/F ADJ-B1” in “DATA MONITOR” mode with CONSULT.
3. Make sure that “0.000” is displayed on CONSULT screen.

>> INSPECTION END

P2100, P2103 THROTTLE CONTROL MOTOR RELAY

DTC Logic

INFOID:0000000012198659

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2100	ETC MOT PWR-B1 (Throttle control motor relay circuit open)	ECM detects a voltage of power source for throttle control motor is excessively low.	• Harness or connectors (Throttle control motor relay circuit is open) • Throttle control motor relay
P2103	ETC MOT PWR (Throttle control motor relay circuit short)	ECM detect the throttle control motor relay is stuck ON.	• Harness or connectors (Throttle control motor relay circuit is shorted) • Throttle control motor relay

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V.

Witch DTC is detected?

P2100 >> GO TO 2.
P2103 >> GO TO 3.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2100

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EC-1136, "Diagnosis Procedure".
NO >> INSPECTION END

3.PERFORM DTC CONFIRMATION PROCEDURE FOR DTC P2103

1. Turn ignition switch ON and wait at least 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-1136, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198660

1.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY

1. Turn ignition switch OFF.
2. Check the voltage between ECM harness connector and ground.

+		–		Voltage
ECM				
Connector	Terminal	Connector	Terminal	
F24	97	E19	152	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Disconnect ECM harness connector.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		–		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F24	97	E15	60	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL

Check the voltage between ECM harness connector and ground as per the following conditions.

ECM				Condition	Voltage (Approx.)
Connector	+ Terminal	Connector	– Terminal		
F24	118	E19	152	Ignition switch: OFF	0 V
				Ignition switch: ON	Battery voltage

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 4.

4. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		–		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F24	118	E15	55	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

P2101 ELECTRIC THROTTLE CONTROL FUNCTION

DTC Logic

INFOID:0000000012198661

DTC DETECTION LOGIC

NOTE:

- **If DTC P2101 is displayed with DTC P2100, first perform the trouble diagnosis for DTC P2100. Refer to EC-1136, "DTC Logic".**
- **If DTC P2101 is displayed with DTC P2119, first perform the trouble diagnosis for DTC P2119. Refer to EC-1143, "DTC Logic".**

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2101	ETC FNCTN/CIRC-B1 (Electric throttle control performance)	Electric throttle control function does not operate properly.	• Harness or connectors (Throttle control motor circuit is open or shorted) • Electric throttle control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11 V when engine is running.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EC-1138, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198662

1.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL

Check the voltage between ECM harness connector terminals as per the following conditions.

ECM				Condition	Voltage (Approx.)
Connector	+ Terminal	Connector	– Terminal		
F24	118	E19	152	Ignition switch: OFF	0 V
				Ignition switch: ON	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 2.

2.CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		–		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F24	118	E15	55	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		–		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F24	97	E15	60	Existed

2. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	2	F24	120	Existed
			119	Not existed
	1		120	Not existed
			119	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct. Refer to EM-192, "Exploded View".
2. Check if foreign matter is caught between the throttle valve and the housing.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to EC-754, "Description".

6.CHECK THROTTLE CONTROL MOTOR

Check the throttle control motor. Refer to EC-1140, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace electric throttle control actuator. Refer to EM-197, "Exploded View".

Component Inspection

INFOID:0000000012198663

1.CHECK THROTTLE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Check the resistance between electric throttle control actuator terminals as per the following.

Electric throttle control actuator		Resistance (Approx.)
+	–	
Terminals		
2	1	1 - 15 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace electric throttle control actuator. Refer to EM-197, "Exploded View".

P2118 THROTTLE CONTROL MOTOR

DTC Logic

INFOID:0000000012198664

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2118	ETC MOT-B1 (Throttle control motor circuit short)	ECM detects short in both circuits between ECM and throttle control motor.	• Harness or connectors (Throttle control motor circuit is shorted.) • Electric throttle control actuator (Throttle control motor)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Check DTC.

Is DTC detected?

YES >> Proceed to EC-1141, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198665

1.CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	2	F24	120	Existed
			119	Not existed
	1		120	Not existed
			119	Existed

5. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK THROTTLE CONTROL MOTOR

Check the throttle control motor. Refer to EC-1142, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace electric throttle control actuator. Refer to EM-197, "Exploded View".

Component Inspection

INFOID:0000000012198666

1.CHECK THROTTLE CONTROL MOTOR

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Check the resistance between electric throttle control actuator terminals as per the following.

Electric throttle control actuator		Resistance (Approx.)
+	–	
Terminals		
2	1	1 - 15 Ω [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace electric throttle control actuator. Refer to EM-197, "Exploded View".

P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

DTC Logic

INFOID:0000000012198667

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition		Possible cause
P2119	ETC ACTR-B1 (Electric throttle control actuator)	A	Electric throttle control actuator does not function properly due to the return spring malfunction.	Electric throttle control actuator
		B	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C	ECM detect the throttle valve is stuck open.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION A AND B

1. Turn ignition switch ON and wait at least 1 second.
2. Set selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
3. Set selector lever to P (CVT) or Neutral (M/T) position.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Set selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
7. Set selector lever to P (CVT) or Neutral (M/T) position.
8. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
9. Check DTC.

Is DTC detected?

YES >> Proceed to EC-1143, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE FOR MALFUNCTION C

1. Turn ignition switch ON and wait at least 1 second.
2. Set selector lever to D (CVT) or 1st (M/T) position and wait at least 3 seconds.
3. Set selector lever to P (CVT) or Neutral (M/T) position.
4. Start engine and let it idle for 3 seconds.
5. Check DTC.

Is DTC detected?

YES >> Proceed to EC-1143, "Diagnosis Procedure".
NO >> INSPECTION END

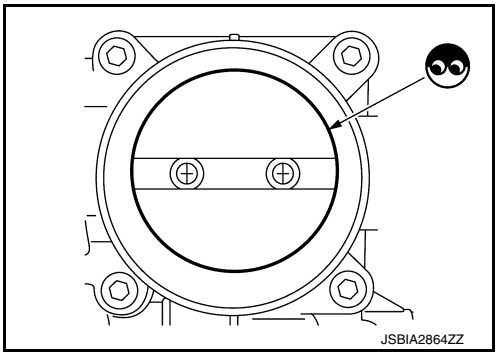
Diagnosis Procedure

INFOID:0000000012198668

1.CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct. Refer to EM-192, "Exploded View".

2. Check if foreign matter is caught between the throttle valve and the housing.



Is the inspection result normal?

YES >> Replace electric throttle control actuator. Refer to EM-197, "Exploded View".

NO >> Remove the foreign matter and clean the electric throttle control actuator inside, then perform throttle valve closed position learning. Refer to EC-754, "Description".

P2122, P2123 APP SENSOR

DTC Logic

INFOID:0000000012198669

DTC DETECTION LOGIC

NOTE:
If DTC P2122 or P2123 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-1060, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2122	APP SEN 1/CIRC (Accelerator pedal position sensor 1 circuit low input)	An excessively low voltage from the APP sensor 1 is sent to ECM.	• Harness or connectors (APP sensor 1 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1)
P2123	APP SEN 1/CIRC (Accelerator pedal position sensor 1 circuit high input)	An excessively high voltage from the APP sensor 1 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-1145, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198670

1.CHECK APP SENSOR 1 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position (APP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between APP sensor harness connector and ground.

+		−	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E101	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		–		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
E101	4	E19	146	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK APP SENSOR 1 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		–		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
E101	2	E19	151	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK APP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

+		–		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
E101	3	E19	150	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK APP SENSOR

Check the APP sensor. Refer to EC-1146, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace accelerator pedal assembly. Refer to ACC-4, "Exploded View".

Component Inspection

INFOID:0000000012198671

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 terminals as per the following condition.

ECM			Condition		Voltage
Connector	+	–			
	Terminal				
E19	150	151	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	143	144		Fully released	0.3 - 0.6 V
				Fully depressed	1.95 - 2.4 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace accelerator pedal assembly. Refer to ACC-4, "Exploded View".

P2127, P2128 APP SENSOR

DTC Logic

INFOID:0000000012198672

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2127	APP SEN 2/CIRC (Accelerator pedal position sensor 2 circuit low input)	An excessively low voltage from the APP sensor 2 is sent to ECM.	• Harness or connectors (APP sensor 2 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 2) • Sensor power supply 2 circuit
P2128	APP SEN 2/CIRC (Accelerator pedal position sensor 2 circuit high input)	An excessively high voltage from the APP sensor 2 is sent to ECM.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-1148, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198673

1.CHECK APP SENSOR 2 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position (APP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between APP sensor harness connector and ground.

+		−	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E101	5	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform EC-1240, "Diagnosis Procedure".

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.

NO >> Repair or replace error-detected parts.

3.CHECK APP SENSOR 2 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		–		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
E101	1	E19	144	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

+		–		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
E101	6	E19	143	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts

5.CHECK APP SENSOR

Check the APP sensor. Refer to EC-1149, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace accelerator pedal assembly. Refer to ACC-4, "Exploded View".

Component Inspection

INFOID:0000000012198674

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 terminals as per the following condition.

ECM			Condition		Voltage
Connector	+	–			
	Terminal				
E19	150	151	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	143	144		Fully released	0.3 - 0.6 V
				Fully depressed	1.95 - 2.4 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace accelerator pedal assembly. Refer to ACC-4, "Exploded View".

P2135 TP SENSOR

DTC Logic

INFOID:0000000012198675

DTC DETECTION LOGIC

NOTE:
If DTC P2135 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-1060, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2135	TP SENSOR-B1 (Throttle position sensor circuit range/performance)	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	• Harness or connector (TP sensor 1 or 2 circuit is open or shorted.) • Electric throttle control actuator (TP sensor 1 or 2)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-1150, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198676

1.CHECK THROTTLE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric throttle control actuator harness connector and ground.

+		−	Voltage (Approx.)
Electric throttle control actuator			
Connector	Terminal		
F29	5	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ground.

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	5	F24	83	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	4	F24	85	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between electric throttle control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric throttle control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F29	6	F24	88	Existed
	3		80	

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair open circuit or short to ground or short to power in harness or connectors.

5.CHECK THROTTLE POSITION SENSOR

Check the throttle position sensor. Refer to EC-1151, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace electric throttle control actuator. Refer to EM-197, "Exploded View".

Component Inspection

INFOID:0000000012198677

1.CHECK THROTTLE POSITION SENSOR

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.

3. Perform “ Throttle Valve Closed Position Learning”. Refer to EC-754, "Description".
4. Turn ignition switch ON.
5. Set selector lever to D (CVT) or 1st (M/T) position.
6. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition		Voltage
Connector	+	–			
	Terminal				
F24	88	85	Accelerator pedal	Fully released	More than 0.36V
				Fully depressed	Less than 4.75V
	80			Fully released	Less than 4.75V
				Fully depressed	More than 0.36V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace electric throttle control actuator. Refer to EM-197, "Exploded View".

P2138 APP SENSOR

DTC Logic

INFOID:0000000012198678

DTC DETECTION LOGIC

NOTE:
If DTC P2138 is displayed with DTC P0643, first perform the trouble diagnosis for DTC P0643. Refer to EC-1060, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2138	APP SENSOR (Accelerator pedal position sensor circuit range/ performance)	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	• Harness or connector (APP sensor 1 or 2 circuit is open or shorted.) • Accelerator pedal position sensor (APP sensor 1 or 2) • Sensor power supply 2 circuit

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for 1 second.
2. Check DTC.

Is DTC detected?

YES >> Proceed to EC-1153, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198679

1.CHECK APP SENSOR 1 POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position (APP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between APP sensor harness connector and ground.

+		–	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E101	4	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.

2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		–		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
E101	4	E19	146	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK APP SENSOR 2 POWER SUPPLY

Check the voltage between APP sensor harness connector and ground.

+		–	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E101	5	Ground	5 V

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform EC-1240, "Diagnosis Procedure".

Is inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

5.CHECK APP SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		–		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
E101	1	E19	144	Existed
	2		151	

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK APP SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between APP sensor harness connector and ECM harness connector.

+		–		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
E101	3	E19	150	Existed
	6		143	

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts

7.CHECK APP SENSOR

Check the APP sensor. Refer to EC-1149, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace accelerator pedal assembly. Refer to EM-197, "Exploded View".

Component Inspection

INFOID:0000000012198680

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 terminals as per the following condition.

ECM			Condition		Voltage
Connector	+	–			
	Terminal				
E19	150	151	Accelerator pedal	Fully released	0.6 - 0.9 V
				Fully depressed	3.9 - 4.7 V
	143	144		Fully released	0.3 - 0.6 V
				Fully depressed	1.95 - 2.4 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace accelerator pedal assembly. Refer to EM-197, "Exploded View".

P2162 VEHICLE SPEED SENSOR

Description

INFOID:0000000012198681

ECM receives a rear wheel sensor signal from ABS actuator and electric unit (control unit) via CAN communication to switch combustion for the direct injection gasoline system. For the direct injection gasoline system, refer to EC-630, "DIRECT INJECTION GASOLINE SYSTEM : System Description".

DTC Logic

INFOID:0000000012198682

DTC DETECTION LOGIC

NOTE:

- If DTC P2162 is displayed with DTC UXXXX, first perform the trouble diagnosis for DTC UXXXX. Refer to EC-706, "DTC Index".
- If DTC P2162 is displayed with DTC P0607, first perform the trouble diagnosis for DTC P0607. Refer to EC-1054, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2162	VEHICLE SPEED SEN A/B (Vehicle speed sensor A/B correlation)	ECM detects a rear LH wheel sensor signal or a rear RH wheel sensor signal transmitted from the ABS actuator and electric unit (control unit) via CAN communication at least for 15 seconds in a row when the vehicle is in stopped condition.	• Harness or connectors (The CAN communication line is open or shorted) • Rear LH wheel sensor • Rear RH wheel sensor • ABS actuator and electric unit (control unit)

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 9 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start engine and let it idle for at least 30 seconds.
   NOTE:
   Never depress the accelerator pedal during idle running.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1156, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198683

1.CHECK DTC WITH ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)

With CONSULT

Check DTC with ABS actuator and electric unit (control unit). Refer to BRC-39, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform diagnosis procedure corresponding to DTC indicated.

2.CHECK REAR WHEEL SENSOR-I

With CONSULT
1. Stop the vehicle.
2. Set the parking brake.
3. Use CONSULT to select “RR LH SENSOR” and “RR RH SENSOR” in “DATA MONITOR” mode of “ABS”
4. Check indications of “RR LH SENSOR” and “RR RH SENSOR”.
   NOTE:
   Never cause the vehicle to vibrate.

Is 0 km/h (0 MPH) indicated for both “RR LH SENSOR” and “RR RH SENSOR”?

YES >> GO TO 3.
NO >> Perform trouble diagnosis of the rear wheel sensor if 0 km/h (0 MPH) is not displayed. Refer to BRC-88, "Diagnosis Procedure".

3. CHECK REAR WHEEL SENSOR-II

With CONSULT
1. Drive the vehicle at 20 km/h (13 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
2. Check indications of “RR LH SENSOR” and “RR RH SENSOR”.

Is the difference between the indicated values of “RR LH SENSOR” and “RR RH SENSOR” within ± 1 km/h (1 MPH)?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Perform trouble diagnosis of the rear wheel sensor. Refer to BRC-88, "Diagnosis Procedure"

P219A AIR FUEL RATIO

DTC Logic

INFOID:0000000012826671

DTC DETECTION LOGIC

NOTE:

- **If DTC P219A is displayed with other DTC, first perform the trouble diagnosis for the other DTC. Refer to EC-706, "DTC Index".**

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P219A	AIR FUEL RATIO B1 (AIR FUEL RATIO B1)	ECM detects a lean/rich air fuel ratio state in any cylinder for a specified length of time.	• Fuel injector • Exhaust gas leaks • Incorrect fuel pressure • Mass air flow sensor • Intake air leaks • Lack of fuel • Incorrect PCV hose connection • Improper spark plug • Insufficient compression • The fuel injector circuit is open or shorted • ignition coil • The ignition signal circuit is open or shorted

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING-1

If DTC Confirmation Procedure has been previously conducted, always perform the following before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

NOTE:

Before performing the following procedure, confirm that battery voltage is 11 V or more at idle.

>> GO TO 2.

2.PRECONDITIONING-2

1. Turn ignition switch ON.
2. Clear the mixture ratio self-learning value. Refer to EC-762, "Description".

Will CONSULT be used?

YES >> GO TO 3.
NO >> GO TO 6.

3.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Turn ignition switch ON.
2. Select “COOLAN TEMP/S” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Start the engine.
4. Make sure that “COOLAN TEMP/S” indicates more than 80°C (176°F).

>> GO TO 4.

4.PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

1. Select “SYSTEM 1 DIAGNOSIS B B1” and “SYSTEM 1 DIAGNOSIS A B1” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Drive vehicle under the following conditions for at least 5 consecutive seconds.

CAUTION:

- **Always drive vehicle at a safe speed.**

ENG SPEED	1,800 – 2,400rpm
COOLAN TEMP/S	More than 80°C (176°F)
B/FUEL SCHDL	5 – 13 msec
Selector lever	CVT: D position M/T: 6th position
SYSTEM 1 DIAGNOSIS B B1	PRSENT

NOTE:
- Drive the vehicle at approximately 88 km/h (55MPH) allows easy diagnosis.
- Keep the accelerator pedal as possible during crusing.

3. Check “SYSTEM 1 DIAGNOSIS A B1” indication.

Is “CMPLT” displayed?

YES >> GO TO 5.
NO >> GO TO 2.

5.PERFORM DTC CONFIRMATION PROCEDURE-3

Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1159, "Diagnosis Procedure".
NO >> INSPECTION END

6.PERFORM DTC CONFIRMATION PROCEDURE-4

Without CONSULT

1. Start the engine and warm it up to normal operating temperature.
2. Drive vehicle under the following conditions for at least 5 consecutive seconds.

CAUTION:
- **Always drive vehicle at a safe speed.**

Engine speed	1,800 – 2,400rpm
Calculated load value	20 – 72 %
Selector lever	CVT: D position M/T: 6th position

NOTE:
- Drive the vehicle at approximately 88 km/h (55MPH) allows easy diagnosis.
- Keep the accelerator pedal as possible during crusing.

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1159, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012826672

1.CHECK FOR INTAKE AIR LEAK

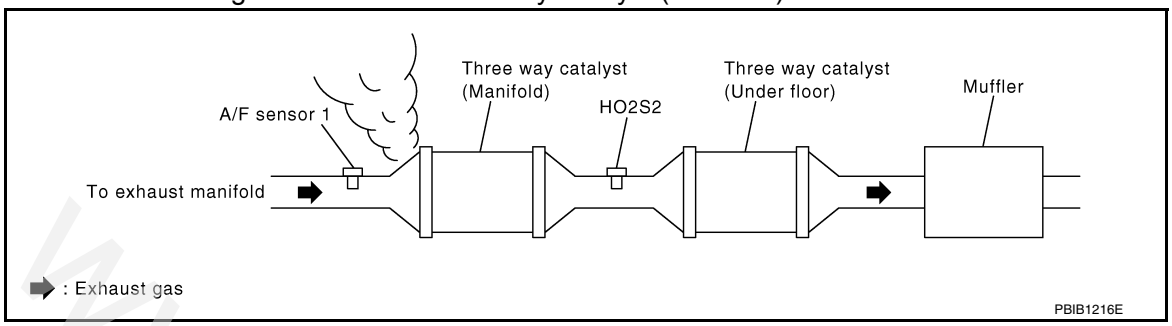
1. Stop engine and check the following for connection.
- Air duct
- Vacuum hoses
- PCV hose
- Intake air passage between air duct to intake manifold
2. Start engine and let it idle.
3. Listen for an intake air leak after the mass air flow sensor.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK EXHAUST GAS LEAK

1. Stop engine and visually check exhaust tube, three way catalyst and muffler for dents connection.
2. Start engine and let it idle.
3. Listen for an exhaust gas leak before three way catalyst (manifold).



Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-771, "Work Procedure".
2. Check fuel pressure. Refer to EC-771, "Work Procedure".

Is the inspection result normal?

YES >> GO TO 4.
NO >> GO TO 8.

4.CHECK MASS AIR FLOW SENSOR

With CONSULT
Check “MASS AIRFLOW” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
For specification, refer to EC-1258, "Mass Air Flow Sensor".

With GST
Check mass air flow sensor signal in Service $01 using GST.
For specification, refer to EC-1258, "Mass Air Flow Sensor".

Is the inspection result normal?

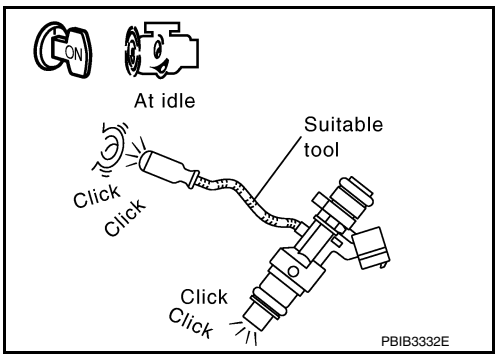
YES >> GO TO 5.
NO >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-838, "Diagnosis Procedure".

5.CHECK FUNCTION OF FUEL INJECTOR

With CONSULT
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Check that each circuit produces a momentary engine speed drop.

Without CONSULT
1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



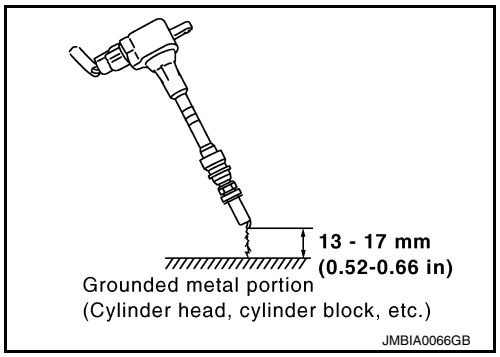
Is the inspection result normal?

YES >> GO TO 6.
NO >> Perform trouble diagnosis for fuel injector, refer to EC-1204, "Component Function Check".

6.CHECK FUNCTION OF IGNITION COIL-1

CAUTION:
Perform the following steps in a well-ventilated area with no combustibles.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse from IPDM E/R to release fuel pressure.
   NOTE:
   CONSULT must not be used to release fuel pressure. It develops again during the following steps, if released by using CONSULT.
3. Start the engine.
4. After an engine stall, crank the engine two or three times to release all the fuel pressure.
5. Turn ignition switch OFF.
6. Disconnect all the harness connectors of ignition coil to prevent electric discharge from occurring in ignition coil.
7. Remove ignition coil assembly and spark plug of cylinder. Refer to EM-214, "Removal and Installation".
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Allow a 13-17mm (0.52-0.66 in) spacing between spark plug and grounded metal portion as shown in the figure to fix the ignition coil with a rope or an equivalent.
11. Crank the engine for approximately 3 seconds to see if sparking occurs between spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:
- **The discharge voltage becomes 20 kV or higher. Therefore, always stay away from the spark plug and ignition coil at least 50 cm (19.7 in) during the inspection.**
- **Leaving a space of more than 17mm (0.66 in) may damage the ignition coil.**

NOTE:
When the gap is less than 13 mm (0.52 in), a the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> GO TO 7.
NO >> GO TO 9.

7.CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-182, "Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

8.DETECT MALFUNCTIONING PART

Check fuel hoses and fuel tubes for clogging.

Is the inspection result normal?

YES >> Replace fuel filter and fuel pump assembly. Refer to FL-6, "2WD : Exploded View" (2WD models) or FL-10, "AWD : Exploded View" (AWD models).
NO >> Repair or replace error-detected parts.

9.CHECK FUNCTION OF IGNITION COIL-2

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a non-malfunctioning spark plug.
3. Crank engine for approximately 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Check ignition coil, power transistor and their circuits. Refer to EC-1229, "Component Function Check".

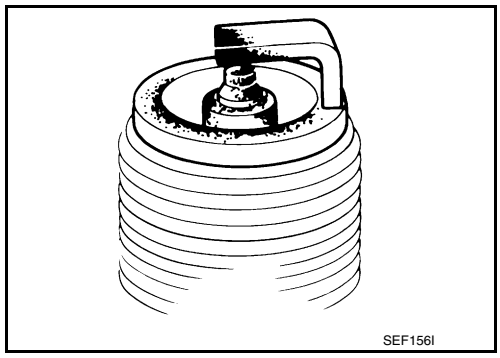
10. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

Is the inspection result normal?

YES >> 1. Repair or clean spark plug. Refer to EM-214, "Exploded View".
2. GO TO 11.

NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-312, "Spark Plug".



11. CHECK FUNCTION OF IGNITION COIL-3

1. Reconnect the initial spark plugs.
2. Crank engine for approximately 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to EM-312, "Spark Plug".

P2263 TC SYSTEM

DTC Logic

INFOID:0000000012198684

DTC DETECTION LOGIC

NOTE:
If DTC P2263 is displayed with DTC P0237 or P0238, first perform the trouble diagnosis for DTC P0237 or P0238. Refer to EC-938, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2263	TC SYSTEM-B1 (Turbocharger boost system performance)	In spite of the boosting area, the boost does not increase.	• Intake air leaks • Exhaust gas leaks • Turbocharger boost sensor • Turbocharger boost control solenoid valve • Exhaust manifold and turbocharger assembly • Electric wastegate control actuator • Harness or connectors (Electric wastegate control actuator circuit is open or shorted.) • Turbocharger bypass control valve • Harness or connectors (Turbocharger bypass control valve circuit is open or shorted.)

DTC CONFIRMATION PROCEDURE

1.PERFORM COMPONENT FUNCTION CHECK

Perform component function check. Refer to EC-1163, "Component Function Check".
NOTE:
Use component function check to check the overall function of the turbocharger system circuit. During this check, a 1st trip DTC might not be confirmed.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1164, "Diagnosis Procedure".

Component Function Check

INFOID:0000000012198685

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

With CONSULT
1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “WASTEGATE ACTUATOR”.
3. Operate “Up” or “Down”, set “W/G ACTUATOR POSITION B1” to 0.002 m, and make a quick short note of value “V1” of “W/G ACTUATOR POSI SEN B1”.
4. Operate “Up” or “Down”, set “W/G ACTUATOR POSITION B1” to 0.006 m, and make a quick short note of value “V2” of “W/G ACTUATOR POSI SEN B1”.

Do the values of “V1” and “V2” change (visually, ACTUATOR SHAFT operates) and “V2” minus “V1” becomes equal to or more than 1.3V?

YES >> INSPECTION END
NO >> Refer to EC-1164, "Diagnosis Procedure".

3.CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

⊗Without CONSULT
1. Turn ignition switch OFF.
2. Disconnect Wastegate control actuator harness connector.
3. While checking the POSITION SENSOR OUT voltage with an oscilloscope, apply a voltage of 12 V to the positive or negative terminal.

Does ACTUATOR SHAFT visually operate and POSITION SENSOR OUT voltage change?

YES >> INSPECTION END
NO >> Refer to EC-1164, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198686

1.CHECK FOR EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak of exhaust manifold.

Is exhaust gas leak detected?

YES >> Repair or replace malfunction parts.
NO >> GO TO 2.

2.CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak between electric throttle control actuator and compressor wheel.

Is intake air leak detected?

YES >> Repair or replace malfunction parts.
NO >> GO TO 3.

3.CHECK RECIRCULATION VALVE

1. Turn ignition switch OFF.
2. Check recirculation valve. Refer to EM-244, "Inspection".

Is the inspection result normal?

YES >> GO TO 4.
NO >> Replace recirculation valve. Refer to EM-242, "Exploded View".

4.CHECK TURBOCHARGER BYPASS CONTROL VALVE POWER SUPPLY

1. Disconnect turbocharger bypass control valve harness connector.
2. Turn ignition switch ON.
3. Check the voltage between turbocharger bypass control valve harness connector and ground.

+		–	Voltage
Turbocharger bypass control valve			
Connector	Terminal		
F64	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5.

5.CHECK TURBOCHARGER BYPASS CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between turbocharger bypass control valve harness connector and IPDM E/R harness connector.

+		–		Continuity
Turbocharger bypass control valve		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F64	1	E14	36	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply.
NO >> Repair or replace error-detected parts.

6.CHECK TURBOCHARGER BYPASS CONTROL VALVE OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between turbocharger bypass control valve harness connector and ECM harness connector.

+		–		Continuity
Turbocharger bypass control valve		ECM		
Connector	Terminal	Connector	Terminal	
F64	2	F24	105	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK TURBOCHARGER BYPASS CONTROL VALVE

Check the turbocharger bypass control valve. Refer to EC-1167, "Component Inspection (Turbocharger Bypass Control Valve)".

Is the inspection result normal?

YES >> GO TO 8.
NO >> Replace turbocharger bypass control valve. Refer to EM-242, "Exploded View".

8.CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect electric wastegate control actuator harness connector and ECM harness connector.
3. Check the continuity between electric wastegate control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric wastegate control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F61	4	F24	107	Existed
	5		108	

Is the inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9.CHECK WASTEGATE CONTROL VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric wastegate control actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric wastegate control actuator harness connector and ground.

+		–	Voltage (Approx.)
Electric wastegate control actuator			
Connector	Terminal		
F61	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 10.
NO >> Perform the trouble diagnosis for power supply circuit.

10. CHECK WASTEGATE CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric wastegate control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric wastegate control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F61	2	F24	72	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace error-detected parts.

11. CHECK WASTEGATE CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between electric wastegate control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric wastegate control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F61	1	F24	65	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 12.
NO >> Repair or replace error-detected parts.

12. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

Check the electric wastegate control actuator. Refer to EC-811, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 13.
NO >> Replace exhaust manifold and turbocharger assembly. Refer to EM-242, "Exploded View".

13. CHECK TURBOCHARGER BOOST SENSOR

Check the turbocharger boost sensor. Refer to EC-1167, "Component Inspection (Turbocharger Boost Sensor)".

Is the inspection result normal?

YES >> GO TO 14.
NO >> Replace turbocharger boost sensor. Refer to EM-194, "Exploded View".

14. CHECK EXHAUST MANIFOLD AND TURBOCHARGER ASSEMBLY

Check the exhaust manifold and turbocharger assembly. Refer to EM-244, "Inspection".

Is the inspection result normal?

YES >> CHECK INTERMITTENT INCIDENT. Refer to GI-45, "Intermittent Incident".
NO >> Replace exhaust manifold and turbocharger assembly. Refer to EM-242, "Exploded View".

Component Inspection (Turbocharger Bypass Control Valve)

INFOID:0000000012198687

1. CHECK TURBOCHARGER BYPASS CONTROL VALVE

With consult
1. Turn ignition switch ON and engine stopped or engine running (idling, less than 1200rpm).
2. On the CONSULT screen, select ENGINE » ACTIVE TEST »"TC BYPASS VALVE".
3. Operate "ON" or "OFF" and check if valve operating sound can be heard.

Without consult
1. Turn ignition switch OFF.
2. Disconnect turbocharger bypass control valve harness connector.
3. Apply a voltage of 12V to the positive or negative terminal.

Can the valve operating sound be heard?

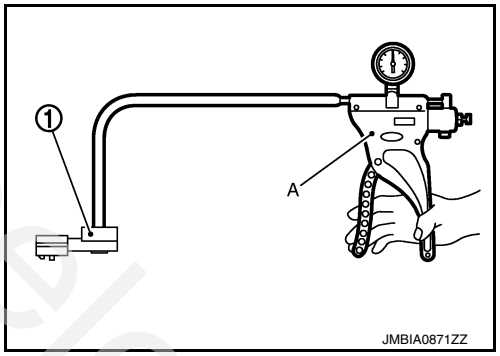
YES >> INSPECTION END
NO >> Replace turbocharger assembly (do not replace bypass control valve only). Refer to EM-242, "Exploded View".

Component Inspection (Turbocharger Boost Sensor)

INFOID:0000000012198688

1. CHECK TURBOCHARGER BOOST SENSOR

1. Turn ignition switch OFF.
2. Remove turbocharger boost sensor with its harness connector.
3. Install pressure pump (A) to turbocharger boost sensor (1).
   CAUTION:
   When insert a pressure pump hose to the sensor, be careful to the damage of the sensor housing.
4. Turn ignition switch ON.
5. Check the voltage between ECM harness connector terminals as per the following conditions.



NOTE:
- Always calibrate the pressure pump gauge when using it.
- Inspection should be done at room temperature [10 - 30°C (50 - 86°F)].

ECM			Condition [Pressure (Relative to atmospheric pressure)]	Voltage (Approx.)
Connector	+	–		
	Terminal			
F23	11	13	0 kPa (0 mbar, 0 mmHg, 0 inHg)	2.03 V
			40 kPa (400 mbar, 300 mmHg, 11.81 inHg)	2.67 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace turbocharger boost sensor. Refer to EM-194, "Exploded View".

P2562, P2566 WASTEGATE CONTROL VALVE POSITION SENSOR

DTC Logic

INFOID:0000000012198693

DTC DETECTION LOGIC

NOTE:
If DTC P2562 or P2566 is displayed with DTC P0643 first perform the trouble diagnosis for DTC P0643. Refer to EC-1060, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P2562	TC BOOST CONTROL POSITION SEN A (Turbocharger boost control position sensor A circuit)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the wastegate control valve position sensor is 4.7 V or more.	• Harness or connectors (Wastegate control valve position sensor circuit is open or shorted.) • Electric wastegate control actuator
P2566	TC BOOST CONTROL POSITION SEN A (Turbocharger boost control position sensor A circuit intermittent)	ECM detects the following status continuously for 0.5 seconds or more: A voltage signal transmitted from the wastegate control valve position sensor is 0.25 V or less.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine and let it idle for 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1168, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198694

1.CHECK WASTEGATE CONTROL VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric wastegate control actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric wastegate control actuator harness connector and ground.

+		−	Voltage (Approx.)
Electric wastegate control actuator			
Connector	Terminal		
F61	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 2.

NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK WASTEGATE CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric wastegate control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric wastegate control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F61	2	F24	72	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK WASTEGATE CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between electric wastegate control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric wastegate control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F61	1	F24	65	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

Check the electric wastegate control actuator. Refer to EC-1169, "Component Inspection (Electric Wastegate Control Actuator)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace electric wastegate control actuator. Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

Component Inspection (Electric Wastegate Control Actuator)

INFOID:0000000012198695

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

With CONSULT

1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “WASTEGATE ACTUATOR”.
3. Operate “Up” or “Down”, set “W/G ACTUATOR POSITION B1” to 0.002 m, and make a quick short note of value “V1” of “W/G ACTUATOR POSI SEN B1”.

4. Operate “Up” or “Down”, set “W/G ACTUATOR POSITION B1” to 0.006 m, and make a quick short note of value “V2” of “W/G ACTUATOR POSI SEN B1”.

Do the values of “V1” and “V2” change (visually, ACTUATOR SHAFT operates) and “V2” minus “V1” becomes equal to or more than 1.3V?

YES >> INSPECTION END
NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator only). Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

3. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

Without CONSULT

1. Turn ignition switch OFF.
2. Disconnect Wastegate control actuator harness connector.
3. While checking the POSITION SENSOR OUT voltage with an oscilloscope, apply a voltage of 12 V to the positive or negative terminal.

Does ACTUATOR SHAFT visually operate and POSITION SENSOR OUT voltage change?

YES >> INSPECTION END
NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator only). Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

P2563 WASTEGATE CONTROL VALVE POSITION SENSOR

DTC Logic

INFOID:0000000012198696

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P2563	TC BOOST CONTROL POSITION SEN A (Turbocharger boost control position sensor A circuit range/performance)	ECM detects the following status when ECM operates the fully closed position learning of a wastegate control valve immediately after engine cold start: A voltage signal transmitted from the turbocharger boost control position sensor is higher than 1.78 V, or lower than 0.60 V.	Electric wastegate control actuator

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Start the engine, and warm it up until the following condition is satisfied.

Engine coolant temperature	65°C (149°F) or more
Engine oil temperature	80°C (176°F) or more

2. Move the vehicle to a cool place.
3. Stop the engine, and cool it down until the following condition is satisfied.

Engine coolant temperature	50°C (122°F) or less
Engine oil temperature	

CAUTION:
Never turn ignition switch ON during soaking.

4. Start engine and let it idle for 5 seconds or more.

CAUTION:
Never turn ignition switch OFF during idling.

5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1171, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198697

1.CHECK WASTEGATE CONTROL VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric wastegate control actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric wastegate control actuator harness connector and ground.

+		–	Voltage (Approx.)
Electric wastegate control actuator			
Connector	Terminal		
F61	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 5.

2.CHECK WASTEGATE CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric wastegate control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric wastegate control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F61	2	F24	72	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK WASTEGATE CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between electric wastegate control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric wastegate control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F61	1	F24	65	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

Check the electric wastegate control actuator. Refer to EC-1173, "Component Inspection (Electric Wastegate Control Actuator)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace electric wastegate control actuator. Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

5.CHECK WASTEGATE CONTROL VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric wastegate control actuator harness connector and ECM harness connector.

Electric wastegate control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F61	3	F24	61	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to EC-792, "Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

Component Inspection (Electric Wastegate Control Actuator)

INFOID:0000000012198698

1.INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

With CONSULT

1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “WASTEGATE ACTUATOR”.
3. Operate “Up” or “Down”, set “W/G ACTUATOR POSITION B1” to 0.002 m, and make a quick short note of value of “W/G ACTUATOR POSI SEN B1”. Assume this value to be "V1".
4. Operate “Up” or “Down”, set “W/G ACTUATOR POSITION B1” to 0.006 m, and make a quick short note of value of “W/G ACTUATOR POSI SEN B1”. Assume this value to be "V2".

Do the values of “V1” and “V2” change (visually, ACTUATOR SHAFT operates) and “V2” minus “V1” becomes equal to or more than 1.3V?

YES >> INSPECTION END
NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator only). Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

3.CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

Without CONSULT

1. Turn ignition switch OFF.
2. Disconnect Wastegate control actuator harness connector.
3. While checking the POSITION SENSOR OUT voltage with an oscilloscope, apply a voltage of 12 V to the positive or negative terminal.

Does ACTUATOR SHAFT visually operate and POSITION SENSOR OUT voltage change?

YES >> INSPECTION END
NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator only). Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

P2564, P2565 WASTEGATE CONTROL VALVE POSITION SENSOR

DTC Logic

INFOID:0000000012198699

DTC DETECTION LOGIC

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P2564	TC BOOST CONTROL POSITION SEN A (Turbocharger boost control position sensor A circuit low)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the wastegate control valve position sensor is 0.25 V or less.	• Harness or connectors (Wastegate control valve position sensor circuit is open or shorted.) • Electric wastegate control actuator
P2565	TC BOOST CONTROL POSITION SEN A (Turbocharger boost control position sensor A circuit high)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the wastegate control valve position sensor is 4.63 V or more.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1174, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198700

1.CHECK WASTEGATE CONTROL VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect electric wastegate control actuator harness connector.
3. Turn ignition switch ON.
4. Check the voltage between electric wastegate control actuator harness connector and ground.

+		−	Voltage (Approx.)
Electric wastegate control actuator			
Connector	Terminal		
F61	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 5.

2.CHECK WASTEGATE CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.

3. Check the continuity between electric wastegate control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric wastegate control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F61	2	F24	72	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3. CHECK WASTEGATE CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between electric wastegate control actuator harness connector and ECM harness connector.

+		–		Continuity
Electric wastegate control actuator		ECM		
Connector	Terminal	Connector	Terminal	
F61	1	F24	65	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

Check the electric wastegate control actuator. Refer to EC-1175, "Component Inspection (Electric Wastegate Control Actuator)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace electric wastegate control actuator. Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

5. CHECK WASTEGATE CONTROL VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between electric wastegate control actuator harness connector and ECM harness connector.

Electric wastegate control actuator		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F61	3	F24	61	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for ECM power supply circuit. Refer to EC-792, "Diagnosis Procedure".
NO >> Repair or replace error-detected parts.

Component Inspection (Electric Wastegate Control Actuator)

INFOID:0000000012198701

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

With CONSULT
1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select “ENGINE” >> “ACTIVE TEST” >> “WASTEGATE ACTUATOR”.
3. Operate “Up” or “Down”, set “W/G ACTUATOR POSITION B1” to 0.002 m, and make a quick short note of value of “W/G ACTUATOR POSI SEN B1”. Assume this value to be "V1".
4. Operate “Up” or “Down”, set “W/G ACTUATOR POSITION B1” to 0.006 m, and make a quick short note of value of “W/G ACTUATOR POSI SEN B1”. Assume this value to be "V2".

Do the values of “V1” and “V2” change (visually, ACTUATOR SHAFT operates) and “V2” minus “V1” becomes equal to or more than 1.3V?

YES >> INSPECTION END
NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator only). Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

3.CHECK ELECTRIC WASTEGATE CONTROL ACTUATOR

Without CONSULT
1. Turn ignition switch OFF.
2. Disconnect Wastegate control actuator harness connector.
3. While checking the POSITION SENSOR OUT voltage with an oscilloscope, apply a voltage of 12 V to the positive or negative terminal.

Does ACTUATOR SHAFT visually operate and POSITION SENSOR OUT voltage change?

YES >> INSPECTION END
NO >> Replace Turbocharger Assembly (do not replace electric wastegate control actuator only). Refer to EC-600, "ENGINE CONTROL SYSTEM : Component Parts Location".

P2610 ECM INTERNAL TIMER

Description

INFOID:0000000012198702

This ECM contains a timer and measures time between an ignition switch OFF and the next ignition switch ON. This enables the judging of the state of engine cooling at an engine start.

DTC Logic

INFOID:0000000012198703

DTC DETECTION LOGIC

DTC No.	CONSULT screen terms (Trouble diagnosis content)	DTC detecting condition	Possible cause
P2610	ECM/PCM INTERNAL ENG OFF TIMER (ECM/PCM internal engine off timer performance)	• ECM internal engine off timer is malfunctioning. • The time calculated by ECM based on a descent allowance of engine coolant temperatures during ignition switch OFF is extremely shorter than the time counted by the Engine internal OFF timer.	• ECM • ECM power supply

DTC CONFIRMATION PROCEDURE

1. INSPECTION START

It is necessary to erase permanent DTC?

YES >> GO TO 4.
NO >> GO TO 2.

2. PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is 12 V or more under ignition switch OFF condition.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Turn ignition switch ON and wait at least 190 seconds.
2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1178, "Diagnosis Procedure".
NO >> INSPECTION END

4. PRECONDITIONING

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is 12 V or more under ignition switch OFF condition.**
- **Before performing the following procedure, check that fuel level is between 2/8 and 7/8.**

>> GO TO 5.

5. PERFORM DTC CONFIRMATION PROCEDURE-I

1. Turn ignition switch ON and wait at least 190 seconds.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1178, "Diagnosis Procedure".
NO >> GO TO 6.

6. PERFORM DTC CONFIRMATION PROCEDURE-II

CAUTION:
To start this self-diagnosis, the conditions listed bellow are required to be satisfied. Perform the following steps to satisfy the conditions.
- **Engine coolant temperature decrease by 55°C (131°F) or more during the time between an ignition switch OFF (after engine warm-up) and the second ignition switch ON.**
- **A fuel temperature at the second ignition switch ON is −5°C (23°F) or more and less than 35°C (95°F).**
- **The temperature difference between engine coolant and fuel is 5°C (41°F) or more.**

NOTE:
This self-diagnosis is not performed if the distance traveled is extremely short.

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and soak the vehicle for at least 12 hours.
   CAUTION:
   - **Never turn ON the ignition switch during soaking.**
   - **Never open the fuel filler cap and perform refueling during soaking.**
4. Turn ignition switch ON and wait at least 190 seconds.
5. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1178, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198704

1. CHECK ECM POWER SUPPLY AND GROUND CIRCUIT

Check ECM power supply and ground circuit. Refer to EC-792, "Diagnosis Procedure".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2. CHECK SELF-DIAGNOSTIC RESULT

Check that DTCs related to the fuel system and the cooling system are not detected.

Is the inspection result normal?

YES >> Check the DTC. Refer to EC-706, "DTC Index".
NO >> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

1. Erase DTC.
2. Perform DTC Confirmation Procedure again. Refer to EC-1177, "DTC Logic".

Is the 1st trip DTC P2610 displayed again?

YES >> Replace ECM. Refer to EC-1256, "Removal and Installation".
NO >> INSPECTION END

P26A3 MULTI-WAY CONTROL VALVE MOTOR

DTC Logic

INFOID:0000000012198705

DTC DETECTION LOGIC

NOTE:
If DTC P26A3 is displayed with DTC P26A5, P26A6, and/or P26A7 first perform the trouble diagnosis for DTC P26A5, P26A6, and/or P26A7. Refer to EC-706, "DTC Index".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P26A3	ENGINE COOLANT BYPASS VALVE (Engine coolant bypass valve A range/performance)	ECM detects the following status continuously for 10 seconds or more: Target valve angle - actual valve angle ≥ ± 5°	• Harness or connectors (Multi-way control valve motor circuit is open or shorted.) • Multi-way control valve

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:
Before performing the following procedure, confirm that battery voltage is between more than 10 V and less than 16 V at idle.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Start the engine and let it idle for 60 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1179, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198706

1.CHECK MULTI-WAY CONTROL VALVE MOTOR OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect multi-way control valve harness connector and ECM harness connector.
3. Check the continuity between multi-way control valve harness connector and ECM harness connector.

+		–		Continuity
Multi-way control valve		ECM		
Connector	Terminal	Connector	Terminal	
F60	1	F23	52	Existed
	2		51	

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK MULTI-WAY CONTROL VALVE MOTOR

Check the multi-way control valve motor. Refer to EC-1180, "Component Inspection (Multi-way Control Valve)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace multi-way control valve. Refer to CO-54, "Removal and Installation".

Component Inspection (Multi-way Control Valve)

INFOID:0000000012198707

1.CHECK MULTI-WAY CONTROL VALVE-1

With CONSULT
1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select “ENGINE” >> “WORK SUPPORT” >> “ENGINE COOLANT BYPASS VALVE”.
3. Check that indication of “ENGINE COOLANT B/V POSI”.

Is “205°” or more displayed on CONSULT screen?

YES >> GO TO 2.
NO >> Replace multi-way control valve. Refer to CO-54, "Removal and Installation".

2.CHECK MULTI-WAY CONTROL VALVE-2

With CONSULT
1. Start the engine.
2. Warm engine up to the normal operating temperature.
3. Check the following condition.

COOLANT TEMP/S	10 - 100°C (50 - 212°F)
ENG OIL TEMP	120°C (248°F) or less
A/C switch	OFF

4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start the engine.
6. Check “ENGINE COOLANT B/V POSI” approximately 2 seconds after engine start.

Is “40°” or less displayed on CONSULT screen?

YES >> INSPECTION END
NO >> Replace multi-way control valve. Refer to CO-54, "Removal and Installation".

P26A5 MULTI-WAY CONTROL VALVE POSITION SENSOR

DTC Logic

INFOID:0000000012198708

DTC DETECTION LOGIC

NOTE:

- If DTC P26A5 is displayed with DTC P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to EC-706, "DTC Index".
- If DTC P26A5 is displayed with DTC P26A3 first perform the trouble diagnosis for DTC P26A3. Refer to EC-1179, "DTC Logic".
- If DTC P26A5 is displayed with DTC P26A6, or P26A7 first perform the trouble diagnosis for DTC P26A6, or P26A7. Refer to EC-1184, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P26A5	ENGINE COOLANT B/V A POSI SEN (Engine coolant bypass valve A position sensor circuit range/ performance)	ECM detects the following status: • A voltage signal transmitted from the multi-way control valve position sensor is 4.76 V or more/4.3 V or less. Outside the above threshold when the valve is moved to the upper side stopper after ignition OFF. • A voltage signal transmitted from the multi-way control valve position sensor is 0.8 V or more/0.34 or less. Outside the threshold when the valve is moved to the lower side stopper after engine start.	• Harness or connectors (Multi-way control valve position sensor circuit is open or shorted.) • Multi-way control valve position sensor

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10 V at ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE-1

1. Start the engine and let it idle.
2. Maintain the following conditions for at least 10 consecutive seconds.

Engine outlet coolant temperature (engine coolant temperature sensor 1)	10°C (50°F) or more
Engine oil temperature	135°C (275°F) or less
Engine speed	4,500 rpm or less
Accelerator pedal	Fully released

3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1182, "Diagnosis Procedure".
NO >> GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-2

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Start the engine and let it idle.
3. Maintain the following conditions for at least 10 consecutive seconds.

Engine outlet coolant temperature (engine coolant temperature sensor 1)	10°C (50°F) or more
Engine oil temperature	135°C (275°F) or less
Engine speed	4,500 rpm or less

4. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1182, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198709

1. CHECK MULTI-WAY CONTROL VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect multi-way control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between multi-way control valve harness connector and ground.

+		−	Voltage (Approx.)
Multi-way control valve			
Connector	Terminal		
F60	5	Ground	5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform the trouble diagnosis for power supply circuit.

2. CHECK MULTI-WAY CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between multi-way control valve harness connector and ECM harness connector.

+		−		Continuity
Multi-way control valve		ECM		
Connector	Terminal	Connector	Terminal	
F60	3	F24	72	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3. CHECK MULTI-WAY CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between multi-way control valve harness connector and ECM harness connector.

+		−		Continuity
Multi-way control valve		ECM		
Connector	Terminal	Connector	Terminal	
F60	4	F24	75	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.

NO >> Repair or replace error-detected parts.

4. CHECK MULTI-WAY CONTROL VALVE POSITION SENSOR

Check the multi-way control valve position sensor. Refer to EC-1183, "Component Inspection (Multi-way Control Valve)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace multi-way control valve. Refer to CO-54, "Removal and Installation".

Component Inspection (Multi-way Control Valve)

INFOID:0000000012198710

1. CHECK MULTI-WAY CONTROL VALVE-1

With CONSULT
1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select “ENGINE” >> “WORK SUPPORT” >> “ENGINE COOLANT BYPASS VALVE”.
3. Check that indication of “ENGINE COOLANT B/V POSI”.

Is “205°” or more displayed on CONSULT screen?

YES >> GO TO 2.
NO >> Replace multi-way control valve. Refer to CO-54, "Removal and Installation".

2. CHECK MULTI-WAY CONTROL VALVE-2

With CONSULT
1. Start the engine.
2. Warm engine up to the normal operating temperature.
3. Check the following condition.

COOLANT TEMP/S	10 - 100°C (50 - 212°F)
ENG OIL TEMP	120°C (248°F) or less
A/C switch	OFF

4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start the engine.
6. Check “ENGINE COOLANT B/V POSI” approximately 2 seconds after engine start.

Is “40°” or less displayed on CONSULT screen?

YES >> INSPECTION END
NO >> Replace multi-way control valve. Refer to CO-54, "Removal and Installation".

P26A6 P26A7 MULTI-WAY CONTROL VALVE POSITION SENSOR

DTC Logic

INFOID:0000000012198711

DTC DETECTION LOGIC

NOTE:
If DTC P26A6 or P26A7 is displayed with DTC P0643 first perform the trouble diagnosis for DTC P0643. Refer to EC-1060, "DTC Logic".

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible Cause
P26A6	ENGINE COOLANT B/V A POSI SEN (Engine coolant bypass valve A position sensor circuit low)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the multi-way control valve position sensor is 0.34 V or less.	• Harness or connectors (Multi-way control valve position sensor circuit is open or shorted.) • Multi-way control valve position sensor
P26A7	ENGINE COOLANT B/V A POSI SEN (Engine coolant bypass valve A position sensor circuit high)	ECM detects the following status continuously for 5 seconds or more: A voltage signal transmitted from the multi-way control valve position sensor is 4.76 V or more.	

DTC CONFIRMATION PROCEDURE

1.PRECONDITIONING

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.
1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

TEST CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11 V at ignition switch ON.

>> GO TO 2.

2.PERFORM DTC CONFIRMATION PROCEDURE

1. Turn ignition switch ON and wait at least 10 seconds.
2. Start the engine and let it idle for 20 seconds.
3. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1184, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198712

1.CHECK MULTI-WAY CONTROL VALVE POSITION SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect multi-way control valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between multi-way control valve harness connector and ground.

+		−	Voltage (Approx.)
Multi-way control valve			
Connector	Terminal		
F60	5	Ground	5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK MULTI-WAY CONTROL VALVE POSITION SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between multi-way control valve harness connector and ECM harness connector.

+		–		Continuity
Multi-way control valve		ECM		
Connector	Terminal	Connector	Terminal	
F60	3	F24	72	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK MULTI-WAY CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between multi-way control valve harness connector and ECM harness connector.

+		–		Continuity
Multi-way control valve		ECM		
Connector	Terminal	Connector	Terminal	
F60	4	F24	75	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK MULTI-WAY CONTROL VALVE POSITION SENSOR

Check the multi-way control valve position sensor. Refer to EC-1183, "Component Inspection (Multi-way Control Valve)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace multi-way control valve. Refer to CO-54, "Removal and Installation".

Component Inspection (Multi-way Control Valve)

INFOID:0000000012198713

1.CHECK MULTI-WAY CONTROL VALVE-1

With CONSULT
1. Turn ignition switch ON and engine stopped.
2. On the CONSULT screen, select “ENGINE” >> “WORK SUPPORT” >> “ENGINE COOLANT BYPASS VALVE”.
3. Check that indication of “ENGINE COOLANT B/V POSI”.

Is “205°” or more displayed on CONSULT screen?

YES >> GO TO 2.
NO >> Replace multi-way control valve. Refer to CO-54, "Removal and Installation".

2.CHECK MULTI-WAY CONTROL VALVE-2

With CONSULT
1. Start the engine.
2. Warm engine up to the normal operating temperature.
3. Check the following condition.

COOLANT TEMP/S	10 - 100°C (50 - 212°F)
ENG OIL TEMP	120°C (248°F) or less
A/C switch	OFF

4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start the engine.
6. Check “ENGINE COOLANT B/V POSI” approximately 2 seconds after engine start.

Is “40°” or less displayed on CONSULT screen?

YES >> INSPECTION END
NO >> Replace multi-way control valve. Refer to CO-54, "Removal and Installation".

P26AB MULTI-WAY CONTROL VALVE

DTC Logic

INFOID:0000000012198714

DTC DETECTION LOGIC

NOTE:

If DTC P26AB is displayed with DTC P0300, P0301, P0302, P0303 or P0304, first perform the trouble diagnosis for P0300, P0301, P0302, P0303, P0304. Refer to EC-941, "DTC Logic".

Engine coolant temperature has not risen enough to open the multi-way control valve even though the engine has run long enough.

This is due to a leak in the seal or the multi-way control valve being stuck open.

DTC No.	Trouble diagnosis name (Trouble diagnosis content)	DTC detecting condition	Possible cause
P26AB	ENGINE COOLANT B/V POSI SEN (Engine coolant bypass valve "A" stuck/open)	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	• Multi-way control valve • Leakage from multi-way control valve • Engine coolant temperature sensor 1

DTC CONFIRMATION PROCEDURE

NOTE:

Never refuel before and during the following procedure.

1.PRECONDITIONING-1

If DTC Confirmation Procedure has been previously conducted, always perform the following procedure before conducting the next test.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.

>> GO TO 2.

2.PRECONDITIONING-2

With CONSULT

1. Turn ignition switch ON.
2. Check the following conditions:

Ambient temperature	−10°C (14°F) or more
A/C switch	OFF
Blower fan switch	OFF

3. Select "DATA MONITOR" mode of "ENGINE" using CONSULT.
4. Check the following conditions:

COOLAN TEMP/S	[(−10°C) – (+52°C) (14 – 126°F)]

Is the condition satisfied?

YES >> GO TO 3.

NO >> 1. Satisfy the condition.
2. GO TO 3.

3.PERFORM DTC CONFIRMATION PROCEDURE-1

With CONSULT

1. Start engine.
2. Drive the vehicle until the following condition is satisfied.

CAUTION:

Always drive vehicle at safe speed.

- **STEP 1**

Drive the vehicle under the conditions instructed below until the difference between “COOLAN TEMP/S” and “FUEL T/TMP SE” becomes at least 23°C (73°F).

COOLAN TEMP/S	68°C (154°F) or less
FUEL T/TMP SE	Less than the value calculated by subtracting 28°C (82°F) from “COOLAN TEMP/S”.*

*: Example

COOLAN TEMP/S	FUEL T/TMP SE
65°C (149°F)	37°C (99°F) or less
60°C (140°F)	32°C (89°F) or less

- **STEP 2**

Drive the vehicle at 60 km/h (37 MPH) or more with the difference between “COOLAN TEMP/S” and “FUEL T/TMP SE” maintained at 28°C (82°F) or more.

NOTE:

Keep the accelerator pedal as steady as possible during cruising.

- **STEP 3**

Drive the vehicle at 60 km/h (37 MPH) or more until “COOLAN TEMP/S” increases by 6°C (43°F).

NOTE:

Keep the accelerator pedal as steady as possible during cruising.

Is the condition satisfied?

YES >> GO TO 4.
NO >> GO TO 1.

4. PERFORM DTC CONFIRMATION PROCEDURE-2

With CONSULT

1. Drive the vehicle until the following condition is satisfied.

COOLAN TEMP/S	68°C (154°F) or more

CAUTION:

Always drive vehicle at safe speed.

2. Check 1st trip DTC.

Is 1st trip DTC detected?

YES >> Proceed to EC-1188, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198715

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR 1

Check the engine coolant temperature sensor 1. Refer to EC-1188, "Component Inspection".

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace engine coolant temperature sensor 1. Refer to CO-54, "Exploded View".

2. CHECK MULTI-WAY CONTROL VALVE

Check the multi-way control valve. Refer to EC-1183, "Component Inspection (Multi-way Control Valve)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace multi-way control valve. Refer to CO-54, "Removal and Installation".

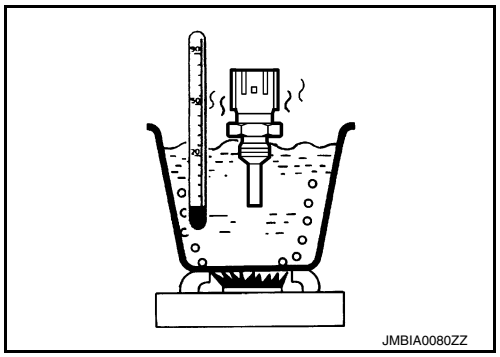
Component Inspection

INFOID:0000000012198716

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR 1

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.



Engine coolant temperature sensor		Condition		Resistance (kΩ)
+	–			
Terminal				
1	2	Temperature [°C (°F)]	20 (68)	2.37 - 2.63
			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 1. Refer to CO-54, "Exploded View".

BATTERY CURRENT SENSOR

Component Function Check

INFOID:0000000012198717

1.CHECK BATTERY CURRENT SENSOR

1. Start engine and warm it up to normal operating temperature.
2. Check the voltage between ECM harness connector terminals.

ECM			Voltage (Approx.)
Connector	+	-	
	Terminal		
F23	38	43	2.6 - 3.5 V*

*: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-97, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1190, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198718

1.CHECK BATTERY CURRENT SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect battery current sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between battery current sensor harness connector and ground.

+		-	Voltage (Approx.)
Battery current sensor			
Connector	Terminal		
F52	1	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform EC-1240, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK BATTERY CURRENT SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		–		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	3	F23	43	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK BATTERY CURRENT SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between battery current sensor harness connector and ECM harness connector.

+		–		Continuity
Battery current sensor		ECM		
Connector	Terminal	Connector	Terminal	
F52	4	F23	38	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts

5.CHECK BATTERY CURRENT SENSOR

Check the battery current sensor. Refer to EC-1092, "Component Inspection".

Is the inspection result normal?

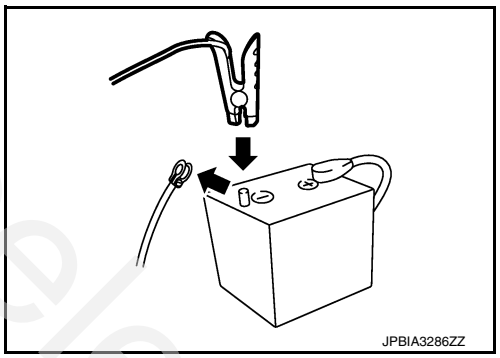
YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace battery negative cable assembly.

Component Inspection

INFOID:0000000012198719

1.CHECK BATTERY CURRENT SENSOR

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Disconnect battery negative cable.
4. Install jumper cable between battery negative terminal and body ground.
5. Turn ignition switch ON.
6. Check the voltage between ECM harness connector and ground.



ECM			Voltage (Approx.)
Connector	+	-	
	Terminal		
F23	38	43	2.5 V*

*: Before measuring the terminal voltage, confirm that the battery is fully charged. Refer to PG-97, "How to Handle Battery".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace battery negative cable assembly.

BRAKE PEDAL POSITION SWITCH

Component Function Check

INFOID:0000000012198720

1.CHECK BRAKE PEDAL POSITION SWITCH FUNCTION

With CONSULT
1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Check “BRAKE SW1” indication as per the following conditions.

Monitor item	Condition		Indication
BRAKE SW1	Brake pedal	Slightly depressed	OFF
		Fully released	ON

Without CONSULT
1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals as per the following.

ECM			Condition		Voltage (Approx.)
Connector	+	–			
	Terminal				
E19	140	152	Brake pedal	Slightly depressed	0 V
				Fully released	Battery voltage

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1192, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198721

1.CHECK BRAKE PEDAL POSITION SWITCH POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect brake pedal position switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between brake pedal position switch harness connector and ground.

+		–	Voltage
Brake pedal position switch			
Connector	Terminal		
E112	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform the trouble diagnosis for power supply circuit.

2.CHECK BRAKE PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between brake pedal position switch harness connector and ECM harness connector.

+		–		Continuity
Brake pedal position switch		ECM		
Connector	Terminal	Connector	Terminal	
E112	2	E19	140	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK BRAKE PEDAL POSITION SWITCH

Check the brake pedal position switch. Refer to EC-1193, "Component Inspection (Brake Pedal Position Switch)"

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace brake pedal position switch. Refer to BR-20, "Exploded View".

Component Inspection (Brake Pedal Position Switch)

INFOID:0000000012198722

1.CHECK BRAKE PEDAL POSITION SWITCH-I

1. Turn ignition switch OFF.
2. Disconnect brake pedal position harness connector.
3. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition		Continuity
+	-			
Terminals				
1	2	Brake pedal	Fully released	Existed
			Slightly de-pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK BRAKE PEDAL POSITION SWITCH-II

1. Adjust brake pedal position switch installation. Refer to BR-21, "Inspection and Adjustment".
2. Check the continuity between brake pedal position switch terminals as per the following conditions.

Brake pedal position switch		Condition		Continuity
+	-			
Terminals				
1	2	Brake pedal	Fully released	Existed
			Slightly de-pressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace brake pedal position switch. Refer to BR-20, "Exploded View".

CLUTCH PEDAL POSITION SWITCH

Component Function Check

INFOID:0000000012198723

1.CHECK FOR CLUTCH PEDAL POSITION SWITCH FUNCTION

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

ECM			Condition		Voltage (Approx.)
Connector	+	–			
	Terminal				
E19	132	152	Clutch pedal	Slightly depressed	Battery voltage
				Fully released	0V

Is the inspection result normal?

YES >> INSPECTION END.
NO >> Proceed to EC-1194, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198724

1.CHECK CLUTCH PEDAL POSITION INPUT SIGNAL

1. Turn ignition switch OFF.
2. Disconnect clutch pedal position switch harness connector.
3. Turn ignition switch ON.
4. Check the voltage between clutch pedal position switch harness connector and ground.

+		–	Voltage
Clutch pedal position switch			
Connector	Terminal		
E113	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK CLUTCH PEDAL POSITION SWITCH INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors.
3. Check the continuity between clutch pedal position switch harness connector and ECM harness connector.

+		–		Continuity
Clutch pedal position switch		ECM		
Connector	Terminal	Connector	Terminal	
E113	1	E19	132	Existed

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK CLUTCH PEDAL POSITION SWITCH GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connectors.

3. Check the continuity between clutch pedal position switch harness connector and ground

+		–	Continuity
Clutch pedal position switch			
Connector	Terminal		
E113	2	Ground	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK CLUTCH PEDAL POSITION SWITCH

Check the clutch pedal position switch. Refer to EC-1195, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace clutch pedal position switch. Refer to BR-20, "Exploded View".

Component Inspection

INFOID:0000000012198725

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 terminals as per the following conditions.

Clutch pedal position switch		Condition		Continuity
+	–			
Terminal				
1	2	Clutch pedal	Fully released	Existed
			Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK CLUTCH PEDAL POSITION SWITCH-II

1. Adjust clutch pedal position switch installation. Refer to CL-12, "Inspection and Adjustment".
2. Check the continuity between clutch pedal position switch terminals as per the following conditions.

Clutch pedal position switch		Condition		Continuity
+	–			
Terminal				
1	2	Clutch pedal	Fully released	Existed
			Slightly depressed	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace clutch pedal position switch. Refer to CL-11, "Exploded View".

COOLING FAN

Component Function Check

INFOID:0000000012198726

1.CHECK COOLING FAN FUNCTION

With CONSULT
1. Turn ignition switch ON.
2. Perform “FAN DUTY CONTROL” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Check that cooling fan speed varies according to the percentage.

Without CONSULT
1. Activate IPDM E/R auto active test and check cooling fan motors operation. Refer to PCS-12, "Diagnosis Description".
2. Check that cooling fan operates.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1196, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198727

1.CHECK COOLING FAN CONTROL MODULE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect cooling fan control nodule harness connector.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan control nodule harness connector and ground.

+		–	Voltage
Cooling fan control module			
Connector	Terminal		
E203	3	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 2.

2.CHECK COOLING FAN CONTROL MODULE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay harness connector.
3. Check the continuity between cooling fan control nodule harness connector and cooling fan relay harness connector.

+		–		Continuity
Cooling fan control module		Cooling fan relay		
Connector	Terminal	Connector	Terminal	
E203	3	E204	3	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK COOLING FAN RELAY POWER SUPPLY CIRCUIT

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between cooling fan relay harness connector and IPDM E/R harness connector.

+		–		Continuity
Cooling fan relay		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E204	1	E17	67	Existed

3. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4. CHECK COOLING FAN RELAY

Check cooling fan relay. Refer to EC-1198, "Component Inspection (Cooling Fan Relay)".

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Replace cooling fan relay.

5. CHECK COOLING FAN CONTROL MODULE GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between cooling fan control nodule harness connector and ground.

+		–	Continuity
Cooling fan control module			
Connector	Terminal		
E203	1	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6. CHECK COOLING FAN CONTROL SIGNAL CIRCUIT

1. Disconnect IPDM E/R harness connector.
2. Check the continuity between cooling fan control nodule harness connector and IPDM E/R harness connector.

+		–		Continuity
Cooling fan control module		IPDM E/R		
Connector	Terminal	Connector	Terminal	
E203	2	E17	72	Existed

3. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. CHECK COOLING FAN CONTROL MODULE OUTPUT SIGNAL CIRCUIT

1. Reconnect all harness connectors disconnected.
2. Disconnect cooling fan control module harness connector.
3. Turn ignition switch ON.
4. Check the voltage between cooling fan control module terminals and ground.

+		–	Voltage
Cooling fan control module			
Connector	Terminal		
E301	4	Ground	Battery voltage
E302	6		

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8.CHECK COOLING FAN MOTORS -1 AND -2

Check the cooling fan motor. Refer to EC-1198, "Component Inspection (Cooling Fan Motor)".

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace cooling motor. Refer to CO-50, "Exploded View".

Component Inspection (Cooling Fan Motor)

INFOID:0000000012198728

1.CHECK COOLING FAN MOTOR

1. Turn ignition switch OFF.
2. Disconnect cooling fan control module harness connector.
3. Supply cooling fan control module harness connector terminals with battery voltage as per the following, and check operation.

Cooling fan control module				Operation
Motor	Connector	Terminal		
		(+)	(–)	
1	E301	4	5	Cooling fan operates.
2	E302	6	7	

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning cooling fan motor. Refer to CO-50, "Exploded View".

Component Inspection (Cooling Fan Relay)

INFOID:0000000012198729

1.CHECK COOLING FAN RELAY

1. Turn ignition switch OFF.
2. Remove cooling fan relay.
3. Check the continuity between cooling fan relay terminals under the following conditions.

Cooling fan relay		Conditions	Continuity
+	–		
Terminal			
3	5	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace cooling fan relay.

ELECTRICAL LOAD SIGNAL

Description

INFOID:0000000012198730

The electrical load signal (Headlamp switch signal, rear window defogger switch signal, etc.) is transferred via the CAN communication line.

Component Function Check

INFOID:0000000012198731

1.CHECK REAR WINDOW DEFOGGER SWITCH FUNCTION

With CONSULT
1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode of “ENGINE” using CONSULT.
3. Select “LOAD SIGNAL” and check indication as per the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Rear window defogger switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 2.
NO >> Proceed to EC-1199, "Diagnosis Procedure".

2.CHECK LIGHTING SWITCH FUNCTION

With CONSULT
Check “LOAD SIGNAL” indication as per the following conditions.

Monitor item	Condition		Indication
LOAD SIGNAL	Lighting switch	ON at 2nd position	ON
		OFF	OFF

Is the inspection result normal?

YES >> GO TO 3.
NO >> Proceed to EC-1199, "Diagnosis Procedure".

3.CHECK HEATER FAN CONTROL SWITCH FUNCTION

With CONSULT
Select “HEATER FAN SW” and check indication as per the following conditions.

Monitor item	Condition		Indication
HEATER FAN SW	Heater fan control switch	ON	ON
		OFF	OFF

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1199, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198732

1.INSPECTION START

Confirm the malfunctioning circuit (rear window defogger, headlamp or heater fan). Refer to EC-1199, "Component Function Check".

Which circuit is related to the incident?

Rear window defogger>>GO TO 2.
Headlamp>>GO TO 3.
Heater fan>>GO TO 4.

2.CHECK REAR WINDOW DEFOGGER SYSTEM

Check the rear window defogger system. Refer to DEF-18, "Work Flow".

>> INSPECTION END

3.CHECK HEADLAMP SYSTEM

Check the headlamp system. Refer to EXL-47, "Work Flow".

>> INSPECTION END

4.CHECK HEATER FAN CONTROL SYSTEM

Perform trouble diagnosis of air conditioning system. Check type of air conditioning system HA-15, "Work Flow" and refer to the follows.

- HAC-45, "Work Flow"

>> INSPECTION END

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Component Function Check

INFOID:0000000012198733

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE FUNCTION

With CONSULT

1. Turn ignition switch OFF.
2. Disconnect the EVAP purge hose from EVAP canister purge volume control solenoid valve (EVAP canister side).
3. Start engine and let it idle.
4. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode wit CONSULT.
5. Touch “Qu” and “Qd” on CONSULT screen to adjust “PURG VOL CONT/V” and check vacuum existence under the following conditions.

PURG VOL CONT/V	Vacuum
100%	Existed
0 %	Not existed

Without CONSULT

1. Turn ignition switch OFF.
2. Disconnect the EVAP purge hose from EVAP canister purge volume control solenoid valve (EVAP canister side).
3. Start engine and let it idle for at least 100 seconds.
4. Check vacuum existence under the following conditions.

Condition	Vacuum
At idle	Not existed
Approx. 2,000 rpm	Existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1201, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198734

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.
4. Check the voltage between EVAP canister purge volume control solenoid valve harness connector and ground.

+		–	Voltage
EVAP canister purge volume control solenoid valve			
Connector	Terminal		
F106	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and IPDM E/R harness connector.

+		–		
EVAP canister purge volume control solenoid valve		IPDM E/R		Continuity
Connector	Terminal	Connector	Terminal	
F106	1	E14	35	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 4.
YES-2 >> Without CONSULT: GO TO 5.
NO >> Repair or replace error-detected parts.

3.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between EVAP canister purge volume control solenoid valve harness connector and ECM harness connector.

+		–		
EVAP canister purge volume control solenoid valve		ECM		Continuity
Connector	Terminal	Connector	Terminal	
F106	2	F24	115	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES-1 >> With CONSULT: GO TO 4.
YES-2 >> Without CONSULT: GO TO 5.
NO >> Repair or replace error-detected parts.

4.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT
1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
4. Check that engine speed varies according to the valve opening.

Does engine speed vary according to the valve opening?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 5.

5.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Check the EVAP canister purge volume control solenoid valve. Refer to EC-1202, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-197, "Exploded View".

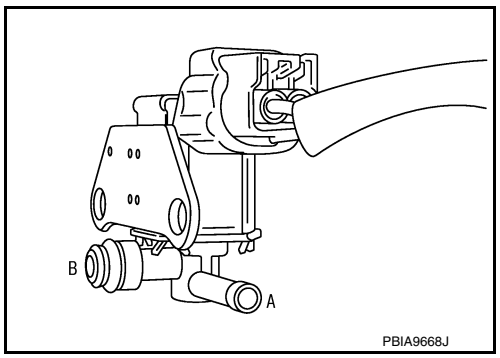
Component Inspection

INFOID:0000000012198735

1.CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

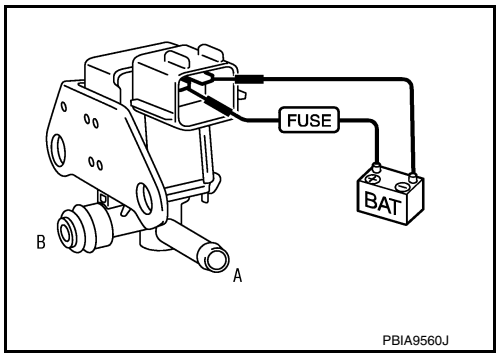
With CONSULT
1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Start engine.
5. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.

6. Touch “Qd” and “Qu” on CONSULT screen to adjust “PURG VOL C/V” opening and check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.



Condition (PURG VOL C/V value)	Air passage continuity between (A) and (B)
100%	Existed
0%	Not existed

Without CONSULT
1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Disconnect EVAP purge hoses connected to EVAP canister purge volume control solenoid valve.
4. Check air passage continuity of EVAP canister purge volume control solenoid valve as per the following conditions.



Condition	Air passage continuity between (A) and (B)
12 V direct current supply between terminals 1 and 2	Existed
No supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace EVAP canister purge volume control solenoid valve. Refer to EM-197, "Exploded View".

FUEL INJECTOR

Component Function Check

INFOID:0000000012198736

1.INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

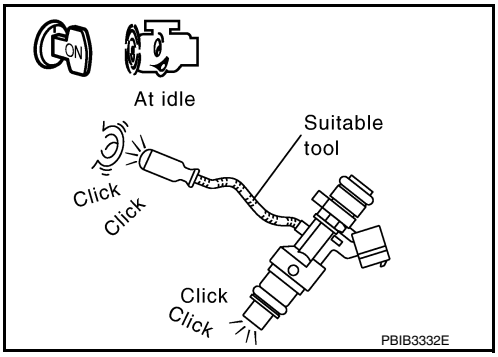
YES >> GO TO 2.
NO >> Proceed to EC-1204, "Diagnosis Procedure".

2.CHECK FUEL INJECTOR FUNCTION

With CONSULT
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Check that each circuit produces a momentary engine speed drop.

Without CONSULT
1. Let engine idle.
2. Listen to each fuel injector operating sound.

Clicking noise should be heard.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1204, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198737

1.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector harness connector.
3. Turn ignition switch ON.
4. Check the voltage between fuel injector harness connector and ground.

+			–	Voltage
Fuel injector				
Cylinder	Connector	Terminal		
1	F65	1	Ground	Battery voltage
2	F66	1		
3	F67	1		
4	F68	1		

Is the inspection result normal?

YES >> GO TO 9.
NO >> GO TO 2.

2.CHECK FUEL INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F65	1	F23	1	Existed
2	F66	1		7	
3	F67	1			
4	F68	1		1	

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3. CHECK FUEL INJECTOR DRIVER POWER SUPPLY

1. Reconnect ECM harness connector.
2. Turn ignition switch ON.
3. Check the voltage between ECM harness connector and ground.

+		–	Voltage
ECM			
Connector	Terminal		
F23	4	Ground	Battery voltage
	5		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident"
NO >> GO TO 4.

4. CHECK FUEL INJECTOR DRIVER POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector relay harness connector.
4. Check the continuity between ECM harness connector and fuel injector relay harness connector.

ECM		Fuel injector relay		Continuity
Connector	Terminal	Connector	Terminal	
F23	4	E57	5	Existed
	5		7	

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts

5. CHECK FUEL INJECTOR RELAY POWER SUPPLY (CONTACT SIDE)

Check the voltage between fuel injector relay harness connector and ground.

+		–	Voltage
Fuel injector relay			
Connector	Terminal		
E57	3	Ground	Battery voltage
	6		

Is the inspection result normal?

YES >> GO TO 6.

NO >> Perform the trouble diagnosis for power supply circuit.

6.CHECK FUEL INJECTOR RELAY POWER SUPPLY (EXCITATION COIL SIDE)

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between fuel injector relay harness connector and ground.

+		−	Voltage
Fuel injector relay			
Connector	Terminal		
E57	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 8.
NO >> GO TO 7.

7.CHECK FUEL INJECTOR RELAY POWER SUPPLY CIRCUIT (EXCITATION COIL SIDE)

1. Turn ignition switch OFF.
2. Disconnect fuel injector relay harness connector.
3. Disconnect IPDM E/R harness connector.
4. Check the continuity between IPDM E/R harness connector and fuel injector harness connector.

IPDM E/R		Fuel injector relay		Continuity
Connector	Terminal	Connector	Terminal	
E14	35	E57	1	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

8.CHECK FUEL INJECTOR RELAY GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel injector relay harness connector.
3. Check the continuity between fuel injector relay harness connector and ground.

Fuel injector relay		−	Continuity
Connector	Terminal		
E57	2	Ground	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 10.
NO >> Repair or replace error-detected parts.

9.CHECK FUEL INJECTOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between fuel injector harness connector and ECM harness connector.

Fuel injector			ECM		Continuity
Cylinder	Connector	Terminal	Connector	Terminal	
1	F65	2	F23	8	Existed
2	F66	2		2	
3	F67	2		3	
4	F68	2		6	

4. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace error-detected parts.

10. CHECK FUEL INJECTOR RELAY

Check the fuel injector relay. Refer to EC-1207, "Component Inspection (Fuel Injector Relay)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident"
NO >> Replace fuel injector relay.

11. CHECK FUEL INJECTOR

Check the fuel injector. Refer to EC-1207, "Component Inspection (Fuel Injector)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident"
NO >> Replace malfunctioning fuel injector. Refer to EM-208, "Exploded View".

Component Inspection (Fuel Injector)

INFOID:0000000012198738

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.

Fuel injector		Resistance
+	–	
Terminals		
1	2	1.44 - 1.73 Ω [at 10 - 60°C (50 - 140°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning fuel injector.EM-208, "Exploded View"

Component Inspection (Fuel Injector Relay)

INFOID:0000000012198739

1. CHECK FUEL INJECTOR RELAY

1. Turn ignition switch OFF.
2. Remove fuel injector relay.
3. Check the continuity between fuel heater relay terminals as per the following conditions.

+	–	Conditions	Continuity
Fuel injector relay			
Terminal			
3	5	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed

+	–	Conditions	Continuity
Fuel injector relay			
Terminal			
6	7	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel injector relay.

G SENSOR

Component Function Check

INFOID:0000000012198740

1.CHECK G SENSOR FUNCTION

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector terminals.

ECM			Condition	Voltage (Approx.)
Connector	+	–		
	Terminal			
F23	34	13	[Engine is running] • Warm-up condition • Idle speed	0 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1209, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198741

1.CHECK G SENSOR POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect G sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between G sensor harness connector terminals.

G sensor			Voltage (Approx.)
Connector	+	–	
	Terminal		
B32	3	2	5 V

Is the inspection result normal?

YES >> GO TO 2.
NO >> GO TO 4.

2.CHECK G SENSOR SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between G sensor harness connector and ECM harness connector.

+		–		Continuity
G sensor		ECM		
Connector	Terminal	Connector	Terminal	
B32	1	F23	34	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK G SENSOR

Check G sensor. Refer to EC-1210, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> 1. Replace G sensor.

2. Perform calibration of G sensor.

4.CHECK G SENSOR POWER SUPPLY CIRCUIT-II

Check the voltage between G sensor harness connector terminal and ground.

+		–	Voltage (Approx.)
G sensor			
Connector	Terminal		
B32	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 7.

5.CHECK G SENSOR GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between G sensor harness connector and ECM harness connector.

+		–		Continuity
G sensor		ECM		
Connector	Terminal	Connector	Terminal	
B32	2	F23	13	Existed

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK ECM GROUND CIRCUIT

Check the continuity between ECM harness connector and ground.

ECM		Ground	Continuity
Connector	Terminal		
F23	9	Ground	Existed
	10		
	50		
F24	60		
	110		
E19	147		
	149		
	152		

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Repair or replace error-detected parts.

7.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

Perform EC-1240, "Diagnosis Procedure".

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

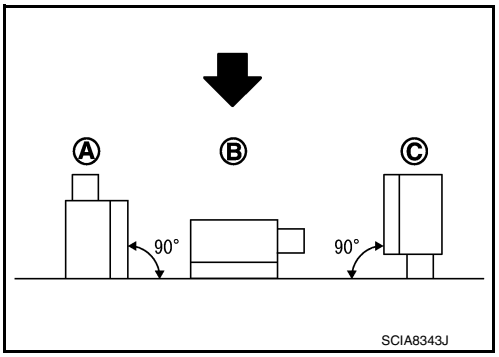
Component Inspection

INFOID:0000000012198742

1.CHECK G SENSOR

With CONSULT
1. Remove G sensor.
2. Reconnect all harness connectors disconnected.
3. Place the G sensor on a flat table.
4. Turn ignition switch ON.
5. Select “G SENSOR” in “DATA MONITOR” mode of “ENGINE” using CONSULT to check indications according to the following conditions:

⬅ : Direction of gravitational force

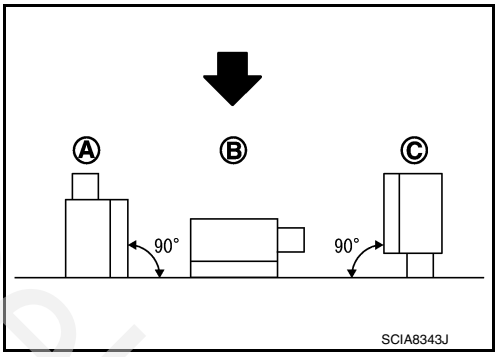


Monitor item	Condition	Value (V)
G SENSOR	Parallel with the table (0G) (B)	2.18 – 2.82
	Vertical to the table (−1G) (A) ↓ Parallel with the table (0G) (B) ↓ Vertical to the table (1G) (C)	0.85 – 1.49* ↓ 2.18 – 2.82* ↓ 3.51 – 4.15*

*: Check that voltage rises as the G sensor measurement condition changes in the order of (A), (B), and (C).

Without CONSULT
1. Remove G sensor.
2. Reconnect all harness connectors disconnected.
3. Place the G sensor on a flat table.
4. Turn ignition switch ON.
5. Check the voltage between ECM harness connector terminal and ground.

⬅ : Direction of gravitational force



+ ECM Connector	+ ECM Terminal	−	Condition	Voltage (V)
F23	34	Ground	Parallel with the table (0G) (B)	2.18 – 2.82
			Vertical to the table (−1G) (A) ↓ Parallel with the table (0G) (B) ↓ Vertical to the table (1G) (C)	0.85 – 1.49* ↓ 2.18 – 2.82* ↓ 3.51 – 4.15*

*: Check that voltage rises as the G sensor measurement condition changes in the order of (A), (B), and (C).

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace G sensor.

HIGH PRESSURE FUEL PUMP

Component Function Check

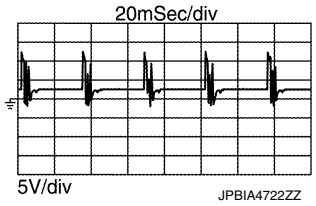
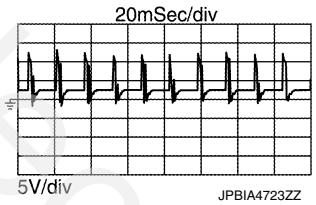
INFOID:0000000012198743

1.CHECK HIGH PRESSURE FUEL PUMP FUNCTION

With CONSULT
1. Start engine.
2. Check “FUEL PRES SEN V” in “DATA MONITOR” mode of “ENGINE” using CONSULT.

Monitor Item	Condition	Values/Status
FUEL PRES SEN V	Engine speed: Idle	1,140 – 1,460 mV
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,300 – 2,900 mV

Without CONSULT
1. Start engine.
2. Check the voltage between ECM harness connector terminals as per the following conditions.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F23	48	49	[Engine is running] • Warm-up condition • Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14 V) ★  JPBIA4722ZZ
			[Engine is running] • Warm-up condition • Engine speed: 2,000 rpm	BATTERY VOLTAGE (11 - 14 V) ★  JPBIA4723ZZ

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1212, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198744

1.CHECK HIGH PRESSURE FUEL PUMP POWER SUPPLY

1. Turn ignition switch ON.
2. Check the voltage between ECM harness connector and ground.

+		–	Voltage
ECM			
Connector	Terminal		
F24	47	Ground	Battery voltage

Is inspection result normal?

YES >> GO TO 8.
NO >> GO TO 2.

2.CHECK HIGH PRESSURE FUEL PUMP POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector relay harness connector.
4. Check the continuity between ECM harness connector and high pressure fuel pump relay harness connector.

+		–		Continuity
ECM		High pressure fuel pump relay		
Connector	Terminal	Connector	Terminal	
F24	47	E58	3	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts

3.CHECK HIGH PRESSURE FUEL PUMP RELAY POWER SUPPLY (CONTACT SIDE)

Check the voltage between high pressure fuel pump relay harness connector and ground.

+		–	Voltage
High pressure fuel pump relay			
Connector	Terminal		
E58	5	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 4.
NO >> Perform the trouble diagnosis for power supply circuit.

4.CHECK HIGH PRESSURE FUEL PUMP RELAY POWER SUPPLY (EXCITATION COIL SIDE)

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check the voltage between high pressure fuel pump relay harness connector and ground.

+		–	Voltage
High pressure fuel pump relay			
Connector	Terminal		
E58	2	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 6.
NO >> GO TO 5

5.CHECK HIGH PRESSURE FUEL PUMP RELAY POWER SUPPLY CIRCUIT (EXCITATION COIL SIDE)

1. Turn ignition switch OFF.
2. Disconnect high pressure fuel pump relay harness connector.
3. Disconnect IPDM E/R harness connector.
4. check the continuity between IPDM E/R harness connector and high pressure fuel pump harness connector.

+		–		Continuity
IPDM E/R		High pressure fuel pump relay		
Connector	Terminal	Connector	Terminal	
E14	35	E58	2	Existed

5. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

6.CHECK HIGH PRESSURE FUEL PUMP RELAY GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect high pressure fuel pump relay harness connector.
3. Check the continuity between high pressure fuel pump relay harness connector and ground.

+		–	Continuity
High pressure fuel pump relay			
Connector	Terminal		
E58	1	Ground	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7.CHECK HIGH PRESSURE FUEL PUMP RELAY

Check the high pressure fuel pump relay. Refer to EC-1216, "Component Inspection (High Pressure Fuel Pump Relay)".

Is inspection result normal?

YES >> GO TO 8.
NO >> Replace high pressure fuel pump relay.

8.CHECK HIGH PRESSURE FUEL PUMP CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and high pressure fuel pump harness connector.
3. Check the continuity between ECM harness connector and high pressure fuel pump harness connector.

+		–		Continuity
ECM		High pressure fuel pump		
Connector	Terminal	Connector	Terminal	
F24	48	F53	1	Existed
	49		2	

4. Also check harness for short to ground and to power.

Is inspection result normal?

YES >> GO TO 9.
NO >> Repair or replace error-detected parts.

9.CHECK HIGH PRESSURE FUEL PUMP

Check the high pressure fuel pump. Refer to EC-1215, "Component Inspection (High Pressure Fuel Pump)".

Is inspection result normal?

YES >> GO TO 10.
NO >> Replace high pressure fuel pump. Refer to EM-203, "Exploded View".

10.CHECK HIGH PRESSURE FUEL PUMP INSTALLATION CONDITION

1. Turn ignition switch OFF.
2. Check that the high pressure fuel pump is installed with no backlash and looseness.

Is the inspection result normal?

YES >> GO TO 11.
NO >> Repair or replace error-detected parts.

11.CHECK CAMSHAFT

1. Remove camshaft. Refer to EM-260, "Exploded View".
2. Check camshaft. Refer to EM-264, "Inspection".

Is inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace camshaft. Refer to EM-260, "Exploded View".

Component Inspection (High Pressure Fuel Pump)

INFOID:0000000012198745

1.CHECK HIGH PRESSURE FUEL PUMP-I

1. Turn ignition switch OFF.
2. Disconnect high pressure fuel pump harness connector.
3. Check the resistance between high pressure fuel pump terminals as follows.

High pressure fuel pump		Condition		Resistance
+	–			
Terminal				
1	2	Temperature °C (°F)	20 – 30 (68 - 86)	0.46 - 0.51 Ω

Is the inspection result normal?

YES >> GO TO 2.
NO >> Replace high pressure fuel pump. Refer to EM-203, "Exploded View".

2.CHECK HIGH PRESSURE FUEL PUMP-II

With CONSULT

1. Reconnect high pressure fuel pump harness connector.
2. Start the engine.
3. Check “FUEL PRES SEN” in “DATA MONITOR” of “ENGINE” using CONSULT.

Data monitor item	Condition	Voltage (Approx.)
FUEL PRES SEN V	Engine speed: idle	1,140 – 1,460 mV
	Engine speed: Revving engine from idle to 4,000 rpm quickly	1,300 – 2,900 mV

Without CONSULT

1. Start the engine.
2. Check fuel rail pressure sensor signal voltage.

+		–	Condition	Value (Approx.)
Fuel rail pressure sensor				
Connector	Terminal			
F7	2	Ground	Engine speed: idle	1.14 – 1.46 V
			Engine speed: Revving engine from idle to 4,000 rpm quickly	1.3 – 2.9 V

Is the inspection result normal?

YES >> INSPECTION END

NO >> Replace high pressure fuel pump. Refer to EM-203, "Exploded View".

Component Inspection (High Pressure Fuel Pump Relay)

INFOID:0000000012198746

1.CHECK HIGH PRESSURE FUEL PUMP RELAY

1. Turn ignition switch OFF.
2. Remove high pressure fuel pump relay.
3. Check the continuity between high pressure fuel pump relay terminals as per the following conditions.

+	–	Conditions	Continuity
High pressure fuel pump relay			
Terminal			
3	5	12 V direct current supply between terminals 1 and 2	Existed
		No current supply	Not existed

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace high pressure fuel pump relay.

HO2S2

Component Function Check

INFOID:0000000012198747

1.PERFORM COMPONENT FUNCTION CHECK-I

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F24	84	78	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F24	84	78	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F24	84	78	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1217, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198748

1.CHECK HO2S2 GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
3. Disconnect ECM harness connector.
4. Check the continuity between HO2S2 harness connector and ECM harness connector.

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F71	1	F24	78	Existed

5. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK HO2S2 INPUT SIGNAL CIRCUIT

1. Check the continuity between HO2S2 harness connector and ECM harness connector.

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F71	2	F24	84	Existed

2. Check the continuity between HO2S2 harness connector and ground, or ECM harness connector and ground.

+		–	Continuity
HO2S2			
Connector	Terminal		
F71	2	Ground	Not existed

+		–	Continuity
ECM			
Connector	Terminal		
F24	84	Ground	Not existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK HEATED OXYGEN SENSOR 2

Check the heated oxygen sensor 2. Refer to EC-1219, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 4.

4.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2.

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

Component Inspection

INFOID:0000000012198749

1.INSPECTION START

Do you have CONSULT?

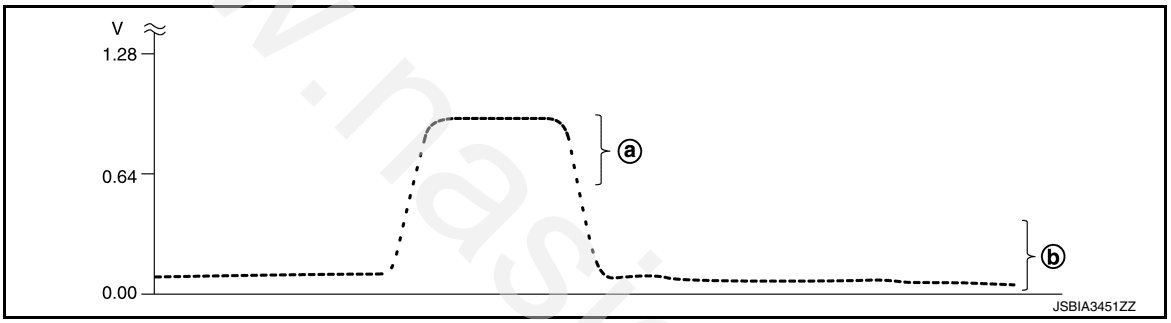
Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 3.

2.CHECK HEATED OXYGEN SENSOR 2

With CONSULT

1. Turn ignition switch ON and select “DATA MONITOR” mode of “ENGINE” using CONSULT.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Select “FUEL INJECTION” in “ACTIVE TEST” mode of “ENGINE” using CONSULT, and select “HO2S2 (B1)” as the monitor item with CONSULT.
7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ± 25%.



ⓐ : The voltage should be above 0.72 V at least on time.

ⓑ : The voltage should be below 0.28 V at least on time.

“HO2S2 (B1)” should be above 0.72 V at least once when the “FUEL INJECTION” is + 25%.
“HO2S2 (B1)” should be below 0.28 V at least once when the “FUEL INJECTION” is − 25%.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

3.CHECK HEATED OXYGEN SENSOR 2-I

Without CONSULT

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	−		
	Terminal			
F24	84	78	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.28 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 4.

4.CHECK HEATED OXYGEN SENSOR 2-II

Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F24	84	78	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.28 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 5.

5.CHECK HEATED OXYGEN SENSOR 2-III

Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F24	84	78	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.72 V at least once during this procedure. The voltage should be below 0.28 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 6.

6.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

HO2S2 HEATER

Component Function Check

INFOID:0000000012198750

1.PERFORM COMPONENT FUNCTION CHECK-I

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F71	84	78	Revving up to 4,000 rpm under no load at least 10 times	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.PERFORM COMPONENT FUNCTION CHECK-II

Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F71	84	78	Keeping engine speed at idle for 10 minutes	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 3.

3.PERFORM COMPONENT FUNCTION CHECK-III

Check the voltage between ECM harness connector and ground as per the following condition.

ECM			Condition	Voltage
Connector	+	–		
	Terminal			
F71	84	78	Coasting from 80 km/h (50 MPH) in D position (CVT), 4th gear position (M/T)	The voltage should be above 0.68 V at least once during this procedure.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1221, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198751

1.CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
3. Turn ignition switch ON.
4. Check the voltage between HO2S2 harness connector and ground.

+		–	Voltage
HO2S2			
Connector	Terminal		
F71	4	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 2.
NO >> Repair or replace error-detected parts.

2.CHECK HO2S2 OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between HO2S2 harness connector and ECM harness connector.

+		–		Continuity
HO2S2		ECM		
Connector	Terminal	Connector	Terminal	
F71	3	F24	117	Existed

4. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair or replace error-detected parts.

3.CHECK HEATED OXYGEN SENSOR 2 HEATER

Check the heated oxygen sensor 2 heater. Refer to EC-1222, "Component Inspection".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> GO TO 4.

4.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

Component Inspection

INFOID:0000000012198752

1.CHECK HEATED OXYGEN SENSOR 2 HEATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 (HO2S2) harness connector.
3. Check resistance between HO2S2 terminals as per the following.

+	–	Resistance
Heated oxygen sensor 2		
Terminal		
4	3	3.3 - 4.4 Ω [at 25°C (77°F)]

+	–	Resistance
Heated oxygen sensor 2		
Terminal		
1	2	∞ Ω (Continuity should not exist)
	3	
	4	
2	1	
	4	
	3	

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.REPLACE HEATED OXYGEN SENSOR 2

Replace heated oxygen sensor 2. Refer to EX-5, "Exploded View".

CAUTION:

- **Discard any sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner [commercial service tool (J-43897-18 or J43897-12)] and approved Anti-seize Lubricant (commercial service tool).**

>> INSPECTION END

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

Component Function Check

INFOID:0000000012198753

1.CHECK ORVR FUNCTION

Check whether the following symptoms are present.
- Fuel odor from EVAP canister is strong.
- Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

Is any symptom present?

YES >> Proceed to EC-1224, "Diagnosis Procedure".
NO >> INSPECTION END

Diagnosis Procedure

INFOID:0000000012198754

1.INSPECTION START

Check whether the following symptoms are present.
A: Fuel odor from EVAP canister is strong.
B: Cannot refuel/Fuel odor from the fuel filler opening is strong while refueling.

Which symptom is present?

A >> GO TO 2.
B >> GO TO 8.

2.CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
   The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

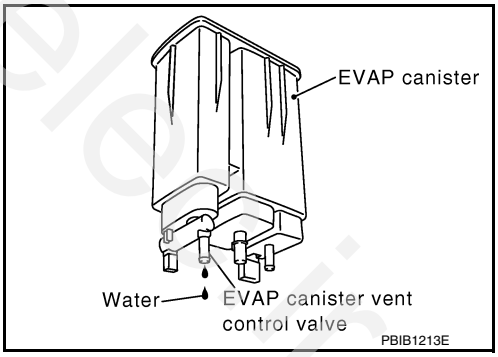
YES >> GO TO 3.
NO >> GO TO 4.

3.CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 4.
NO >> GO TO 7.



4.REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 5.

5.CHECK DRAIN FILTER

Refer to EC-1228, "Component Inspection (Drain filter)".

Is the inspection result normal?

OK >> GO TO 6.
NO >> Replace drain filter.

6.DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

7. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-1226, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace refueling EVAP vapor cut valve with fuel tank.

8. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
   The weight should be less than 1.9 kg (4.2 lb).

Is the inspection result normal?

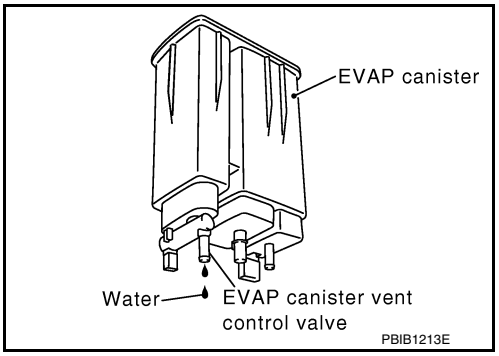
YES >> GO TO 9.
NO >> GO TO 10.

9. CHECK IF EVAP CANISTER IS SATURATED WITH WATER

Check if water will drain from EVAP canister.

Does water drain from the EVAP canister?

YES >> GO TO 10.
NO >> GO TO 13.



10. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 11.

11. CHECK DRAIN FILTER

Refer to EC-1228, "Component Inspection (Drain filter)".

Is the inspection result normal?

OK >> GO TO 12.
NO >> Replace drain filter.

12. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

13. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.

Is the inspection result normal?

YES >> GO TO 14.
NO >> Repair or replace hoses and tubes.

14. CHECK RECIRCULATION LINE

Check recirculation line for clogging, dents and cracks.

Is the inspection result normal?

YES >> GO TO 15.
NO >> Replace fuel filler tube.

15. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-1226, "Component Inspection (Refueling EVAP vapor cut valve)".

Is the inspection result normal?

YES >> GO TO 16.
NO >> Replace refueling EVAP vapor cut valve with fuel tank.

16. CHECK FUEL FILLER TUBE

Check fuel filler tube and hose connected to the fuel tank for clogging, dents and cracks.

Is the inspection result normal?

YES >> GO TO 17.
NO >> Replace fuel filler tube.

17. CHECK ONE-WAY FUEL VALVE-I

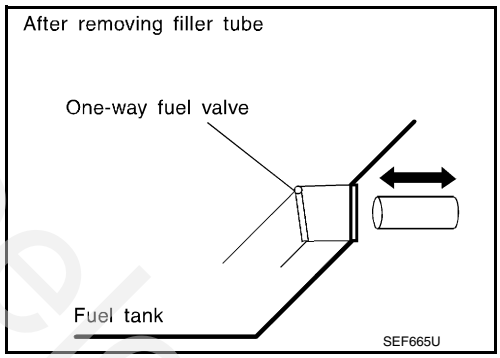
Check one-way valve for clogging.

Is the inspection result normal?

YES >> GO TO 18.
NO >> Repair or replace one-way fuel valve with fuel tank.

18. CHECK ONE-WAY FUEL VALVE-II

1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as per the following.
   When a stick is inserted, the valve should open, when removing stick it should close.
   Do not drop any material into the tank.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.

Component Inspection (Refueling EVAP vapor cut valve)

INFOID:0000000012198755

1. INSPECTION START

Do you have CONSULT?

Do you have CONSULT?

YES >> GO TO 2.
NO >> GO TO 3.

2. CHECK REFUELING EVAP VAPOR CUT VALVE

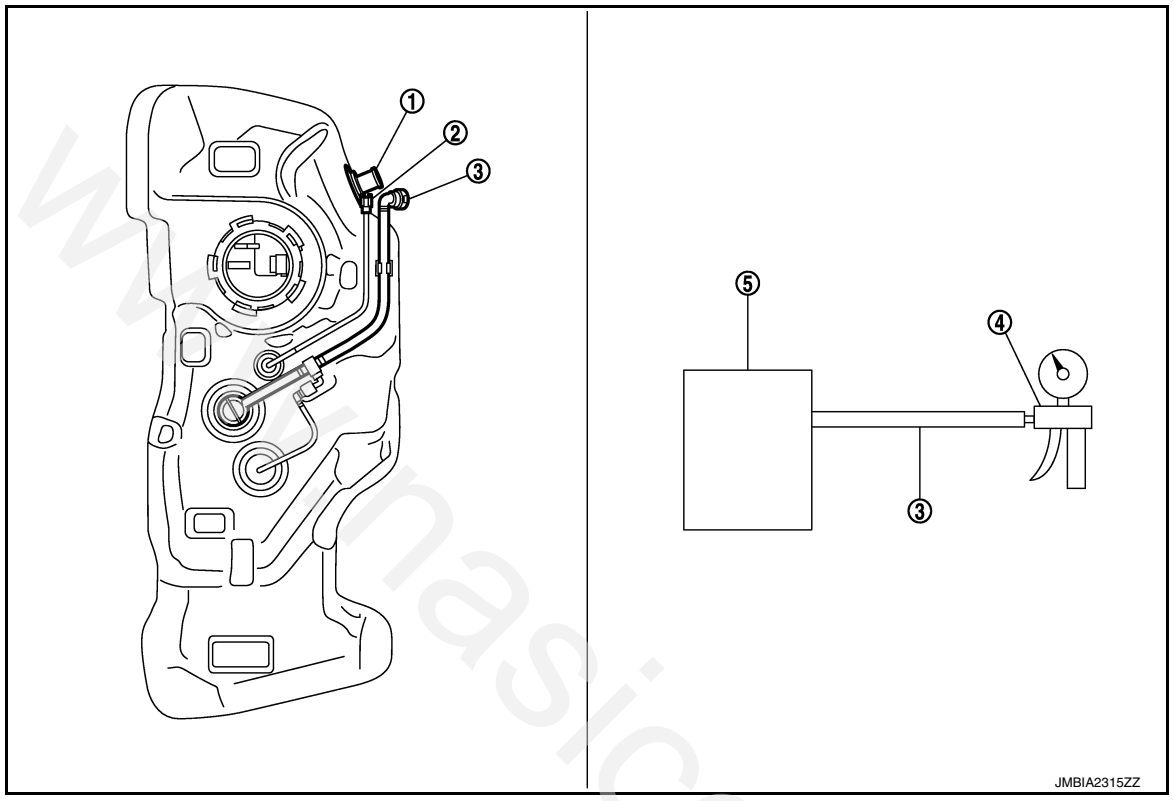
With CONSULT

1. Remove fuel tank. Refer to FL-18, "2WD : Removal and Installation".
2. Drain fuel from the tank as per the following:
- Remove fuel feed hose located on the fuel gauge retainer.
- Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
- Drain fuel using “FUEL PUMP RELAY” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
3. Check refueling EVAP vapor cut valve for being stuck to close as per the following.
   Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
4. Check refueling EVAP vapor cut valve for being stuck to open as per the following.

- Connect vacuum pump to hose end.
- Remove fuel gauge retainer with fuel gauge unit.

Always replace O-ring with new one.

- Put fuel tank upside down.
- Apply vacuum pressure to hose end [−13.3 kPa (−0.136 kg/cm^3, −1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.



1. Filler tube
2. Recirculation line
3. EVAP/ORVR line
4. Vacuum/pressure handy pump
5. Fuel tank

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace refueling EVAP vapor cut valve with fuel tank. Refer to FL-27, "2WD : Exploded View".

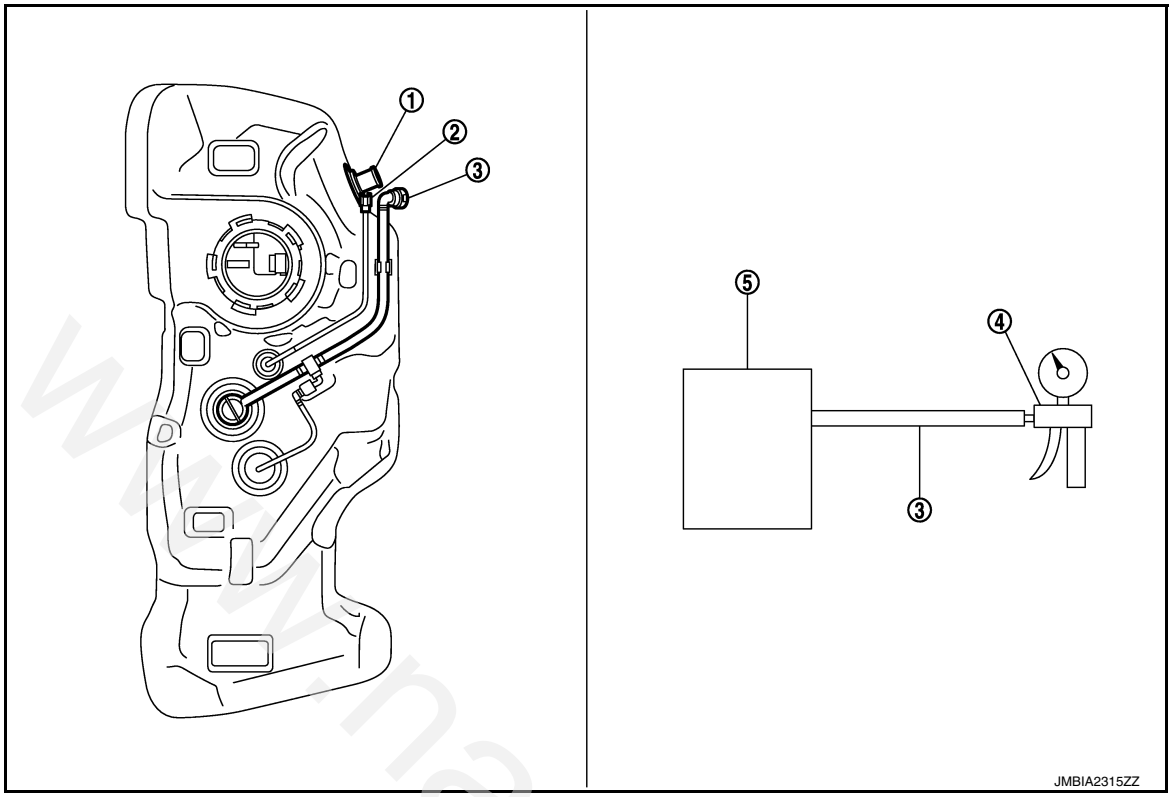
3. CHECK REFUELING EVAP VAPOR CUT VALVE

Without CONSULT

1. Remove fuel tank. Refer to FL-18, "2WD : Exploded View".
2. Drain fuel from the tank as per the following:
- Remove fuel gauge retainer.
- Drain fuel from the tank using a handy pump into a fuel container.
3. Check refueling EVAP vapor cut valve for being stuck to close as per the following.
Blow air into the refueling EVAP vapor cut valve (from the end of EVAP/ORVR line hose), and check that the air flows freely into the tank.
4. Check refueling EVAP vapor cut valve for being stuck to open as per the following.
- Connect vacuum pump to hose end.
- Remove fuel gauge retainer with fuel gauge unit.

Always replace O-ring with new one.

- Put fuel tank upside down.
- Apply vacuum pressure to hose end [−13.3 kPa (−0.136 kg/cm^3, −1.93 psi)] with fuel gauge retainer remaining open and check that the pressure is applicable.



1. Filler tube
2. Recirculation line
3. EVAP/ORVR line
4. Vacuum/pressure handy pump
5. Fuel tank

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace refueling EVAP vapor cut valve with fuel tank .Refer to FL-27, "2WD : Exploded View".

Component Inspection (Drain filter)

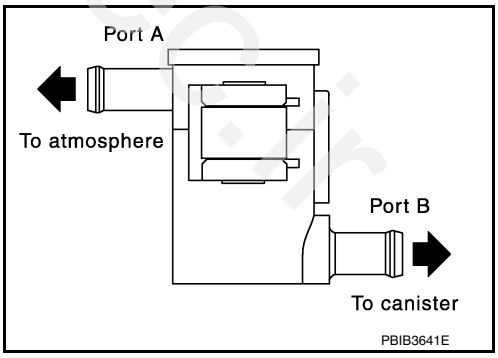
INFOID:0000000012198756

1.CHECK DRAIN FILTER

1. Check visually for insect nests in the drain filter air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Blow air into port A and check that it flows freely out of port B.
5. Block port B.
6. Blow air into port A and check that there is no leakage.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace drain filter.



IGNITION SIGNAL

Component Function Check

INFOID:0000000012198757

1.INSPECTION START

Turn ignition switch OFF, and restart engine.

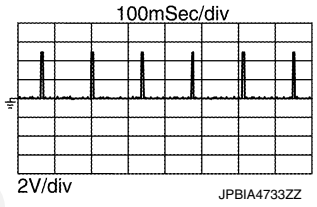
Does the engine start?

YES >> GO TO 2.
NO >> Proceed to EC-1229, "Diagnosis Procedure".

2.IGNITION SIGNAL FUNCTION

With CONSULT
1. Perform “POWER BALANCE” in “ACTIVE TEST” mode of “ENGINE” using CONSULT.
2. Check that each circuit produces a momentary engine speed drop.

Without CONSULT
1. Let engine idle.
2. Check the voltage signal between ECM harness connector and ground with an oscilloscope.

ECM				Voltage signal
+		–		
Connector	Terminal	Connector	Terminal	
F24	96	E19	152	
	95			
	104			
	101			

NOTE:
The pulse cycle changes depending on rpm at idle.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1229, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198758

1.CHECK CONDENSER POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Turn ignition switch ON.
4. Check the voltage between condenser harness connector and ground.

+		–	Voltage
Condenser			
Connector	Terminal		
F13	1	Ground	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK CONDENSER POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between IPDM E/R harness connector and condenser harness connector.

+		–		Continuity
IPDM E/R		Condenser		
Connector	Terminal	Connector	Terminal	
E15	61	F13	1	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK CONDENSER GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between Condenser harness connector and ground.

+		–	Continuity
Condenser			
Connector	Terminal		
F13	2	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK CONDENSER

Check the condenser. refer to EC-1232, "Component Inspection (Condenser)".

Is the inspection result normal?

YES >> GO TO 5.
NO >> Replace condenser.

5.CHECK IGNITION COIL POWER SUPPLY

1. Reconnect all harness connectors disconnected.
2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ignition coil harness connector and ground.

+			–	Voltage
Ignition coil				
Cylinder	Connector	Terminal		
1	F33	3	Ground	Battery voltage
2	F34	3		
3	F35	3		
4	F36	3		

Is the inspection result normal?

YES >> GO TO 6.
NO >> Perform the trouble diagnosis for power supply circuit.

6.CHECK IGNITION COIL GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between ignition coil harness connector and ground.

+			–	Continuity
Ignition coil				
Cylinder	Connector	Terminal		
1	F33	2	Ground	Existed
2	F34	2		
3	F35	2		
4	F36	2		

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 7.
NO >> Repair or replace error-detected parts.

7. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check the continuity between ECM harness connector and ignition coil harness connector.

+			–		Continuity
Ignition coil			ECM		
Cylinder	Connector	Terminal	Connector	Terminal	
1	F33	1	F24	96	Existed
2	F34	1		95	
3	F35	1		104	
4	F36	1		101	

3. Also check harness for short to ground and short to power.

Is the inspection result normal?

YES >> GO TO 8.
NO >> Repair or replace error-detected parts.

8. CHECK IGNITION COIL WITH POWER TRANSISTOR

Check the ignition coil with power transistor. Refer to EC-1231, "Component Inspection (Ignition Coil with Power Transistor)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-214, "Exploded View".

Component Inspection (Ignition Coil with Power Transistor)

INFOID:0000000012198759

1. CHECK IGNITION COIL WITH POWER TRANSISTOR-I

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as per the following.

Ignition coil with power transistor		Resistance [Ω at 25°C (77°F)]
+	–	
Terminal		
1	2	Except 0 or ∞
	3	Except 0
2	3	

Is the inspection result normal?

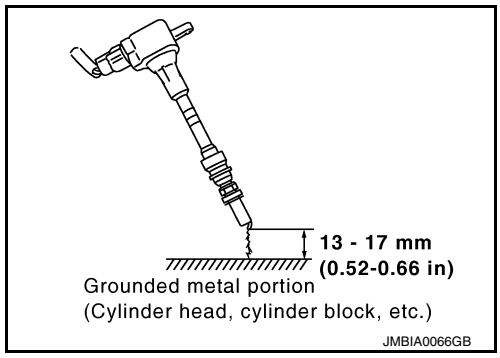
YES >> GO TO 2.

NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-214, "Exploded View".

2.CHECK IGNITION COIL WITH POWER TRANSISTOR-II

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Remove fuel pump fuse in IPDM E/R to release fuel pressure.
   NOTE:
   Do not use CONSULT to release fuel pressure, or fuel pressure applies again during the following procedure.
4. Start engine.
5. After engine stalls, crank it two or three times to release all fuel pressure.
6. Turn ignition switch OFF.
7. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils. Refer to EM-214, "Exploded View".
8. Remove ignition coil and spark plug of the cylinder to be checked. Refer to EM-214, "Exploded View".
9. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
10. Connect spark plug and harness connector to ignition coil.
11. Fix ignition coil using a rope etc. with gap of 13 - 17 mm (0.52 - 0.66 in) between the edge of the spark plug and grounded metal portion as shown in the figure.
12. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **During the operation, always stay 0.5 cm (19.7 in) away from the spark plug and the ignition coil. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20 kV or more.**
- **It might cause to damage the ignition coil if the gap of more than 17 mm (0.66 in) is taken.**

NOTE:
When the gap is less than 13 mm (0.52 in), the spark might be generated even if the coil is malfunctioning.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace malfunctioning ignition coil with power transistor. Refer to EM-214, "Exploded View".

Component Inspection (Condenser)

INFOID:0000000012198760

1.CHECK CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check resistance between condenser terminals as per the following.

Condenser		Resistance
+	–	
Terminal		
1	2	Above 1 MΩ [at 25°C (77°F)]

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace Condenser.

INFORMATION DISPLAY (ASCD)

Component Function Check

INFOID:0000000012198761

1.CHECK INFORMATION DISPLAY

1. Start engine.
2. Press ASCD MAIN switch on ASCD steering switch.
3. Drive the vehicle at more than 40 km/h (25 MPH).
   CAUTION:
   Always drive vehicle at a safe speed.
4. Press COAST/SET switch.
5. Check that the reading of the speedometer shows the same value as the set speed indicated in the information display while driving the vehicle on a flat road.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1233, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198762

1.CHECK DTC

Check that DTC UXXXX, P0500 or P1574 is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO-1 >> Perform trouble diagnosis for DTC UXXXX.
NO-2 >> Perform trouble diagnosis for DTC P0500. Refer to EC-1027, "EXCEPT FOR M/T MODELS : DTC Logic".
NO-3 >> Perform trouble diagnosis for DTC P1574. Refer to EC-1113, "DTC Logic".

2.CHECK DTC WITH COMBINATION METER

Refer to MWI-22, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis for DTC indicated.

3.CHECK INTERMITTENT INCIDENT

Perform GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-64, "Removal and Installation".
NO >> Repair or replace error-detected parts.

LOW PRESSURE FUEL PUMP

Component Function Check

INFOID:0000000012198763

1.CHECK FUEL PUMP FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.

NOTE:
Fuel pressure pulsation should be felt on the fuel feed hose for 1 second after ignition switch is turned ON.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1234, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198764

1.CHECK FUEL PUMP RELAY POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Turn ignition switch ON.
4. Check the voltage between ECM harness connector terminals.

ECM				Voltage
Connector	+	Connector	-	
	Terminal		Terminal	
F24	82	E19	152	Battery voltage

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between ECM harness connector and IPDM E/R harness connector.

+		–		Continuity
ECM		IPDM E/R		
Connector	Terminal	Connector	Terminal	
F24	82	E13	31	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK LOW FUEL PUMP POWER SUPPLY

1. Turn ignition switch OFF.
2. Reconnect ECM harness connector.
3. Disconnect fuel level sensor unit harness connector.
4. Turn ignition switch ON.
5. Check the voltage between fuel level sensor unit harness connector and ground.

+		-	Voltage
Fuel level sensor unit			
Connector	Terminal		
B46	1	Ground	Battery voltage should for exist 1 second after ignition switch is turn ON.

Is the inspection result normal?

YES >> GO TO 5.
NO >> GO TO 4.

4.CHECK LOW FUEL PUMP POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect IPDM E/R harness connector.
3. Check the continuity between fuel level sensor unit harness connector and IPDM E/R harness connector.

+		–		Continuity
Fuel level sensor unit		IPDM E/R		
Connector	Terminal	Connector	Terminal	
B46	1	E15	54	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

5.CHECK LOW FUEL PUMP GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Check the continuity between fuel level sensor unit harness connector and ground.

+		-	Continuity
Fuel level sensor unit			
Connector	Terminal		
B46	3	Ground	Existed

3. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 6.
NO >> Repair or replace error-detected parts.

6.CHECK LOW FUEL PUMP

Check the low fuel pump. Refer to EC-1235, "Component Inspection (Low Pressure Fuel Pump)".

Is the inspection result normal?

YES >> Check intermittent incident. Refer to GI-45, "Intermittent Incident".
NO >> Replace fuel level sensor unit. Refer to FL-6, "2WD : Exploded View" (2WD) or FL-10, "AWD : Exploded View" (AWD).

Component Inspection (Low Pressure Fuel Pump)

INFOID:0000000012198765

1.CHECK FUEL PRESSURE REGULATOR

1. Turn ignition switch OFF.
2. Check low fuel pressure. Refer to EC-771, "Work Procedure".

Is inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK LOW PRESSURE FUEL PUMP

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit.
3. Check resistance between fuel level sensor unit terminals as follows.

Fuel level sensor unit		Condition	Resistance
+	–		
Terminals			
1	3	Temperature: 25°C (77°F)	0.2 - 5.0 Ω

Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace fuel level sensor unit. Refer to FL-6, "2WD : Exploded View" (2WD) or FL-10, "AWD : Exploded View" (AWD).

MALFUNCTION INDICATOR LAMP

Component Function Check

INFOID:0000000012198766

1.CHECK MIL FUNCTION

1. Turn ignition switch ON.
2. Check that MIL lights up.

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1237, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198767

1.CHECK DTC

Check that DTC UXXXX is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis for DTC UXXXX.

2.CHECK DTC WITH METER

Refer to MWI-22, "CONSULT Function".

Is the inspection result normal?

YES >> GO TO 3.
NO >> Perform trouble diagnosis for DTC indicated.

3.CHECK INTERMITTENT INCIDENT

Refer to GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace combination meter. Refer to MWI-64, "Removal and Installation".
NO >> Repair or replace error-detected parts.

REFRIGERANT PRESSURE SENSOR

Component Function Check

INFOID:0000000012198768

1.CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower fan switch ON.
3. Check the voltage between ECM harness connector and ground.

ECM			Voltage
Connector	+	–	
	Terminal		
F23	12	13	1.0 - 4.0V

Is the inspection result normal?

YES >> INSPECTION END
NO >> Proceed to EC-1238, "Diagnosis Procedure".

Diagnosis Procedure

INFOID:0000000012198769

1.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY

1. Turn ignition OFF.
2. Disconnect refrigerant pressure sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between refrigerant pressure sensor harness connector and ground.

+		–	Voltage (Approx.)
Refrigerant pressure sensor			
Connector	Terminal		
E49	3	Ground	5 V

Is the inspection result normal?

YES >> GO TO 3.
NO >> GO TO 2.

2.CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

+		–		Continuity
Refrigerant pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
E49	3	F23	29	Existed

4. Also check harness for short to ground.

Is the inspection result normal?

YES >> Perform the trouble diagnosis for power supply circuit.
NO >> Repair or replace error-detected parts.

3.CHECK REFRIGERANT PRESSURE SENSOR GROUND

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between refrigerant pressure sensor harness connector and ECM harness connector.

+		–		Continuity
Refrigerant pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
E49	1	F23	13	Existed

4. Also check harness for short to power.

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair or replace error-detected parts.

4.CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT

1. Check the continuity between ECM harness connector and refrigerant pressure sensor harness connector.

+		–		Continuity
Refrigerant pressure sensor		ECM		
Connector	Terminal	Connector	Terminal	
E49	2	F23	12	Existed

2. Also check harness for short to ground and to power.

Is the inspection result normal?

YES >> GO TO 5.
NO >> Repair or replace error-detected parts.

5.CHECK INTERMITTENT INCIDENT.

Perform GI-45, "Intermittent Incident".

Is the inspection result normal?

YES >> Replace refrigerant pressure sensor. Refer to HA-36, "Exploded View".
NO >> Repair or replace error-detected parts.

SENSOR POWER SUPPLY 2 CIRCUIT

Description

INFOID:0000000012198770

ECM supplies a voltage of 5 V to some of the sensors systematically divided into 2 groups, respectively. Accordingly, when a short circuit develops in a sensor power source, a malfunction may occur simultaneously in the sensors belonging to the same group as the short-circuited sensor.

Sensor power supply 1

- Crankshaft position sensor
- Battery current sensor
- EGR pressure sensor
- Intake manifold runner control valve position sensor
- Manifold absolute pressure sensor
- EGR volume control valve
- Electric wastegate position sensor
- Multi-way control valve position sensor
- Exhaust valve timing control position sensor
- Throttle position sensor
- Accelerator pedal position sensor 1

NOTE:
If sensor power supply 1 circuit is malfunctioning, DTC P0643 is displayed.

Sensor power supply 2

- Mass air flow sensor
- G sensor
- Refrigerant pressure sensor
- Fuel rail pressure sensor
- Engine oil pressure sensor
- Turbocharger boost sensor
- Camshaft position sensor
- Accelerator pedal position sensor 2

Diagnosis Procedure

INFOID:0000000012198771

1.CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-1

1. Turn ignition switch OFF.
2. Disconnect accelerator pedal position (APP) sensor harness connector.
3. Turn ignition switch ON.
4. Check the voltage between APP sensor harness connector and ground.

+		−	Voltage (Approx.)
APP sensor			
Connector	Terminal		
E101	5	Ground	5 V

Is the inspection result normal?

YES >> INSPECTION END
NO >> GO TO 2.

2.CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT-2

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check the continuity between APP sensor harness connector and ECM harness connector.

+		–		Continuity
APP sensor		ECM		
Connector	Terminal	Connector	Terminal	
E101	5	E19	142	Existed

Is the inspection result normal?

YES >> GO TO 3.
NO >> Repair open circuit.

3.CHECK SENSOR POWER SUPPLY 2 CIRCUIT

1. Disconnect following sensors harness connector.
2. Check harness for short to power and short to ground, between the following terminals.

ECM		Sensor		
Connector	Terminal	Name	Connector	Terminal
E19	142	APP sensor 2	E101	5
F23	26	Mass air flow sensor	F8	1
	29	G sensor	B32	3
		Refrigerant pressure sensor	E49	3
		EOP sensor	F43	3
		Turbocharger boost sensor	F75	2
		FRP sensor	F7	1
F24	66	CMP sensor	F109	1

Is the inspection result normal?

YES >> GO TO 4.
NO >> Repair short to ground or short to power in harness or connectors.

4.CHECK COMPONENTS

Check the following.
- APP sensor 2 (Refer to EC-1146, "Component Inspection".)
- FRP sensor (Refer to EC-921, "Component Inspection".)
- EOP sensor (Refer to EC-1040, "Component Inspection".)
- Turbocharger boost sensor (Refer to EC-939, "Component Inspection".)
- Camshaft position sensor (PHASE) (Refer to EC-954, "Component Inspection".)
- Mass air flow sensor (Refer to EC-845, "Component Inspection".)
- Refrigerant pressure sensor (Refer to EC-1238, "Diagnosis Procedure".)
- G sensor (Refer to EC-1122, "Component Inspection".)

Is the inspection result normal?

YES >> Perform GI-45, "Intermittent Incident".
NO >> Replace malfunctioning component.EC-921, "Component Inspection"

SYMPTOM DIAGNOSIS

ENGINE CONTROL SYSTEM

Symptom Table

INFOID:0000000012198772

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Low pressure fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-1234
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-771
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-1204
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-1252
	FRP sensor circuit	1	1	2	2	2		2	2			2			EC-919
	High pressure fuel pump circuit			4		3									EC-1212
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-1255
	Incorrect idle speed adjustment						1	1	1	1		1			EC-1250
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-1138, EC-1143
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-1251
	Ignition circuit	1	1	2	2	2		2	2			2			EC-1229
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-792
Mass air flow sensor circuit		1	1	2	2	2		2	2			2			EC-843
Engine coolant temperature sensor circuit							3			3					EC-860
Air fuel ratio (A/F) sensor 1 circuit					3										EC-871, EC-875, EC-878, EC-900
Throttle position sensor circuit							2			2					EC-864, EC-929, EC-1084, EC-1085
Accelerator pedal position sensor circuit				3	2	1									EC-1145, EC-1148, EC-1153

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Heated oxygen sensor 2 circuit			6		6		6	6			5			EC-881, EC-887, EC-894
Knock sensor circuit			2								3			EC-947
Engine oil temperature sensor circuit			4		2						3			EC-926
Engine oil pressure sensor circuit			4		4	3	3	3			3			EC-1038
Crankshaft position sensor (POS) circuit	2	2												EC-949
Camshaft position sensor (PHASE) circuit	3	2												EC-952
Turbocharger boost sensor circuit			3		3									EC-938
Manifold absolute pressure sensor circuit					2									EC-851
Vehicle speed signal circuit		2	3		3						3			EC-1027, EC-1031
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-1050, EC-1052, EC-1054, EC-1057, EC-1058
Intake valve timing control solenoid valve circuit	2	2	2		2		2	2						EC-799, EC-813
Intake intermediate valve timing control solenoid valve circuit	2	2	2		2		2	2						EC-799, EC-813
Exhaust valve timing control solenoid valve circuit	2	2	2		2		2	2						EC-802, EC-816
Exhaust valve timing control position sensor circuit	2	2			3									EC-955
EGR pressure sensor											5			EC-1025
Intake manifold runner control valve motor circuit	5	4	4	2	4		4	4			4			EC-1126
Intake manifold runner control valve position sensor circuit														EC-1129
Turbocharger bypass control valve circuit			3		3									EC-932
Electric wastegate valve circuit					1									EC-1168
Electric recirculation valve circuit					1									EC-836
PNP signal circuit			3		3		3	3			3			EC-1065
Refrigerant pressure sensor circuit		2				3			3		4			EC-1238
Cooling fan control module circuit	5	5	5	5	5		5	5	5	4	5			EC-1196

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Atmospheric pressure sensor circuit											3			EC-851
Battery current sensor circuit						4	5	5					3	EC-1091, EC-1094, EC-1097, EC-1100
Electrical load signal circuit							3							EC-1199
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	HAC-45
ABS actuator and electric unit (control unit)			4											BRC-59

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FL-18, FL-23
	Fuel piping			5	5	5		5	5			5			EM-213
	Vapor lock														—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Air	Air duct														EM-192
	Air cleaner														EM-192
	Air leakage from air duct (Mass air flow sensor — electric throttle control actuator)		5	5		5		5	5			5			
	Electric throttle control actuator	5			5		5			5					EM-197
	Air leakage from intake manifold/ Collector/Gasket														
Cranking	Battery	1	1	1		1		1	1					1	PG-105
	Generator circuit														CHG-8
	Starter circuit	3										1			STR-6
	Signal plate	6													EM-287
	PNP signal	4													TM-24, TM-326
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-273
	Cylinder head gasket										4		3		
	Cylinder block														
	Piston												4		
	Piston ring	6	6	6	6	6		6	6			6			EM-287
	Connecting rod														
	Bearing														
	Crankshaft														
Valve mechanism	Timing chain														EM-249
	Camshaft														EM-261
	Intake valve timing control	5	5	5	5	5		5	5			5			EM-249
	Exhaust valve timing control														EM-249
	Intake valve												3		EM-261
	Exhaust valve														

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EX-10, EM-243
	Three way catalyst														EM-232, EM-235, EX-10
	EGR valve		5		5	5			5		5	5			EC-961, EC-993
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery/Oil cooler	5	5	5	5	5		5	5			5			EM-200, EM-282, LU-32,
	Oil level (Low)/Filthy oil														LU-28
	Variable displacement oil pump	5	5		4							4			EC-1041
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		4	5			CO-46
	Thermostat									5					CO-57
	Water pump														CO-52
	Water gallery														CO-54
	Cooling fan														CO-50
	Coolant level (Low)/Contaminated coolant									5					CO-40
	Multi-way control valve	5	5	5	5	5		5	5	5	4	4			EC-1179, EC-1181, EC-1184
NATS (Nissan Anti-theft System)		1	1												SEC-16

1 - 6: The numbers refer to the order of inspection.

ASCD MAIN SWITCH DOES NOT TURN ON/OFF

Diagnosis Procedure

INFOID:0000000012198773

1.CHECK DTC WITH ECM

Check that DTC is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis relevant to DTC indicated.

2.CHECK ASCD MAIN SWITCH

Refer to EC-1233, "Component Function Check".

Is the inspection result normal?

YES >> Perform GI-45, "Intermittent Incident".
NO >> Repair or replace malfunctioning part.

ASCD TEMPORARY RELEASE CANNOT BE PERFORMED BY THE CLUTCH PEDAL

Diagnosis Procedure

INFOID:0000000012198774

1.CHECK DTC WITH ECM

Check that DTC is not displayed.

Is the inspection result normal?

YES >> GO TO 2.
NO >> Perform trouble diagnosis relevant to DTC indicated.

2.CHECK CLUTCH PEDAL POSITION SWITCH

Refer to EC-1194, "Component Function Check".

Is the inspection result normal?

YES >> Perform GI-45, "Intermittent Incident".
NO >> Repair or replace malfunctioning part.

NORMAL OPERATING CONDITION

Description

INFOID:0000000012198775

FUEL CUT CONTROL (AT NO LOAD AND HIGH ENGINE SPEED)

If the engine speed is above 1,800 rpm under no load (for example, the selector lever position is neutral and engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.

Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

NOTE:

This function is different from deceleration control listed under direct injection gasoline system, EC-630, "DIRECT INJECTION GASOLINE SYSTEM : System Description".

PERIODIC MAINTENANCE

IDLE SPEED

Inspection

INFOID:0000000012198776

1.CHECK IDLE SPEED

With CONSULT
Check idle speed in “DATA MONITOR” mode with CONSULT.

>> INSPECTION END

IGNITION TIMING

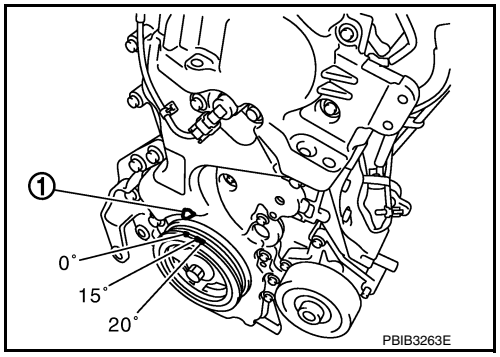
Inspection

INFOID:0000000012198777

1.CHECK IGNITION TIMING

1. Attach timing light to the ignition coil No.1 harness.
2. Check ignition timing.

1 : Timing indicator



>> INSPECTION END

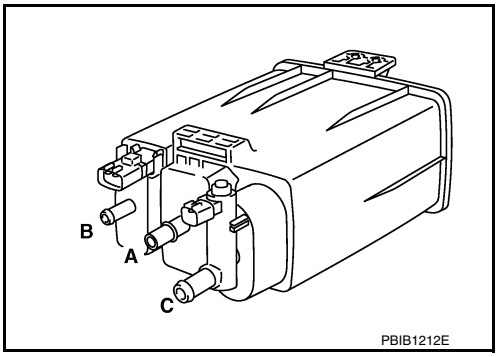
EVAPORATIVE EMISSION SYSTEM

Inspection

INFOID:0000000012198778

1.CHECK EVAP CANISTER

1. Block port (B).
2. Blow air into port (A) and check that it flows freely out of port (C).
3. Release blocked port (B).
4. Apply vacuum pressure to port (B) and check that vacuum pressure exists at the ports (A) and (C).
5. Block port (A) and (B).
6. Apply pressure to port (C) and check that there is no leakage.



>> INSPECTION END

EVAP LEAK CHECK

Inspection

INFOID:0000000012198779

CAUTION:

- **Do not use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2, 0.6 psi) of pressure in EVAP system.**

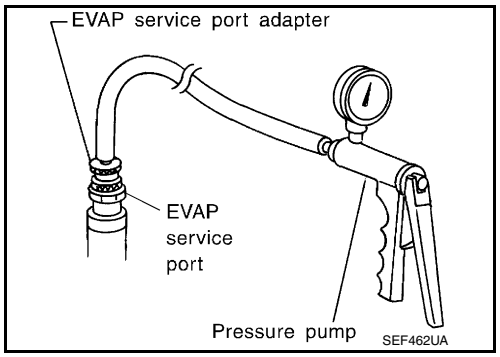
NOTE:

- Do not start engine.
- Improper installation of EVAP service port adapter [commercial service tool: (J-41413-OBD)] to the EVAP service port may cause a leak.

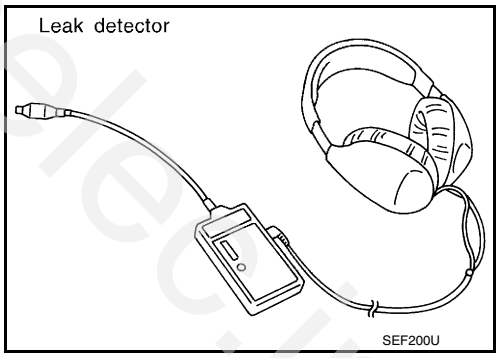
1. EVAP LEAK CHECK

With CONSULT

1. Install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.

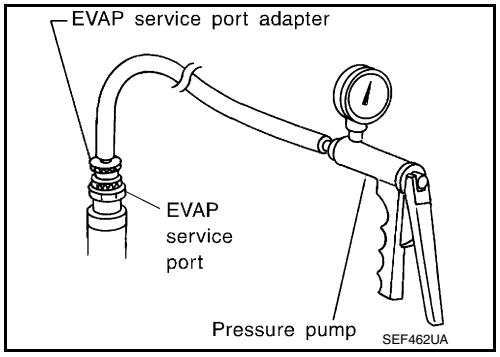


2. Turn ignition switch ON.
3. Select the “EVAP SYSTEM CLOSE” in “WORK SUPPORT” mode of “ENGINE” using CONSULT.
4. Touch “START”. A bar graph (Pressure indicating display) will appear on the screen.
5. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
6. Remove EVAP service port adapter [commercial service tool: (J-41413-OBD)] and hose with pressure pump.
7. Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to EC-650, "EVAPORATIVE EMISSION SYSTEM : System Description".

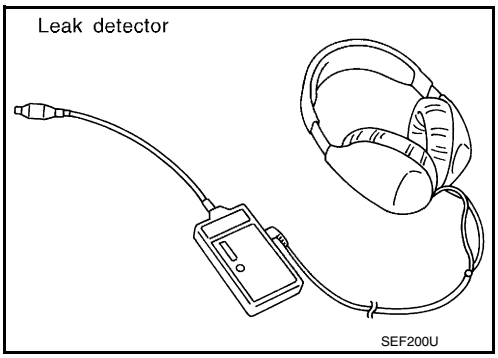


Without CONSULT

1. Install EVAP service port adapter [commercial service tool: (J-41413-OBD)] and pressure pump to EVAP service port.



2. Apply battery voltage between the terminals of EVAP canister vent control valve to make a closed EVAP system.
3. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2, 0.2 to 0.4 psi).
4. Remove EVAP service port adapter [commercial service tool: (J-41413-OBD)] and hose with pressure pump.
5. Locate the leak using a leak detector [commercial service tool: (J-41416)]. Refer to EC-650, "EVAPORATIVE EMISSION SYSTEM : System Description".



>> INSPECTION END

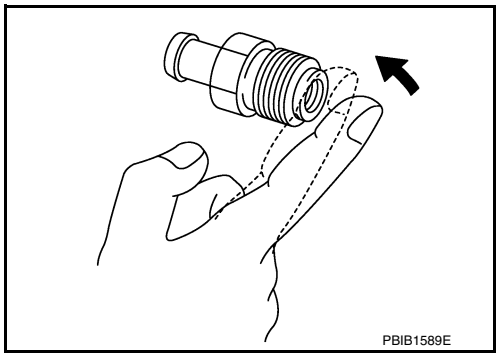
POSITIVE CRANKCASE VENTILATION

Inspection

INFOID:0000000012198780

1.CHECK PCV VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.



Is the inspection result normal?

YES >> INSPECTION END
NO >> Replace PCV valve.

REMOVAL AND INSTALLATION

ECM

Removal and Installation

INFOID:0000000012198781

CAUTION:
Perform ADDITIONAL SERVICE WHEN REPLACING ECM. Refer to EC-749, "Work Procedure".

REMOVAL

1. Remove fusible link bracket. Keep a service area.
2. Disconnect ECM harness connectors. Refer to PG-6, "Harness Connector".
3. Remove ECM mounting nuts, and then remove ECM.

INSTALLATION

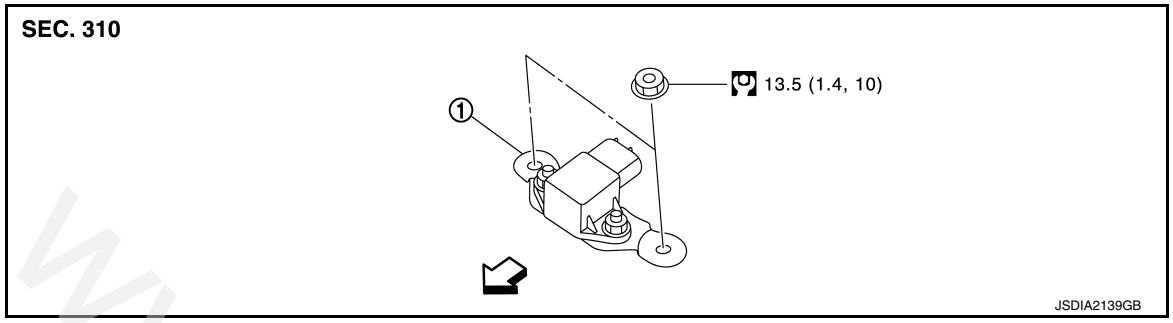
Install in the reverse order of removal.

G SENSOR

Exploded View

INFOID:0000000012198782

SEC. 310



1. G sensor

⇦ : Vehicle front

: N·m (kg-m, ft-lb)

Removal and Installation

INFOID:0000000012198783

CAUTION:

- **Never drop or strike G sensor, because it has little tolerance for impact.**
- **Never use a power tool to avoid impact.**

REMOVAL

1. Disconnect the battery cable from the negative terminal. Refer to PG-106, "Removal and Installation".
2. Remove driver seat (LHD) or passenger seat (RHD). Refer to SE-21, "Removal and Installation".
3. Remove center pillar lower garnish (left side) and dash side finisher (left side). Refer to INT-22, "CENTER PILLAR LOWER GARNISH : Removal and Installation" (center pillar lower garnish) and INT-21, "DASH SIDE FINISHER : Removal and Installation" (dash side finisher).
4. Pull up floor carpet. Refer to INT-24, "Removal and Installation".
5. Disconnect G sensor harness connector.
6. Remove G sensor.

INSTALLATION

Installation is the reverse order of removal.

Adjustment

INFOID:0000000012198784

ADJUSTMENT AFTER INSTALLATION

Perform “CALIBRATION OF G SENSOR”. Refer to EC-763, "Description".

SERVICE DATA AND SPECIFICATIONS (SDS)

SERVICE DATA AND SPECIFICATIONS (SDS)

Idle Speed

INFOID:0000000012198785

Transmission	Condition	Specification
CVT	No load* (in P or N position)	650 ± 50 rpm
M/T	No load* (in Neutral position)	600 ± 50 rpm

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Ignition Timing

INFOID:0000000012198786

Transmission	Condition	Specification
CVT	No load* (in P or N position)	5 ± 2° BTDC
M/T	No load* (in Neutral position)	5 ± 2° BTDC

*: Under the following conditions

- A/C switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

INFOID:0000000012198787

Condition		Specification (Using CONSULT)
At idle	CVT (in N position)	Approx. 21 %
	M/T (in Neutral position)	Approx. 17%
At 2,500 rpm		Approx. 15 %

Mass Air Flow Sensor

INFOID:0000000012198788

Condition	Specification (Using CONSULT)
At idle*	Approx. 1.6 g/sec
At 2,500 rpm*	Approx. 5.0 g/sec

*: Engine is warmed up to normal operating temperature and running under no load.